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Outdoor Recreation Management



PRICING PUBLIC-SECTOR RECREATION: A FUNCTIONALIST PERSPECTIVE

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Abstract: In the late 20th century, the American recreation estate, from core city parks to remote wilderness areas, is increasingly managed on a pay-as-you-go basis. However, while the current economy looks magnificent in toto, the distribution of wealth has changed dramatically over the past 30 years. Consequently, many Americans have reduced ability to pay, raising questions about equity in public-sector recreation management. These questions can be addressed only when we gain a clear understanding of the public purposes--or functions--of public-sector recreation management.

Introduction: An Historical Perspective on Fees and Public Lands

Public lands have been a significant component of American national identity for more than two centuries. In the early 19th century, Americans suffered from a cultural inferiority complex in comparisons with Europe. But what we did have--and what Europe did not--was wildlands. Consequently, in that century's early years, many of America's urban, educated elite shared positive feelings about natural landscapes (Wellman 1987). Bolstered by the writings of Walt Whitman and the Concord Transcendentalists, the Romantic Movement idealized wild nature, paving the way for the preservation movement and resulting in the United States becoming the first country in history to create national parks.

In cities, the garden city movement paralleled the movement to preserve wildland (Hall 1988). The ills of 19th century cities were legion, and reformers believed that one way to mitigate them was by providing naturalistic landscapes. No one was more important in this movement than Frederick Law Olmstead. While many of his contemporaries thought of parks in terms of physical health, Olmstead saw them as being important to democracy itself. He believed that natural scenery should be available to everyone, and he refused to agree with the apologists of the aristocracy who argued that working men and women were incapable of appreciating natural scenery or being improved by its influences (Wellman 1987).

In the 20th century, romantic preservationism gave way to a concern for more active recreation. In cities, the playground movement sought to get children off the streets into safer play environments, while swimming pools were constructed to increase sanitation among immigrant families (Cranz 1982). Recognizing the pressures created by urban living, Robert Moses, New York Commissioner of Parks from 1934 to

1960, established a prototypic network of state parks and parkways designed to give New York residents access to beaches and picnic sites in the country. Following Moses' lead, other cities developed smaller neighborhood parks that featured athletic fields and other provisions for active recreation (Cranz 1982).

While these efforts gave America what may be the world's finest public recreation estate, financial issues always have been a concern because parks require funding not only for acquisition and development but also for operation and maintenance. The record here has been less than exemplary. According to LaPage (1994), the United States has experienced long cycles of park and natural area degradation interspersed with brief, infrequent periods of public embarrassment and short-term atonement. Today, for public parks and recreation, budgets have declined to the point where some observers have questioned whether the nation's varied recreation opportunities can be sustained (Morton 1997).

Fees are one obvious solution to fiscal problems, so it is hardly surprising that they have a history as long as the American park and recreation movement. The Congress that established Yellowstone National Park in 1872 was in no mood to spend money on recreation and suggested that the park become financially self-sustaining (Wellman 1987). At the federal level, the first fees were collected at Mount Rainier National Park in 1908 (Harris and Driver 1987). However, Olmstead's philosophy prevailed, and Congress imposed a ban on fees that lasted until the 1960's. In 1965, the Land and Water Conservation Fund Act (p.l. 85-578) authorized federal agencies to charge fees at designated areas, and a 1972 amendment established the current policy of charging fees only at sites such as swimming facilities or campgrounds, or for special-use permits (Harris and Driver 1987). Recently, Congress authorized federal agencies to initiate a 3-year experiment with recreation fees, renewing interest in the fee debate at all governmental levels.

This history of fees at the state and municipal levels is, of necessity, more variable. During the 1930's, Robert Moses implemented parking fees at New York's state parks with the explicit goal of excluding blacks and low-income users (Caro 1975). By the 1980's, there were only four state park systems that did not have some facility-generated revenue (Morgan 1996). During that decade, facility-generated revenues rose by 157 percent to \$313 million across all states. However, this revenue accounted for only 27 percent of operating costs. During the 1990's, a number of states have markedly increased their reliance on fees. In New Hampshire, the legislature authorized the state park agency to become self-funding by raising fees to cover all operating and maintenance costs (LaPage 1994). In Vermont, the state park system incurred operating costs of \$4.5 million during 1994, but was able to operate at a profit by raising \$4.9 million in fees. New York, New Jersey, and Montana also have increased their reliance on fees in recent years (Reiling and Kotchen 1996).

Municipal fee programs have been widespread for some time. In a study of municipal agencies in the Great Lakes Region,

Brademas and Readnour (1989) reported that 95 percent of the agencies surveyed charged fees and that fees had increased by an average of 84.4 percent from 1987 and 1988.

Agency respondents believed that fees were consistent with agency philosophy, that the basic reason for charging was that tax income no longer covered costs, and that fees would enable them to offer additional programs of higher quality.

Most respondents stated that their reliance on fees probably would increase in the future.

Thus, in the late 20th century, the American recreation estate is increasingly being managed on a pay-as-you-go basis. While agencies seek to generate revenues to cover costs and reduce their reliance on legislative appropriations, it is possible to question how such a strategy affects their ability to deliver services to the public as a whole. To examine the effects of pricing on equity (fairness in the distribution of costs and benefits), we need to examine the changing economic circumstances of the American public. For this analysis, I have relied on Cassidy's (1995) synthesis of social and economic data.

The Public's Ability to Pay for Recreation

The United States always has considered itself to be a middle-class society. By the 1950's, most Americans described themselves as middle class regardless of their income, an assessment attributable to an economy that divided the gains from economic productivity remarkably evenly. In fact, during this period, there were five distinct classes. These ranged from rich to poor, though the income expectations of each class were rising. Despite occasional setbacks, economic growth was taken for granted and the mood of the country was optimistic. The period between 1947 and 1973 has been dubbed the Golden Era of the U.S. economy. By 1973, however, the nation's economic picture had begun to change. Economic growth slowed and inflation began to consume the financial gains. More importantly, the distribution of economic gains shifted significantly. From 1973 to 1993, income levels for the bottom 40 percent of American families declined in real terms; in 1993, the richest fifth of America's households received 48.2 percent of all the aggregate income produced. The top 1 percent made even more spectacular gains: between 1977 and 1989, their average income of this group rose by 78 percent to \$576,553.

These numbers confirm what many people have long suspected: while living standards have stagnated or declined for a majority of Americans, a small minority has enjoyed a bonanza. Even the "Goldilocks" economy of 1998 with its record low unemployment has been beset by distribution problems, and much of the new employment is in low-paying, service-sector jobs. Consequently, it makes little sense to speak of the American middle class. Rather, the United States now comprises four economic groups that are suspicious of each other and of the future, Cassidy (1995, p. 118) claims:

"At the top, there is an immensely wealthy elite which has never had it so good. At the bottom, there is an underclass which is increasingly divorced from the rest of society. And in between these extremes there are, instead of a unified middle class, two distinct groups: an upper echelon of highly

skilled, highly educated professionals who are doing pretty well, and a vast swath of unskilled and semiskilled workers who are experiencing falling wages, stagnant or declining living standards, and increased economic uncertainty."

Anxiety over declining incomes and a desire to return to the optimistic expectations of the Golden Era have increased libertarian calls to limit the size of government. Although most economists blamed declining wages on factors such as the globalization of trade, technological innovation, the decline of labor unions, and immigration (Cassidy 1995), the public was encouraged to blame taxation and government spending. In this environment, recreation agency budgets often fared poorly. For example, between 1986 and 1991, the national forests in southern Appalachian received about 47 percent of the planned recreation budgets, while timber programs received 97 percent of planned funding (Morton 1997).

Despite declining budgets and calls to limit spending, agencies still have their own goals to pursue. A basic principle of organizational behavior is that all social organizations strive to grow, to enhance their power and prestige. Recreation agencies with staffs to maintain and maintenance, program, and equipment needs are no exception. Note that rather than closing facilities and eliminating programs, most of the municipal agencies in the Brademas and Readnour study spoke of finding ways to offer more programs! With authority to charge and retain fees, agencies are able to pursue their goals while legislators can proclaim "No new taxes!" So the current enthusiasm for fees can be seen as a happy convergence between antigovernment, libertarian sentiment and agency self-interest. But what has become of public purpose and the public interest?

The Effects of Fees

While fees for the use of public lands and facilities may seem desirable to both legislators and administrators, how are they likely to be received by the general public? When considering a fee program, it is appropriate to ask: "Who is at risk? Who will be priced out?" With respect to the class structure described earlier, it is fair to say that the top two classes would be relatively unaffected by fees or fee increases. The poor, too, would be largely unaffected by fees implemented at most federal and state areas, though fees for municipal facilities might discourage their participation at local sites. Fees are likely to have the greatest impact among members of the working class--the people who think twice about paying to go to the beach, spending \$20 or \$50 for an annual pass, or paying to watch a sunset. Despite our reputation as an educated country, in 1995 only 25 percent of American men had earned a college degree, and the median male salary was \$27,716 (Cassidy 1995). This means that 50 percent of the men earned less and, since the gender gap in wages still exists, working women cannot fully compensate for declining family salaries. So a substantial portion of the working

class is increasingly less well off; even those who have attended college may face staggering levels of family debt. The Vermont Student Assistance Corporation estimates that the average level of student debt for 4 years of college will

total \$21,268 for Vermont students enrolling in 1998 (Burlington Free Press, June 23, 1998). Should two of these students marry, this new family will be starting out with a debt of \$42,500 before they have jobs, a car, or a place to live. And since housing costs have nearly doubled over the past 20 years, and the average family now spends far more for utilities and health care than in the past, it is quite evident that most working-class Americans have an increasingly limited ability to pay.

What happens when agencies raise fees for recreation areas and programs? Obviously, some working-class families will be priced out and will no longer participate; however, many more will reduce their level of participation. Reiling et al. (1992) found that low-income campers in Maine tended to camp more than upper-income recreationists when camping fees were low, but dropped out of the market rapidly as fees increased. Stevens et al. (1989) found the demand for day-use in Massachusetts state parks was more price sensitive than previously thought. In Britain, Kay and Jackson (1991) identified financial and time constraints as the two most widespread categories of leisure constraint. When faced with these constraints, most people reduced but did not eliminate their participation. Increasing fees, then, likely will result in reduced participation, particularly among working-class families. They are the difference between a 1-week and a 2-week vacation, between leaving early or staying an extra night, between taking the children swimming 3 times per summer instead of 10. Do these changes matter? The only way to answer this question is to have a firm sense of the purposes of public-sector recreation management.

The Functions of Public-Sector Recreation Management

Much of the debate in the literature on recreation user fees has centered on the mechanics of setting fees: Which costs should be covered? What prices are optimal? Are fees effective in achieving management goals? (cf. Manning et al. 1984; Rosenthal et al. 1984; Daniels 1987). Less obvious but undoubtedly more important are questions related to purpose--functionalist questions. Why do we even have public-sector recreation? What important purposes are being served? How do fees enhance or reduce our ability to serve these purposes? Understanding the functions that public-sector recreation management serves is central to establishing a rational pricing policy for public lands.

Insights into public functions often can be obtained from enabling legislation or mission statements. The national parks were founded with the twin--and often conflicting--objectives of resource protection/preservation and promotion of public use and enjoyment. State parks tended to follow suit, adopting these same goals. By contrast, national forests and state forests combined recreation/preservation with multiple-use objectives, maintaining the ethic of a working landscape. City parks tend to be much more diverse in function. While they also tend to have preservation goals, human use and enjoyment goals tend to predominate. Thus, there are neighborhood

parks that provide facilities for active recreation, playgrounds that provide safe recreational and educational experiences for children, and larger landscaped parks that offer both recreation opportunities and solitude. Interestingly, it is with urban parks that the importance of thinking clearly about function becomes most apparent.

According to Cranz (1982), the great landscape parks of the 19th century had become passé by the early 20th century. As a result, people began to adapt their designs to more contemporary needs, introducing a variety of discordant elements into parks. Cranz noted that in contemporary practice, the word "park" applies to an almost indiscriminate range of properties: playgrounds, playfields, swimming areas, golf courses, landscaped ovals and other small segments of street grid, downtown squares, botanical gardens, waterfronts, etc. The common purpose uniting such a collection is not obvious. Without a clear, well-defined sense of purpose, it is unlikely that parks will fare well in the budget process. And such confusion undoubtedly contributes to increase pressure to assess fees. Is it possible that fees will confuse a sense of public purpose further by blurring the line between public and private? I believe this is the case. Indeed, fees may be the first step on the road to privatization. If some parks can charge fees and generate a substantial return on investment, and if we do not care about equity, why should these parks be in the public sector?

There are no such problems with most state and federal areas: the twin objectives--resource protection and public use and enjoyment--are clear. The difficulty is that they often are in conflict. The burgeoning demand for outdoor recreation that followed World War II, fueled by new inventions like snowmobiles, trail bikes, and mountain bikes, and new technologies that opened up seasons other than summer has led to claim that America's parklands are being damaged irreparably. While some of these claims may be exaggerated, particularly compared to damage resulting from more broadly based policy decisions (cf. Chase 1987), there have been numerous calls to limit public use. To some economists, pricing is the most efficient way to achieve this limitation (cf. Rosenthal et al. 1984). The difficulty with this position is that, given the income distribution described earlier, to allocate by price is to allocate by class. Kelly (1993), has excoriated natural resource managers for failing to understand the importance of social class as a determining factor in people's lives. Most of today's key natural resource managers were socialized during the "Golden Era" of the 1950's and 1960's, and may be making unrealistic assumptions about the U.S. public's current ability to pay. As the studies cited indicate, fees affect low-income people much more heavily than upper income people. Consequently, they are the most regressive possible source of park funding. As we price public lands, we increasingly restrict their benefits to the comfortably affluent. If rationing is required to preserve these lands for future generations, mechanisms other than pricing must be found. If we give any credence to Frederick Olmstead's vision of parks and wildlands as powerful engines of democracy, we must clearly define their social and biological functions.

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AN EXPERIMENT IN PROGRESS -- PERMITTING PETS IN SELECTED FLORIDA STATE PARK CAMPGROUNDS

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Abstract: Florida State Parks Campgrounds are currently one of the few state park systems to restrict pets from their campgrounds. In 1996, the state park system undertook a research project to evaluate this issue. Phase I of the study asked campers in public and private campgrounds how they might react if pets were to be permitted in campgrounds. A second phase of the study was conducted in 1997/98. 5 campgrounds from throughout the state park system were selected to permit some types of pets into campgrounds for a one-year trial period. Data was collected using user surveys, management reports and biological inventory. Initial analysis of reports from the five campgrounds indicates that many of the anticipated problems such as increased noise, safety and wildlife impacts were over estimated in the 1996 survey. Though still in preliminary stages, this study is finding a discrepancy between the anticipated impacts of permitting pets into campgrounds and the reported impacts that occur when pets are permitted

Introduction:

Florida State Park Campground system is currently one of only five state park systems to restrict pets from campgrounds. Over the years many campers indicated displeasure with this policy to park managers, park administrators and state legislatures. In 1996, at the request of the state legislature, the state parks system undertook a research project to survey campground visitors about this issue. Results of this study were somewhat mixed with some campers suggesting that they would increase their frequency of camping in state parks if the policy was changed while a nearly equal number suggested that they would visit less frequently. A high number of campers anticipated that permitting pets would have negative impacts on noise level, camper safety, wildlife observance and the overall experience.

As a second phase of the study, the state park system selected campgrounds from throughout the state to permit some types of pets into campgrounds for a one-year trial period. During the one year period, July 1, 1997 -- June 30, 1998, cats and dogs were permitted into campgrounds

while research into the biological, social and operational impacts was conducted. This paper presents an update on how the project is proceeding as well as preliminary findings.

Methodology

This study was conducted at five state park campgrounds selected from throughout the state. Campgrounds were chosen based on two criteria. First, one campground was to be selected from each region of the state; secondly, chosen campgrounds needed sufficient occupancy throughout the year to allow for inter-park comparisons. Parks selected were: Fort Clinch State Park, Jonathon Dickinson State Park, Oscar Scherrer State Recreation Area, Saint Andrews State Recreation Area, and Tomoka State Park.

This project uses a multi-disciplinary approach. State Park district biologists conduct monthly surveys of campgrounds to evaluate biological impacts. Social impacts are studied in several ways: First, records of all incidents, comments and complaints are collected and forwarded to the research office at the University of Florida. Secondly, on-site intercept surveys are conducted quarterly at each test park to evaluate campers' attitudes and experiences.

The protocol specifies four on-site data collection visits throughout the time period July 1, 1997 and June 30, 1998. This paper focuses primarily on the data collected during the on-site interviews during the first two of four data collection cycles, August, 1997- January 1998. A total of 254 completed survey forms were collected and analyzed. General questions included basic demographics, observations of pets in parks, perceived impacts on camper experiences, opinions on current policy and impacts on future visitation. Data was initially analyzed descriptively then comparisons were made between the 1996 findings and the newly collected data.

Findings:

The respondents were primarily Florida residents with 65.4% reporting state residency. About 30.3% were from states other than Florida and about 4.3% were international visitors. When tabulated by age, 3% were 18-24 years of age, 51% were 25-44 years of age, 31% were 45-64 years of age and 16% were 65 or older. The typical respondent was a Florida resident between the ages of 25-44. At this point in the survey process, nearly two thirds of the respondents were Florida residents. About 50% were familiar with the project. About 35% reported that permitting pets had played a role in the selection of the campground

Generally, respondents saw many more dogs than cats. 83% of the respondents reported seeing dogs in the campground at least once while only 16.5% reported seeing cats. 6.3% of the campers reported seeing pet droppings that were not being picked up by pet owners while 24.4% of the respondents reported seeing owners picking up their pet droppings. Reported interactions between pets and wildlife were rare with only 3.6% of the respondents reported viewing any interactions at all.

Table 1. Observations of pets in parks:

Observations	Often >4	Occasionally 2 - 3	Seldom 1	Never 0
12. How often have you seen dogs in this campground on this trip?	88 (34.6%)	77 (30.3%)	47 (18.5%)	42 (16.5%)
13. How often have you seen cats in this campground on this trip?	4 (1.6%)	7 (2.8%)	31 (12.2%)	212 (83.5%)
14. How often have you seen pet dropping not picked up by pet owners?	2 (.8%)	4 (1.6%)	10 (3.9%)	238 (93.7%)
15. How often have you seen pet dropping being picked up by pet owners?	6 (3.8)	17 (10.6%)	16 (10.0%)	121 (75.6%)

16. How often have you seen interactions between pets and wildlife?	1 (.4%)	1 (.4%)	9 (3.6%)	243 (96.4%)

*** Question added after some surveys were completed. Total responses are less than 254.

Table 2. Perceived impacts

Perceived Impacts	Strongly Positive	Somewhat Positive	Neutral	Somewhat Negative	Strongly Negative
17. What effect did allowing pets into campgrounds have on <u>camper safety</u> in the campground?	11 (4.3%)	31 (12.3%)	185 (73.1%)	19 (7.5%)	7 (2.8%)
18. What effect did allowing pets into campgrounds have on the observation of <u>wildlife</u> in the campground?	1 (.4%)	5 (2.0%)	202 (79.8%)	37 (14.6%)	8 (3.2%)
19. What effect did allowing pets into campgrounds have on <u>noise</u> in the campground?	1 (.4%)	3 (1.2%)	201 (79.4%)	38 (15%)	10 (4.0%)

There were mixed responses when campers were asked about perceived impacts caused by permitting pets in campgrounds. In each case, the majority of the respondents felt that the impacts were "neutral" but the proportions of people who felt either positive or negative impacts changed depending upon the issue.

When asked about camper safety Though most campers felt neutral impacts, more than 16% of the respondents felt safety was positively impacted while just over 10% felt safety was negatively impacted.

When asked about the observation of wildlife. Most campers felt that there were neutral impacts, while nearly 18% felt that the observation of wildlife was negatively impacted. Only a few campers (2.4%) felt that the observation of wildlife was positively impacted.

When asked about noise in campgrounds. Again most campers felt that the impacts were neutral but of those who felt impacts, most (19%) felt that noise in the campground had been negatively impacted.

Table 3. Impacts on "Overall Experience":

Impacts on "Overall Experience":	Strongly Positive	Positive	Neutral	Negative	Strongly Negative
20. What effect did allowing pets into campgrounds have on your <u>overall experience</u> in the campground?	43 (16.9%)	25 (9.8%)	158 (62.2%)	21 (8.3%)	7 (2.8%)

When asked how permitting pets into the campground impacted the overall experience, about 26% felt that their experience was positively impacted while about 11% felt

that their experience was negatively impacted. 62% felt that permitting pets had neutral impacts on their overall experience.

Table 4. Opinions on the current policy:

Opinions on the current policy:	Keep pets out	Neutral	Let pets in
22. Considering your experiences here, do you support the policy of restricting all fur bearing pets from Florida State Park Campgrounds?	53 (20.9%)	22 (8.7%)	179 (70.5%)

When asked whether or not the current policy should be kept in force, about 21% felt that the current policy should be left in place. About 9% were neutral and slightly over 70% felt that pets should be permitted into Florida State Park Campgrounds. Generally, when this question was

asked, people verbally responded that pets should be permitted with restrictions such as leash regulations, clean up pet droppings and noise control. Only occasionally did respondents feel that pets should be allowed with no restrictions.

Table 5. Impacts on frequency of visits:

Impacts on frequency of visits:	Great increase	Some increase	No change	Some decrease	Great decrease
23. If Florida State Parks permitted pets in campgrounds, how would this affect the frequency of your camping in Florida State Parks?	43 (17.1%)	33 (13.1%)	151 (59.9%)	17 (6.7%)	8 (3.2%)

Nearly 30% of the campers indicated that they would increase their visits to Florida State Park Campgrounds if pets were permitted while just less than 10% of the campers indicated that they would decrease their visits. Overall, nearly 60% of the campers would not change their camping frequency if the policy were changed.

Conclusions

Initial analysis of reports from the five campgrounds indicates that many of the anticipated problems such as increased noise, safety and wildlife impacts were over estimated in the 1996 survey. Though most campers knew that pets were permitted in their camping areas, many reported not observing them. Few campers actually reported any negative impacts at all. Most campers now report that they would not change their camping patterns based on this issue. Interestingly, only rarely did campers report that their current camping trip had any impacts on their feelings about permitting pets in campgrounds- most respondents tend to hold to the beliefs that they previously held.

Though still in preliminary stages, this study is finding a discrepancy between the anticipated impacts of permitting pets into campgrounds and the reported impacts that occur when pets are permitted. When the current study is compared to the 1996 study: perceived negative impacts drop and the support for policy change increases. If the policy is changed to permit pets state wide, respondents are more likely to increase camping frequency than decrease.

Discussion:

From the project-related perspective, this may indicate that permitting pets into Florida State Park Campground is less of an issue than it was perceived to be. From the research and decision making perspective these findings are somewhat problematic. Apparently respondents may over report anticipated impacts. This could potentially lead to poor decision-making based on inaccurate assumptions. Further attempts to reconcile the differences between anticipated and actual reported impacts should be considered.

APPLYING RECREATION SPECIALIZATION, WILLINGNESS TO PAY AND WILLINGNESS TO ACCEPT TO NEW YORK STATE ANGLERS

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Abstract: This study used fresh water fishing in New York State as a case to study the relationship between recreation specialization and willingness to pay (WTP) for fishing license fees and willingness to accept (WTA) compensation for not receiving a fishing license. The results revealed four specialized angler groups in New York State could be clustered based on angling methods used and target species sought. The four angler groups, from low to high angling specialization, are occasional general anglers, frequent warm-water game anglers, frequent general anglers and frequent cold-water game anglers. These four angler groups are quite different in WTP but not in WTA. Frequent cold-water game anglers are willing to pay more than any other group and the WTP of a higher specialized group is more inelastic than that of a lower specialized group. The four angler groups are not significantly different in WTA. For those anglers willing to accept compensation for not receiving a fishing license, the WTA function of the frequent general anglers is most inelastic. Study results suggests that the angler population size could be affected through adjusting fishing license fees.

Introduction

Understanding the diverse nature of the angling public has been a major challenge facing recreational fisheries managers. Many researchers (Absher et al. 1987, Andersen 1990, Bryan 1977, Chipman and Helfrich 1988, Dawson et al. 1992, Dawson 1995, Ditton et al. 1992, Gill 1980, Fisher 1997, Loomis and Warnick 1991) have emphasized their research on angler typologies and relevant motivations, preferences, participation, and satisfaction. For example, specialized anglers have been found to be more likely to fish more frequently, spend more time and money on angling, have fished for more years, express a deep commitment to conservation, and be motivated by factors directly tied to catching fish. There are few advanced studies on angler economic characteristics, except for angler equipment investments and travel expenditures (Connelly et al. 1996). A series of questions may be asked by resource managers about angler characteristics such as "Do different angler groups value

their fishing opportunities differently?", "What are the differences between them?", "What reasons cause these differences?", and "How do we apply these differences in resource management?"

Based on the jurisdiction and in order to assure the fishing quality or improve the fishing resource, government agencies charge anglers a license fee. Fishing license fees could be viewed as a management tool to affect the angler population. Through increasing the fishing license fee or buying back the licenses sold, resource managers can reduce the angler population. Contrarily, a low fishing license fee may cause an increase in the number of anglers.

Willingness to pay (WTP) and willingness to accept (WTA) are the monetary concepts with which researchers measure the value of non-market goods (Bjornstad and Kahn 1996, Dixon et al. 1994, Ebert 1993, Loehman 1991, Walsh 1986). Anglers' WTP and WTA related to fishing license fees can represent how the anglers value their fishing opportunities. The purpose of this research is to use fresh water fishing in New York State as a case to study the relationship between the recreation specialization, willingness to pay (WTP) for fishing license fees, and willingness to accept (WTA) compensation for not receiving a fishing license. Through this exploratory study we can understand how the different groups value their fishing opportunities and policy and decision makers can understand the importance of fishing resources to different angler groups.

Methods

This study separated anglers based on their participation frequency for different types of fishing activities according to the concept that distinct groups of anglers could be categorized by angling techniques used and target species sought (Dawson 1995). Six variables were defined from two angling techniques (e.g. nature bait and artificial lure), and three categories of fish (e.g. panfish, warm-water game fish, and cold-water game fish). These six variables were used to cluster New York State anglers into specialized groups similar to Bryan's hierarchical specialization concept (Bryan 1979). A cluster analysis using average linkage between groups and squared Euclidean distances was computed to classify the anglers with similar participation characteristics.

The fish species definitions used in this study were: (1) Panfish are small, easily caught fish in a wide range of species such as sunfish, bullhead, crappies, and others; (2) Warm-water game fish are fish that can live and reproduce in a warm environment, such as northern pike, pickerel, muskellunge, walleye, catfish, and others; and (3) Cold-water game fish are fish that can live and reproduce in a cold water environment, such as trout, salmon, smelt, steelhead, and others (Cone 1968).

The fishing method definitions used in this study were: (1) Artificial lures which are artificial imitations of natural bait, such as man-made flies, spinners, spoons, plugs, jigs and other lures including those that contain some natural

substances such as deer hair and feathers; and (2) Natural bait which are all baits which might be ingested or swallowed by fish including, but not limited to, fish (dead or alive), fish eggs, worms, shellfish, amphibians, insects and others (NYSDEC 1996).

Contingent valuation method (CVM) was used to survey anglers and their WTP and WTA values for their New York State fresh water fishing licenses. For WTP, it was assumed that other factors including fishing access, fish stock, environment quality and other recreation fees are constant. In addition, respondent need a fishing license to go fishing. For WTA, it was assumed that the New York State government might start a program to preserve fishing resources and would compensate anglers for not purchasing a fishing license.

Willingness to pay (WTP) and willingness to accept (WTA) values of anglers for their licenses were asked through a bidding-type game with 11 intervals from \$1-\$10 to \$101 and above. Then maximum WTP and minimum WTA were asked. If anglers' maximum WTP or minimum WTA were "0", a brief reason was requested to check that the value was a real zero or not. Regression analysis was used to calculate the WTP and WTA functions (i.e., quantity of licenses sold at each bid price level) for each specialized angler group. In addition, ANOVA tests was

used to test the differences in WTP or WTA between the different angler groups.

A systematic sample of one thousand New York State freshwater fishing licenses (i.e., resident or nonresident) was selected for the license year beginning October 1, 1995 and ending September 30, 1996. The mail survey was conducted starting in December 1997. A modified Dillman mail survey technique (Salant and Dillman 1994) was used and two follow-up survey reminders (sent out on 12/23/97 and 01/23/98) were used to ensure a high response rate. From the 1,000 mail survey sample, 110 questionnaires were undeliverable and 473 respondents returned their questionnaires (53% response rate).

Non Respondent Bias

In order to assess the possibility of non-response bias, three external variables from the license files (i.e., age, gender, and in-state or out-state residence) were tested to compare the difference between respondents and non-respondents to the mail survey (table 1). There were no statistically significant differences in gender (Chi-square=7.2, df=1, p=.40) or residents versus non-residents (Chi-square=2.5, df=1, p=.07). There was a statistically significant difference in the mean age of respondents and non-respondents (44.6 vs. 41.0, t-test value=4.1, df=996, p<.05).

Table 1. Summary results of variables from the NYS license for the entire sample, including non-deliverable mail questionnaires for NYS anglers.

Variable	Entire sample (N = 1,000)	Respondents (N = 473)	Non-respondents (N = 527)
Age (years) ^a	43	45	41
Gender (%)			
Male	87.8	87.4	88.1
Female	12.2	12.6	11.9
In-town or out-town (%)			
Residents	83.9	81.9	85.6
Non-residents	16.1	18.1	14.4

^a significant at p<.05 level.

In addition, age was plotted based on the number of respondents and non-respondents and the results were similar to those reported by Fisher (1996). For anglers with ages from 22 to 34, there were more non-respondents than respondents. However, the mean ages of the four specialized angler groups did not have a statistically significant difference at p<0.05 level, so any potential age

bias should not affect the trends of WTP or WTA between the four angler groups. An ANOVA test (table 2) showed that anglers returning questionnaires in the three survey reminder periods did not have a statistically significant difference in their WTP, WTA, and annual fishing days. Therefore, the potential for non-respondent bias is not considered to be significant for this study.

Table 2. ANOVA test of mail survey variables for non-response bias, by the three time periods of angler mail survey returns in 1997-98.

	Total	Period 1	Period 2	Period 3	F-value	P
Annual fishing days (mean days)	17.7	20.2	15.8	15.4	2.290	.103
WTP (\$)	32.4	34.1	31.1	30.8	0.911	.403
WTA (\$)	959.9	1073.3	1587.6	629.9	1.067	.346

Angler typology

The cluster analysis produced a dendrogram that separated the NYS anglers into four groups that showed the hierarchical specialization concept. A canonical discriminant function plot (figure 1) showed the four angler

groups could be separated clearly by the six participation variables. An ANOVA (table 3) also supported this study result since each variable showed a statistically significant difference among the four angler groups.

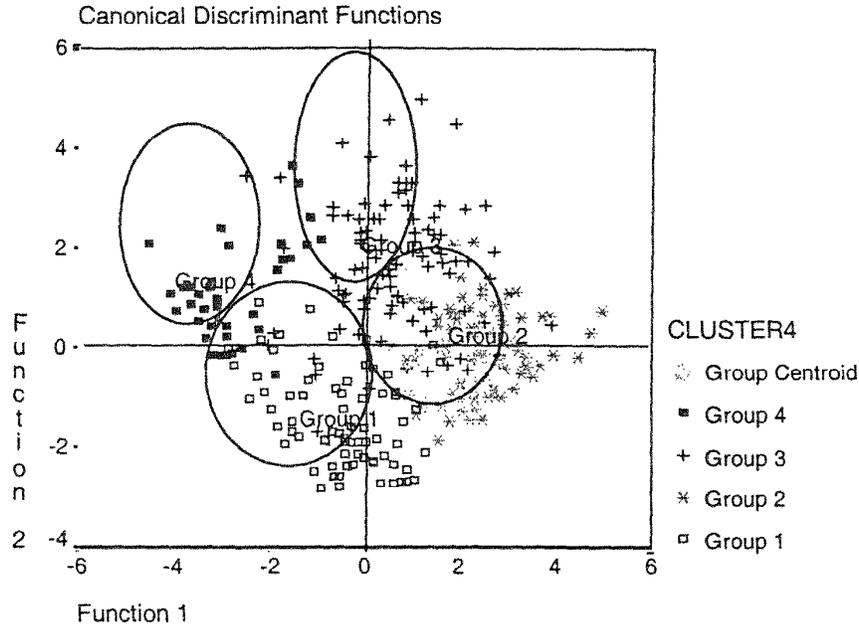


Figure 1. Canonical discriminant function plot of the four specialized groups of NYS anglers.

Specialization in fishing participation was conceptualized as increasing from low to high across the four angler clusters from group 1 to 4 (table 3). Group 1 was named **occasional anglers** due to their overall low fishing participation. Group 2 was named **warm-water game anglers** because of their high participation in two types of warm-water game fishing. Group 3 was named **frequent**

anglers because they frequently took part in many kinds of fishing activities. Group 4 was named **cold-water game anglers** because they preferred cold-water game fish and fished frequently for them. Groups 1 and 3 are quite different in their participation frequency; groups 2 and 4 have different interest in the fish species sought.

Table 3. ANOVA for the level of participation^a in each specialization variable against four specialized angler groups in NYS.

Mean	Nat. bait panfish	Art. lure panfish	Nat. bait warm fish	Art. lure warm fish	Nat. bait cold fish	Art. lure cold fish
Group 1 (n=140)	.59	.30	.29	.86	.61	.50
Group 2 (n=107)	1.68	.83	2.76	2.09	.38	.43
Group 3 (n=109)	1.77	0.95	2.30	2.07	2.51	1.93
Group 4 (n=77)	.29	.42	.29	.35	1.17	3.53
Total Mean	1.10	.61	1.41	1.38	1.13	1.13
F-value	43.54	13.72	324.93	55.60	89.40	276.11
P>F	.00	.00	.00	.00	.00	.00

^a The number shown in the table is the mean of participation: 0=none; 1=few; 2=some; 3=most; 4=all

Willingness to pay

The preliminary data plot of WTP displayed a logarithm function, so the maximum WTP was transformed to a logarithm and plotted to display the relationship between

the log(WTP) and number of anglers who were willing to pay for the fishing licenses (figure 3). A linear regression analysis was used to calculate the WTP function for each group. Those functions are semilog functions; their R-

square values range from .85 to .89 and residual means are near zero (table 4). The slopes of the four angler group log(WTP) equations are negative (figure 2); this indicates as admission fees increase, the number of licenses purchased declines. The WTP function of group 2 has the lowest intersection to the log(WTP) axis. Comparing the slopes of the functions, at the same admission fee, shows that elasticity increases as the angler specialization level increases. One possible reason is that fishing is their major

recreation activity and the fishing opportunity is relatively more important for more specialized anglers. Contrarily, the elasticity of group 1 is smallest: this might indicate that fishing opportunity for group 1 might be not as important as for other angler and they may change their recreation activities or substitute other activities as license fees increase.

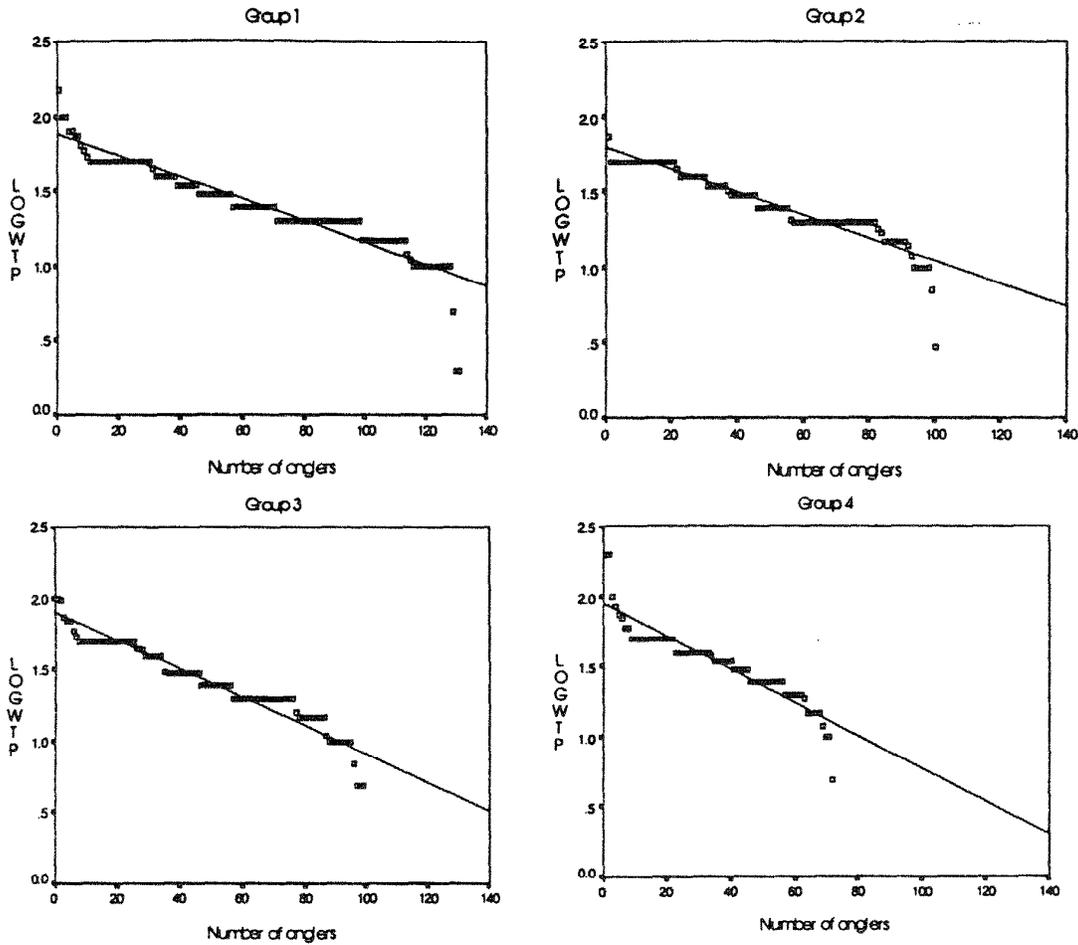


Figure 2. Plots of log(WTP) vs. number of anglers and the regression lines by four angler groups in NYS.

Table 4. The regression function of WTP by four angler specialization groups in NYS.

Group	N	Regression Function	R Square	Residual Mean
Group 1	132	$\text{Log (WTP1)} = 1.88 - 7.2 \times 10^{-3} n$	.88	4.26×10^{-16}
Group 2	100	$\text{Log (WTP2)} = 1.80 - 7.6 \times 10^{-3} n$	.89	1.21×10^{-16}
Group 3	102	$\text{Log (WTP3)} = 1.92 - 10.0 \times 10^{-3} n$	.85	2.29×10^{-16}
Group 4	74	$\text{Log (WTP4)} = 1.95 - 11.4 \times 10^{-3} n$	.86	4.00×10^{-16}

Table 5. ANOVA ^a of WTP for four specialized angler groups in NYS.

Group	N	Mean (\$)	Std. Deviation	95% Confidence Interval for Mean	
				Lower Bound	Upper Bound
Group 1	136	30.0	21.7	26.3	33.7
Group 2	100	29.4	14.2	26.6	32.2
Group 3	104	30.2	19.3	26.4	34.0
Group 4	75	40.0	32.0	32.6	47.3
Total	415	31.7	22.2	29.6	33.9

^a F = 4.381, P-value < 0.05

Table 6. T-test of WTP in pairs of specialized angler groups in NYS.

	T-value	df.	P-value
1. H ₀ : WTP1 vs. WTP2	0.24	234	.807
2. H ₀ : WTP1 vs. WTP3	-0.07	237	.945
3. H ₀ : WTP1 vs. WTP4 ^a	-2.69	209	.008
4. H ₀ : WTP2 vs. WTP3	-0.33	201	.739
5. H ₀ : WTP2 vs. WTP4 ^a	-2.95	173	.004
6. H ₀ : WTP3 vs. WTP4 ^a	-2.54	176	.012

^a significant at .05 level

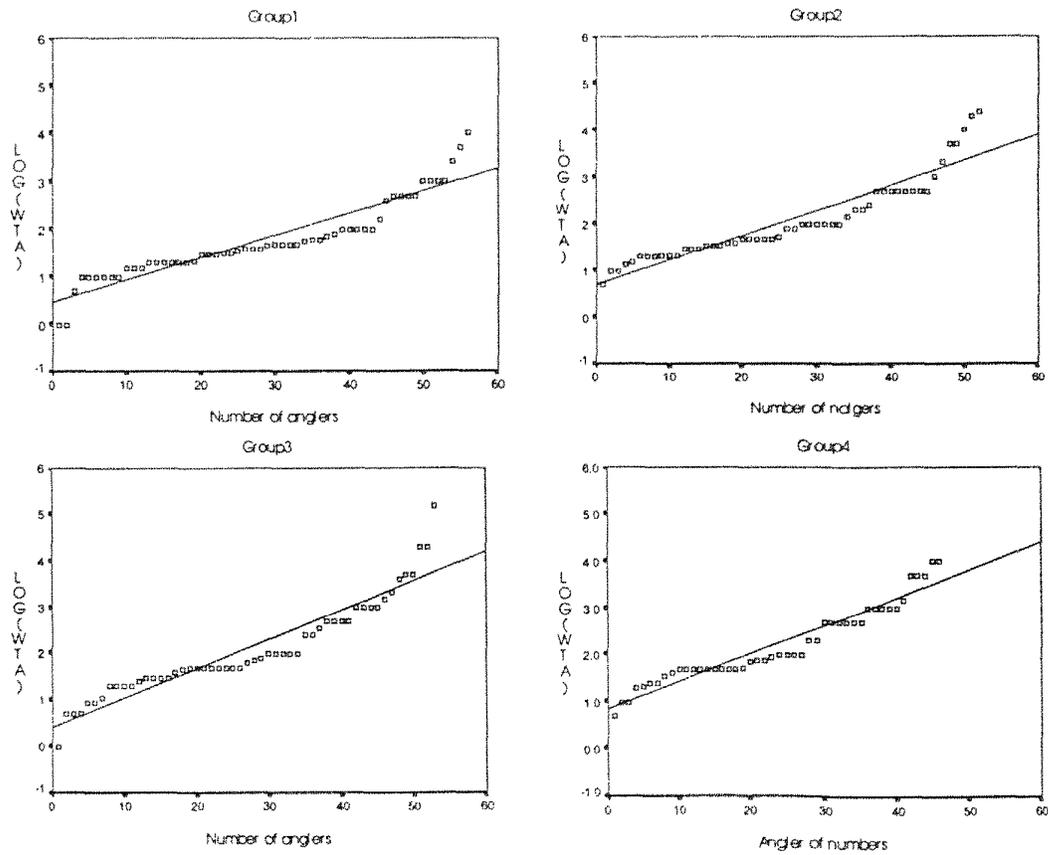


Figure 3. Plots of log(WTA) vs. number of anglers and the regression lines by angler groups in NYS.

The ANOVA test result of the mean WTP (table 5) is significant at the $p=0.05$ level, so at least two of the four groups are significantly different in their WTP. Group 1 (\$30.0), group 2 (\$29.4), and group 3 (\$30.2) have similar maximum WTP; however, the WTP of group 4 (40.0) is different from any other group. An additional test was used (t-test) to evaluate all group WTP means (table 6). Results show the WTP of group 4 is significantly higher than any other group, and the differences between groups 1, 2 and 3 are not statistically significant.

Willingness to accept

For WTA, 49 percent of the respondents reported their minimum WTA as larger than zero, 40 percent of the respondents reported their minimum WTA equal to zero, and 11 percent of the respondents did not answer this question. The reasons for the zero values included "willing to cooperate with management and do not need compensation", "will not give up fishing", "NYS can not pay enough compensation", "fishing is a right or freedom", "unreasonable question", and other reasons. Only the first reason -- "don't need compensation" -- was assigned as a real zero value. Because of missing data and various responses, WTA was discussed in two ways. First, a regression analysis and an ANOVA test were used for those respondents who had the minimum WTA including respondents with a real zero value because these people are willing to be compensated. Second, all WTA values

reported were classified into four categories: 0-100, 101-500, 501-5000, and 5001 and above. A chi-square test was used to test the relationship between WTA and the specialized angler groups.

From the preliminary data plot, WTA also displayed the logarithm function, so WTA was transformed to a logarithm and plotted to display the relationship between $\log(WTA)$ and number of anglers who were willing to accept compensation for the fishing licenses (figure 3). A linear regression analysis showed the functions are semilog functions; R-square values range from .88 to .93, and residual means are near zero (table 7).

The regression results showed all slopes of the functions are positive; the number of anglers willing to be compensated will increase as the compensation increased. The slopes increase as the specialization level increases except group 4 whose slope is slightly smaller than group 3. One possible reason might be the anglers in group 3 fished much more often than group 4. Table 8 showed the WTA increased as the specialization level increased except group 4; however, this difference is not statistically significant at $p=0.05$ level (F-value = 1.33, P-value = 0.26). Furthermore, all WTA values were classified into four categories (table 9) and the relationship between WTA and those specialized groups were not statistically significant (Chi-square = 11.81, df = 9, P-value = 0.22).

Table 7. Regression function of WTA, by angler groups in NYS.

Group	N ^a	Regression Function	R Square	Residual Mean
Group 1	56	$\text{Log}(WTA1) = .45 + 4.7 \times 10^{-2} n^*$	.88	-5.55×10^{-17}
Group 2	52	$\text{Log}(WTA2) = .68 + 5.3 \times 10^{-2} n$	.88	-1.11×10^{-16}
Group 3	53	$\text{Log}(WTA3) = .41 + 6.3 \times 10^{-2} n$	.89	-2.18×10^{-16}
Group 4	46	$\text{Log}(WTA4) = .82 + 5.9 \times 10^{-2} n$	.93	-1.79×10^{-16}

^a n is the number of anglers who are willing to accept compensation for not fishing at the relative WTA level.

Table 8. ANOVA^a of WTA for four specialized angler groups in NYS.

Group	N	Mean (\$)	Std. Deviation	95% Confidence Interval for Mean	
				Lower Bound	Upper Bound
Group 1	63	407.9	1425.9	48.8	767.0
Group 2	55	1351.3	4476.1	141.2	2561.3
Group 3	53	4072.1	20800.7	-1661.3	9805.5
Group 4	51	907.9	2199.5	289.3	1526.5
Total	222	1631.3	10505.2	241.7	3020.8

^a F = 1.338, P-value > 0.05

Table 9. Percent distribution of four categories of WTA across the four specialized angler groups in NYS.

WTA Categories	Group 1	Group 2	Group 3	Group 4
\$ 0-100	51.6	46.6	51.6	50.8
\$ 101-500	7.4	19.2	11.1	12.7
\$ 501-5000	6.3	5.5	12.5	14.3
\$ 5001 and about	34.7	28.8	30.6	22.2
Total	100%	100%	100%	100%

^a Chi-square statistic= 11.811, df = 9, P-value = 0.224 > 0.05

Conclusions

The study results indicate that NYS anglers could be clustered into four angler groups by six fishing participation variables based on fishing methods and target species. This four angler groups are quite different in WTP values but not in WTA values. Cold-water game anglers are willing to pay more than any other group, and the WTP of a higher specialized group is more inelastic than that of a lower specialized angler group. The four angler groups are not significantly different in WTA although frequent anglers showed the highest WTA. For those anglers who are willing to accept compensation not to fish, the WTA function of frequent anglers is most inelastic.

Thus, if the license fees increased, the anglers with a lower specialized level will be more often eliminated than anglers with a higher specialized level. Contrarily, if the license fee goes down, lower specialized angler numbers will increase more than higher specialized angler groups. Comparing anglers' response for WTP and WTA, WTA is much higher than WTP and this supports past research (Adamowicz et al. 1993, Adamowicz et al. 1994, Brown 1994, Hanemann 1991, Knetsch 1990, Knetsch and Sinden 1984). In addition, past studies have shown that higher specialized anglers are more likely to express a deep commitment to conservation (Hendee 1969, Loomis and Ditton 1987), so adjusting fishing license fees could be a potential method for reducing the number of anglers and their impacts on the fishery resources. However, further research is needed to explore the practical effect of this proposed management method.

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THE HUMAN DIMENSIONS OF THE WILDERNESS EXPERIENCE IN THE HIGH PEAKS WILDERNESS AREA

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Abstract: A descriptive study of High Peaks Wilderness Area users was conducted to measure the human dimensions of the experience and develop indicators to monitor social conditions. From May 30 to August 31, 1997, 710 hikers in the High Peaks Wilderness Area in the Adirondacks were interviewed and sent a mail survey and 462 people responded (deliverable response rate of 67%). Using an exploratory factor analysis, nine positive and four negative dimensions of the wilderness user experience were identified. Wilderness managers can use these human dimensions to create indicators to monitor existing social conditions in wilderness areas and to better understanding the attitudes, needs, and behaviors of wilderness users.

Introduction

In 1972, under the Adirondack Park State Land Master Plan (APSLMP), New York State designated 16 areas, including approximately one million acres, of the Adirondack State Park as wilderness. One of the areas designated was the High Peaks Wilderness Area (HPWA) which covers 226,435 acres in the geographic center of the park. The HPWA receives over 130,000 visitors annually far exceeding visitation rates experienced at other wilderness areas in the Adirondacks (NYSDEC 1996).

The APSLMP uses a definition of Wilderness, written in 1970, which closely parallels the United States Congressional definition used in the 1964 Wilderness Act. The major difference is that the APSLMP substitutes "forest preserve" for "federal land" and increased the minimum size requirements from five thousand acres to ten thousand acres (NYSDEC 1996). The APSLMP not only mandates the need to protect wilderness character and provide opportunities for solitude but also provide opportunities for a primitive and unconfined experience. Before we can provide these wilderness experiences, they first must be defined and understood.

Research attempting to measure user satisfaction has repeatedly used solitude or user density as the distinguishing characteristic of wilderness. Solitude has been measured in relation to the numbers of users and their

relative distribution in a wilderness area. Approaches evaluating associations between solitude and the user's perception of crowding have resulted in low statistical correlations (Graefe et al. 1984).

Human dimensions research in recreational resource management is becoming more important as managers attempt to better understand the dynamic attitudes and needs of recreationists and their behavior on public lands. There is an increasing amount of attention being given to human dimensions research. Researchers at the Aldo Leopold Wilderness Research Institute are increasingly emphasizing the importance of understanding the personal and societal benefits of wilderness protection (Watson and Landres 1997). These benefits and values go beyond those listed in wilderness legislation which traditionally include solitude, unimpaired wilderness characteristics, and remoteness. However, researchers are now broadening their scope by acknowledging other wilderness values (e.g., spiritual values, connectedness, and experiential values) as carrying the same or greater weight as solitude (Watson and Williams 1995).

Most recently, studies have broadened their scope and begun using other approaches in evaluating user experiences. For example with the multi-dimensional concept of privacy, researchers measured the recreational user experience in wilderness (Lee 1977; Hammit 1982; Hammit and Brown 1984; Hammit and Madden 1989; Priest and Bugg 1991; Hammit 1994). This multi-dimensional approach has been successfully field tested in a variety of settings using the Cognitive Dimensions of Privacy Scale and Functions of Privacy Scale (Hammit and Madden 1989; Priest and Bugg 1991; Hammit 1994; Dawson and Hammit 1996). These broader approaches to the original privacy scales have proven more representative of user experiences and expanded our understanding of the human dimensions of the wilderness experience (Dawson and Hammit 1996; Hummel and Donovan 1990).

Yet, there is still a need to further expand these scales. Some studies report that users express the importance of spiritual and psychological connections to wilderness (McDonald 1990). Understanding these and other diverse attitudes toward wilderness in our society continues to be an important challenge (Watson and Landres 1997). In order to understand these values more thoroughly, research has begun to systematically explore a wider scope of the human dimensions of the wilderness experience. For example, Dawson, Newman and Watson (1997) have conceptually outlined nine cognitive categories of human dimensions attributes that are potential satisfiers during recreational experiences in wilderness: psychological, social, solitude, spiritual, exploration, inspirational, physical and physiological, skills, and natural environment. Similarly, Dawson et al. (1997) reported two cognitive categories of human dimensions attributes that are potential dis-satisfiers during wilderness experiences. These 11 human dimension categories were conceptually organized based on a series of focus group interviews and published literature to identify a full range of human dimensions in

wilderness experiences (i.e., they are not empirically derived). This current research builds upon the previous research of Dawson et al. (1997) through an empirical study and exploratory factor analysis that identifies and measures human dimensions.

The purpose of this exploratory research project is twofold: to identify the human dimensions of the wilderness experience in the HPWA of the Adirondack State Park, and to develop indicators which HPWA managers can use in monitoring the human dimensions of HPWA users. This study begins to identify the positive and negative cognitive dimensions of wilderness users so researchers and managers alike can begin to monitor the human dimensions of the wilderness experience.

Methods

This study measured the human dimensions of wilderness users in the HPWA. Data was collected through a combination of on-site interviews and a follow-up mail survey. The follow-up survey was designed to collect more in depth characteristics of the wilderness users and their perceptions of the wilderness experience.

The field research for this study was carried out between May 31 and August 31, 1997 in the HPWA of the Adirondack State Park. A total of 12 week days and 21 weekend days were systematically sampled at three different public trailheads. Three major use trailheads were chosen for the amount of use and geographic access to the HPWA based on the information in the proposed High Peaks Unit Management Plan (HPUMP) produced by the New York State Department of Environmental Conservation (1996). Brief field interviews of wilderness user's measured descriptive user characteristics including: previous wilderness experience, number of days on the trail, whether they were a first time user of the HPWA, and user name and address. The interview days were split into two sessions: the morning sessions took place from 7:00 am - 12:00 pm and the afternoon sessions took place from 2:00 - 7:00 pm. The interviewer systematically conducted interviews at two different trail heads per day in the following order: Adirondack Loj, the Upper Works, and Johns Brook. These rotations were done in three day blocks ensuring that each trailhead was sampled equally for morning and afternoon sessions and stratified for weekend days and weekdays. Because there were a large number of users at the trailheads, the interviewer systematically selected users at the trail register for interviews during each sampling session (i.e., the next user were selected as each interview was completed).

The mail survey was developed for a larger study conducted in three Adirondack wilderness areas: Ha-Da-Ron-Dah, Siamese Ponds, and High Peaks Wilderness Areas and based upon the work of Dawson et al. (1997). The mail survey asked in depth questions about user characteristics and the human dimensions of the wilderness experience including: 46 wilderness attributes that are potential satisfiers and 16 wilderness attributes that are potential dis-satisfiers. The respondent was asked to rate

each attribute on an 11 point scale of importance (0 least important to 10 most important) as well as whether they were satisfied or not with that particular attribute in their HPWA wilderness experience on a 5 point Likert scale (-2 dissatisfied to 2 satisfied). The survey included an overall satisfaction question about whether the respondent was satisfied with their HPWA wilderness experience using the same 5 point Likert scale.

A modified Dillman mail survey technique was used (Salant and Dillman 1994) and up to two mail survey reminders were sent to ensure a high response rate. Herein, those users who were interviewed will be referred to interviewees and those users who were interviewed and who responded to the mail survey will be referred to as respondents.

The interview and mail survey data was coded and entered into SPSS for Windows. The statistical analysis procedures included: descriptive statistics, frequencies analysis, a chi-square test and an exploratory factor analysis. The exploratory factor analysis was conducted using orthogonal varimax rotation with pairwise deletion to extract the underlying cognitive human dimensions within both the 46 potential attributes (satisfiers) and the 16 potential attributes (dis-satisfiers) listed in the survey. Two criteria were used for inclusion in the factors: (1) factor loadings had to be 0.40 or greater for each individual item to be included in a factor and (2) Eigenvalues had to be 1.0 or greater to retain a factor (factors were not forced). Cronbach's alpha tests calculated the internal reliability of the extracted dimensions (Nunnally 1978) and each factor had to have a Cronbach's alpha of greater than 0.50 to be retained.

User Characteristics

A total of 710 people were interviewed during the 1997 study and asked to participate in the follow-up mail survey. Of the 710 surveys sent out, 462 people responded and 21 surveys were undeliverable making for a response rate of 67%. The possibility of a mail non-response bias was assessed by comparing six variables collected during the on-site interview. There were no statistical differences found between the mail survey respondents and non-respondents interviewed: at the three different trail heads, in the morning or afternoon sessions, during weekend days and weekdays, and from different residence areas (table 1). There was a statistically significant difference in respondent and non-respondent responses in their reported levels of previous experience. The percentage difference was not large and suggests that those with more experience were more likely to respond to the mail survey (table 1). In a t-test of the mean days of trip length for respondents and non-respondents, no statistically significant differences were found (non-respondent mean days = 2.13 and respondent mean days = 2.60, $F = .333$, $p = .56$).

The HPWA users interviewed came from a variety of different places with over half of them from New York State and nearly a quarter from Canada, most notably the provinces of Ontario and Quebec (table 2). Of the 710

wilderness users interviewed, 68% had other wilderness experience and had been to the HPWA before. 18% were first time visitors to the HPWA. 10% had no other wilderness experience and were first time visitors to the HPWA. and 4% had no previous wilderness experience. Just over half of the users interviewed (54%) were day users while the rest (46%) of the users stayed 2 or more days in the HPWA.

Table 1. Chi-square tests comparing the responses of mail survey respondents and non-respondents in the HPWA during the summer of 1997.

Variables	X ²	DF	P
Comparison between three trailheads.	1.69	2	.52
Comparison between those interviewed during AM or PM interview sessions.	.37	1	.58
Comparison between those during weekend vs. weekday interview sessions.	.55	1	.25
Comparison between reported residence areas.	11.76	9	.22
Comparison between users previous experience in wilderness*	4.80	1	.03

*Chi-squared statistic significant at p< .05

Table 2. Residence of interviewees in the HPWA during the summer of 1997.

Residence area	Percent
New York	51.3%
New Jersey	5.1%
Pennsylvania	4.1%
Vermont	3.8%
Connecticut	2.4%
Massachusetts	1.4%
Other states	8.2%
Canada	23.7%
Outside U.S	0.1%
Total	100.0%

Human Dimensions of the HPWA Wilderness Experience

The distribution analysis of the responses to the 52 experience attributes showed a tri-modal distribution and suggested a digit preference (i.e., certain numbers were reported disproportionately). Digit preference is defined as a special case of response bias that can be recognized because disproportionate numbers of responses end in certain digits (Vaske et al. 1996). Prevalent in this study were responses to the importance scale with the digits 0, 5, and 10. Although digit preference is recognized in the literature, little attention has focused on defining the concept nor the explanatory variables that might account for such response patterns (Vaske et al. 1996). Strategies for dealing with digit preference are experimental at best. Vaske et al. (1996) suggest that mathematical smoothing may be best way to treat the data set. However, this works

better with larger scale scores and larger data sets. The treatment used to achieve a more normal distribution in this data set (i.e., reduce the digit preference bias) was lumping the 11-point scale score into a seven point scale as follows: 0, 1 and 2, 3 and 4, 5, 6 and 7, 8 and 9, 10. This created a "lumped" importance scale that was then used for an exploratory factor analysis.

An exploratory factor analysis was conducted on the 46 positive (satisfier) attributes and nine factors were extracted and named based on the attributes which built each factor or human dimension (table 3).

Exploratory - This factor was made up of seven attributes, three of which were the highest ranked of the 46 items: (1) experience the scenic quality of nature, (2) see spectacular views and unique places, and (3) enjoy the view from the mountain top. This dimension illustrates the importance of wilderness characteristics to the wilderness user. In a wilderness privacy report by Dawson and Hammitt (1996), one of the highest ranked items in those studies of users in the Great Smoky National Park and the Adirondack Forest Preserve wilderness was "the tranquillity and peacefulness of the remote environment" which parallels how this attribute was ranked in this study.

Remoteness - The three items in this factor indicate that characteristics such as remoteness and experiences free from human influences are quite important to the user and are ranked close to the exploratory dimension. This is similar to Dawson and Hammitt's (1996) findings that attributes such as developing a sense of remoteness free from human intrusions of lights and sound were among the top ranked items in their wilderness area studies.

Simple Living - This factor was comprised of three attributes that indicate the enjoyment of a simplification of life or a different lifestyle than the one the user participates in on a daily basis. It suggests that wilderness is not a departure from life but a return to basic needs of food, water and shelter, plus the opportunity to concentrate on body and self.

Natural Environment - Observing wildlife, experiencing mature forests, and exploring in a natural environment made up this dimension. Each of these attributes were similarly rated by respondents and lend support to each other. These attributes depend on the ecological resources of the wilderness condition and points to the ecological awareness of the wilderness user.

Shared Solitude - These two attributes suggest that users seek solitude from other groups when in a wilderness setting but look for social interaction among members of their own group for a "shared solitude" (Hummel and Donovan 1990). These two attributes also appeared in Dawson and Hammitt's (1996) study under a dimension called "Intimacy" and appear as important attributes in both studies.

Table 3: Cognitive satisfier dimensions of the wilderness experience in the High Peaks Wilderness Area based on factor analysis of 46 individual items for the High Peaks Wilderness Area respondents from May 31 - August 31 1998.

Satisfier	Factor Loadings	Mean Ratings*	Factor Mean	Factor Alpha Value (Cronbach's)
Exploratory			5.2	.83
Experience the scenic quality of nature	.60	5.5		
See spectacular views and unique places	.74	5.4		
Enjoy the view from the mountain top	.70	5.3		
See different dramatic landscapes	.75	5.1		
Tranquillity and peacefulness of the remote environment	.43	5.1		
Physical challenge	.46	5.0		
Having an adventure and sense of discovery	.46	5.0		
Remoteness			5.0	.63
An environment free of man made lights	.81	5.3		
Develop a sense of remoteness from cities and people	.76	5.2		
Get away from man made lights	.45	4.5		
Simple Living			4.8	.64
Physical health and exercise	.54	5.2		
Get away from daily routines	.59	5.0		
Simplify daily priorities and needs	.51	4.3		
Natural Environment			4.7	.71
Observe and hear wildlife in a natural setting	.62	4.7		
Experience mature and natural forests	.45	4.7		
Explore in a natural environment	.61	4.7		
Shared Solitude			4.2	.66
Privacy from most people, yet a personal relationship with my family and friends	.75	4.5		
A small, intimate group experience, isolated from all other groups	.71	3.9		
Connectedness/Spiritual			4.0	.88
Feel excitement about life	.41	4.6		
Celebrate wilderness as a symbol of naturalness	.53	4.5		
Develop a sense of oneness with nature	.51	4.4		
Feel connected to a place that is important to me	.57	4.4		
Observe and appreciate the complexity of an ecosystem	.50	4.4		
Feel connection with others who value wilderness	.66	4.1		
Recreate in an outdoor primitive environment	.47	4.0		
Feel a sense of an earlier rugged time in history	.56	3.8		
Experiencing feelings about the fragility of life	.50	3.3		
Feel connection to others who have written about wilderness	.51	2.6		
Wilderness Travel Skills			3.9	.88
Develop a sense of self sufficiency	.62	4.4		
Improve wilderness travel skills	.70	4.4		
Learn to travel to a remote destination and return successfully	.51	4.1		
Develop a sense of self confidence	.60	4.0		
Share my skills and knowledge with others	.61	3.8		
Share my knowledge with others	.69	3.7		
Test recreational equipment	.66	2.7		
Self Discovery			3.6	.87
Reflect on life and living	.53	4.3		
Chance to think and solve problems	.71	3.8		
Being alone and experiencing and experiencing solitude	.62	3.6		
Stimulate creativity	.52	3.6		
Opportunity for self discovery	.62	3.6		
Get in touch with true self	.61	3.3		
Free from observation by all other people	.47	3.1		
Adventure			3.4	.78
Freedom of choice as to actions and use of time	.45	3.9		
Experience places I read about or heard about from others	.57	3.4		
To have a story to tell others later	.59	3.3		
Feel like I was one of the first people to experience this place	.62	2.9		

*Mean Ratings based on a 7-point scale from not important (0) to extremely important (6).

Connectedness/Spiritual - This was the dimension with the most attributes and almost all of the ten attributes use such descriptors as "feel" and "connection." This is the essence of romantic ideas among users and writers about wilderness. Borrie and Roggenbuck (1996) examined six aspects of the wilderness experience based on the writings of wilderness philosophers like Muir, Thoreau, Nash and Olson: oneness, humility, primitiveness, timelessness, solitude, and care. For example, Borrie and Roggenbuck suggest that wilderness promotes a re-establishment of close relationships to nature or as John Muir wrote "going to the wilderness is going home." These connections were inherent in the early wilderness visionaries of the wilderness movement. This dimension suggests these same wilderness ideals are alive and well in the HPWA wilderness users of today.

Wilderness Travel Skills - The seven items which made up this dimension show the importance of wilderness as a classroom to HPWA users. When testing skills and equipment or developing self sufficiency and confidence,

these users are showing a willingness to learn, adapt, and improve their proficiency in wilderness travel.

Self Discovery - This dimension included seven items all of which focused on self. This dimension indicates a need for opportunities for users to focus inward during their wilderness experience. These attributes touch on the ideas of Roderick Nash (1979) and Gary Snyder (1990) who examine the "inner" wilderness, not as a land designation but as a place within each of us.

Adventure - The adventure dimension is made up of four items which emphasize the spirit of adventure that has been an integral part of human history and literature. The desire to experience an adventure that one has read about or heard about is at the heart of why so many users travel to wilderness.

An exploratory factor analysis was conducted on the 16 negative (dis-satisfier) attributes and four factors were extracted and named based on the attributes which built each factor or human dimension (table 4).

Table 4. Cognitive dis-satisfiers dimensions of the wilderness experience in the High Peaks Wilderness Area based on factor analysis of 16 individual items for the High Peaks Wilderness Area respondents from May 31 - August 31 1998.

Dis-satisfier	Factor Loadings	Mean Ratings*	Factor Mean	Factor (Cronbach's) Alpha Value
Visual Litter Impacts			4.9	.56
The amount of litter along the trails and at campsites	.76	5.6		
Adequate disposal of human waste	.51	4.9		
Campfire rings full of charcoal, ashes & trash	.68	4.1		
Crowding Issues			4.4	.93
The number of large groups 10 or more people	.82	4.5		
The number of hikers you saw at scenic overlooks or summits	.90	4.5		
The number of groups camped	.77	4.4		
The number of hikers you saw on trails	.87	4.4		
The number of hikers you saw on at ponds or lakes	.87	4.2		
Information Dissemination			4.4	.61
The ability to find an unoccupied campsite	.73	4.7		
Finding safe drinking water	.65	4.4		
Information on where others are likely to be	.68	3.9		
Management Impacts			4.2	.62
Condition of trail system	.57	4.6		
Enough parking spaces at entry	.56	4.3		
Publicized rules and regulations at entry points	.80	4.2		
The number of places where others have camped	.49	4.2		
Dogs allowed with in area	.49	3.6		

*Mean Ratings based on a 7-point scale from not important (0) to extremely important (6)

Visual Litter Impact - The three items which made up this factor all deal with visual impairment concerning litter and impacts created by the last user. This factor had some of the highest mean attribute ratings and the highest factor mean among the dis-satisfier dimensions. It suggests that people are quite aware of impacts by other users on the resource and suggests a negative impact on the overall experience of the wilderness user.

Crowding Issues - This dimension is made up of five attributes that deal with the number of other users seen in a

certain area. Crowding often has been studied because of its impacts on the wilderness experience and this dimension shows that crowding does have an important impact on the users of the HPWA. However, this dimension alone does not define the wilderness experience since nearly 70% of the interviewees were wilderness users with previous experience in the HPWA and other wilderness areas (i.e., most users were aware of the potential crowding in the HPWA based on experience).

Figure 1. Potential indicators for managers to monitor the human dimension conditions in the HPWA.

Indicator	Importance Rating: 0 (no importance) to 6 (high importance)	Satisfaction Rating: -2 (very dissatisfied) to 2 (very satisfied)
Exploratory		
Experience the scenic quality of nature, Tranquillity and peacefulness of remote environment, Physical Challenge	_____	_____
Remoteness		
Develop a sense of remoteness from cities and people, An environment free of man made lights.	_____	_____
Simple Living		
Physical Health and exercise; Get away from daily routines; Simplify Daily Priorities	_____	_____
Natural Environment		
Observe and hear wildlife in a natural setting; Experience mature natural forests	_____	_____
Shared Solitude		
Privacy from most people, yet a personal relationship with my family and friends;	_____	_____
Connectedness/Spiritual		
Celebrate wilderness as a symbol of naturalness; Feel excitement about life; Develop a oneness with nature	_____	_____
Wilderness Travel Skills		
Develop a self sufficiency in wilderness; Improve wilderness travel skills	_____	_____
Self Discovery		
Reflect on life and living; Chance to think and solve problems	_____	_____
Adventure		
Freedom of choice as to actions and use of time;		
Experience places I read about or heard about from others	_____	_____
Visual Litter Impacts		
Amount of litter on trails and at campsites; Adequate disposal of human waste	_____	_____
Crowding Issues		
Number of large groups 10 or more people; Number of hiker you saw at scenic overlooks and on trails	_____	_____
Information Dissemination		
The ability to find an unoccupied campsite; Finding safe drinking water	_____	_____
Management Impacts		
Condition of trail system; Enough parking at entry points	_____	_____

Information Dissemination - The ability to find safe water, an unoccupied campsite site, or a campsite away from other people are the three items that made up this dimension. These attributes may make up a minimum acceptable site condition necessary for a satisfying wilderness experience and suggest the need to educate users on current conditions of popular destination points.

Management Impacts - The five items in this dimension are all items which can be managed by land management agencies. The top three items are related to access issues: trail conditions, parking availability, and publicized rules and regulations at entry points. These issues are a constant challenge to wilderness managers who are chronically under funded and managing high demand areas.

Discussion

The NYSDEC utilizes the Limits of Acceptable Change (LAC) framework in setting the objectives for wilderness conditions in the HPWA. The LAC uses concepts of carrying capacity to regulate and manage for desired social, economic and ecological conditions. For example, the NYSDEC (1996) will use the LAC within the HPUMP and apply four considerations to identify possible actions to manage the social conditions in the HPWA: (1) the identification of acceptable social indicators, (2) an analysis of the relationship between existing social conditions and those desired, (3) determinations of necessary actions needed to achieve desired social conditions, and (4) a monitoring program to see if objectives are being met. The actions taken by the NYSDEC will follow a course of increasing control (i.e.,

“minimum tool rule”) where priority is first placed on management by : (1) education and information dispersal, (2) indirect control methods such as dispersing use, and (3) the minimum degree of regulation required to meet the management objective.

For managers, constrained by budgets and man power, monitoring all aspects of human dimensions (i.e., social conditions) is not possible. Managers seeking to monitor changes in conditions (e.g., social and ecological) are increasingly looking to the use of indicators (Merigliano 1990). An indicator is defined as a means of reducing a large amount of information down to its simplest form while still retaining the essential information needed to make decisions (Ott 1978). Indicators provide a comprehensive overall assessment of current conditions. Social indicators when used in the LAC framework will alert managers to changing conditions in need of corrective measures and evaluate the effectiveness of current or past management actions. In this way, managers can monitor their status in achieving their desired objectives.

The nine potentially positive or satisfier dimensions and four potentially negative or dis-satisfier dimensions identified in this study provide an overview of what today's HPWA wilderness user's are looking for in their wilderness experience. Once these 13 indicators have been further tested, managers can assess human dimensions conditions in wilderness areas using surveys which are far shorter and less cumbersome to both manager and respondent while still providing an accurate assessment of the wilderness conditions. This can be done by using each identified dimension as an indicator item on a questionnaire (Figure 1)

Utilizing a questionnaire like this one will give managers a report card of human dimensions (i.e., social conditions) which can be evaluated by users on their way out of the HPWA. The results of this report card can be plotted using an importance performance analysis, where X is the mean importance scale score of each indicator and Y is the mean satisfaction scale score of each indicator (Martilla and James 1977). This instrument will be helpful to managers seeking an overview of conditions which need remedial actions. This instrument is not intended to pinpoint specific items in need of corrective management action rather it is intended to give an overview of what areas and conditions warrant attention. Once conditions are ascertained, managers and researchers can focus on specific aspects of the user experience which need corrective measures.

Managers from different state and federal agencies governing designated wilderness are now making the identification of the human dimensions of the wilderness experience a research and monitoring priority (Brunson 1995; Watson and Landres 1997; Roggenbuck 1990). This information is important to the LAC process and, more generally, it is directly valuable to managers who can better understand the user and manage more effectively by: (1) obtaining the information to educate the public, (2)

providing information to users enabling them to find the recreational experience they desire, and (3) providing insight to the user and manager on how to better protect the resource.

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DO RESOURCE MANAGERS DIFFER FROM THE PUBLIC IN THEIR PREFERENCES FOR MANAGEMENT ALTERNATIVES?

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Abstract: A conjoint ranking survey was designed to solicit preferences for various levels of timber harvesting, wildlife habitats, hiking trails, snowmobile use, and off-road-vehicle access on the Green Mountain National Forest in Vermont. The survey, in which respondents chose between multiple-objective alternatives, was completed by 76 respondents during public involvement sessions and by 32 personnel from the Green Mountain National Forest. Market segmentation techniques are used to compare the preference structures of resource managers with those of the public.

Introduction

Based on a nationwide study of USDA Forest Service personnel, Brown and Harris (1993) concluded that an increasing number of nonforesters within the agency would have a significant impact on the agency's resource management paradigm. Xu and Bengston (1997) used a computerized content analysis to track values related to national forests over time. They found that forest value systems had shifted and that there were significant differences between three groups: forestry professionals, environmentalists, and the general public. This study examines differences in the preferences toward various attributes of multiple-objective management strategies between USDA Forest Service personnel and the public.

The primary objective of this study was to solicit and assess public preferences and acceptable tradeoffs for various levels of timber harvesting, wildlife habitats, and three recreational opportunities: hiking trails, snowmobile use, and off-road-vehicle (ORV) access on two adjacent units of the Green Mountain National Forest (GMNF). The Greendale and Utley management units have a combined area of approximately 7,500 hectares, consisting primarily of mixed northern hardwoods. Dennis (1998) provides a thorough discussion of the study area, management concerns, procedures, and results of the public involvement process. A second objective was to assess the preferences and values of Forest Service personnel toward the same set of management alternatives. This was done to give Forest Service managers an understanding and "feel" for the survey used to solicit public inputs as well as the means to compare their own values with those of the public. We felt that understanding differences and similarities in the preferences and values of the two groups would improve the quality of decisions on the forest. A conjoint ranking technique was used to assess preferences.

Conjoint Analysis

Conjoint analysis is a technique for measuring psychological judgments that is often used in marketing research to measure consumer preferences (Green et al. 1988). In conjoint studies, respondents make choices between alternative products or scenarios displaying various levels of selected attributes. The objective is to decompose a set of factorially designed stimuli or attributes so that the utility of each attribute can be inferred from the respondent's overall evaluations. For example, a company interested in assessing consumer preferences for a new breakfast cereal could ask a sample of consumers to choose between or rank cereals with various attributes such as sweetness, crunchiness, nutritional quality, package design and price. These data, which outline the preferences or tradeoffs that a respondent is willing to make, can be used to solve for the partial utilities for each attribute that are imputed from the overall tradeoffs. These partial utilities or "part-worths" can be combined to estimate relative preference for any combination of attribute levels. Thus, the analyst obtains high leverage between the options actually evaluated by respondents and those that can be analyzed after the evaluation.

Conjoint techniques are well suited for soliciting and analyzing the preferences of stakeholders in environmental decisions. These decisions frequently entail tradeoffs between costs and benefits that are not represented efficiently in market transactions. For example, Opaluch et al. (1993) described an approach that used paired comparisons to rank potential noxious facility sites in terms of social impacts. Asking respondents to make choices between alternatives mimics the real choices that managers must make and shows stakeholders the consequences of their choices. Choice experiments can be designed and analyzed in many ways. Respondents may be asked to reveal their preferences by choosing one of two or more options, ranking several options, or assigning numerical ratings to each option. Numerical ratings provide the most information but may place the greatest cognitive demands on respondents. Green (1974), Green and Srinivasan (1978), Louviere and Woodworth (1983), and Louviere (1988) provide information on experimental design in the context of conjoint analysis.

Survey Design

A conjoint ranking survey was designed to solicit preferences for five forest-related attributes: timber, wildlife habitat, hiking trails, snowmobile use, and ORV access. Three levels covering the range of reasonable alternatives for the Greendale and Utley units were selected for each attribute (Table 1). Eighteen alternatives, each depicting a unique bundle of attribute levels, were chosen using an orthogonal design that allows estimation of linear and quadratic main effect components over the entire range of possible attribute combinations, with the least number of trials.

Respondents were given an explanation describing concerns and alternatives for the Greendale/Utley area as well as an overview of the nature and purpose of the conjoint study. In addition, the attributes and associated levels were described and respondents were given the opportunity to ask questions or discuss their concerns. Additional information, such as

expected volume of timber harvests for each level of the timber attribute, and lists of species favored for each level of the wildlife attribute, was provided. Large overlay maps were used to illustrate locations of forest types, prospective harvests and silvicultural treatments, travelways, and other pertinent information. Respondents then ranked 18 sample cards, each representing a unique alternative depicted by a bundle of forest-related attribute or factor levels for the Greendale/Utley area. Two sample cards are shown in Table 2. Respondents also completed a series of attitudinal and demographic questions.

Table 1. Choice attributes and levels.

Table 1. Choice attributes and levels.	
Timber	
1	Do not harvest timber
2	Harvest timber on 5-10 % of the planning area
3	Harvest timber on 15-20 % of the planning area
Wildlife	
1	Favor wildlife preferring contiguous unbroken forests
2	Favor wildlife preferring a mix of young forests and contiguous unbroken forests
3	Favor wildlife preferring open lands and young forests
Hiking Trails	
1	Maintain existing hiking opportunities
2	Extend the hiking trail system to include 2 additional miles
3	Extend the hiking trail system to include 6 additional miles
Winter Motorized	
1	Do not permit snowmobile use
2	Maintain the existing 16 miles of travelway for snowmobile use
3	Extend the travelway available for snowmobile use to 23 miles
Summer Motorized (e.g. 3-and 4-wheelers, motor trail bikes)	
1	Do not permit ORVs on travelways
2	Provide approximately 5 miles of travelway for ORV use
3	Provide approximately 8 miles of travelway for ORV use

Table 2. Two illustrative sample cards.

Alternative #8	Alternative #14
Harvest timber on 20-25% of the planning area	Harvest timber on 5-10% of the planning area
Favor wildlife preferring a mix of young forests and contiguous unbroken forests	Favor wildlife preferring a mix of young forests and contiguous unbroken forests
Extend the hiking trail system to include 6 additional miles of trails	Extend the hiking trail system to include 6 additional miles of trails
Maintain the existing 16 miles of travelway available for snowmobile use	Do not permit snowmobile use
Do not permit ORV's on travelways	Provide approximately 5 miles of travelway for ORV use
RANK ____	RANK ____

The survey was administered by USDA Forest Service personnel during public meetings. Although efforts were made to attain a broad group of respondents, we did not attempt to achieve representation from every interested group or to select a random sample of respondents to represent the general public. The goal for this portion of the GMNF's outreach effort was to solicit and analyze the preferences of people who were interested and willing to participate in the management decisions for the Greendale/Utley area. Similarly, the sample of Forest Service personnel was not selected to represent the views or preferences of Forest Service employees in general. The choices and preferences expressed by the Forest Service personnel were their personal views and not the choices that they would necessarily make with respect to managing the area for the public.

Results and Discussion

The survey was completed by 76 respondents during public involvement sessions and by 32 personnel from the GMNF. The conjoint procedure in "SPSS Categories" was used to estimate the model parameters. This procedure uses an ordinary least-squares estimation method that has been found to perform as well as other methods, and has the advantage of being easier to use and interpret (SPSS Inc. 1994). Linear effects were estimated for all attributes, and quadratic effects were estimated for the attributes depicting timber harvesting, wildlife habitats, and snowmobile access. Previous work indicated these to be the important effects (Dennis 1998). The procedure produces utility (part-worth) scores and their standard errors for each attribute or factor level for each respondent. Results may be averaged across selected groups as shown in Table 3 for public and Forest Service respondents.

Table 3. Estimated model parameters for public and Forest Service respondents.

Attribute	Public		Forest Service	
	Coefficient	t-value	Coefficient	t-value
Hiking	0.1623	1.07	0.1641	0.77
ORV	-1.7050	-11.28	-0.1849	-0.86
Timber	12.1120	11.45	10.6900	7.14
(Timber) ²	-2.5395	-9.70	-1.8203	-4.91
Wildlife	1.9792	1.87	1.4010	0.94
(Wildlife) ²	-0.5428	-2.07	-0.3906	-1.05
Snowmobile	3.3893	3.20	7.9557	5.31
(Snowmobile) ²	-0.8980	-2.29	-1.8203	-4.91
Constant	-3.8004	2.29	-11.7400	-4.99

The part-worth for a particular attribute level can be computed using the coefficients shown in Table 3. For variables with linear effects, only the part-worth is the estimated coefficient multiplied by the factor or attribute level. If there is also a quadratic effect, the associated coefficient is multiplied by the square of the attribute level and added to the linear effect to yield the part-worth for the respective attribute. For example, for public respondents the

Figure 1. Importance Scores

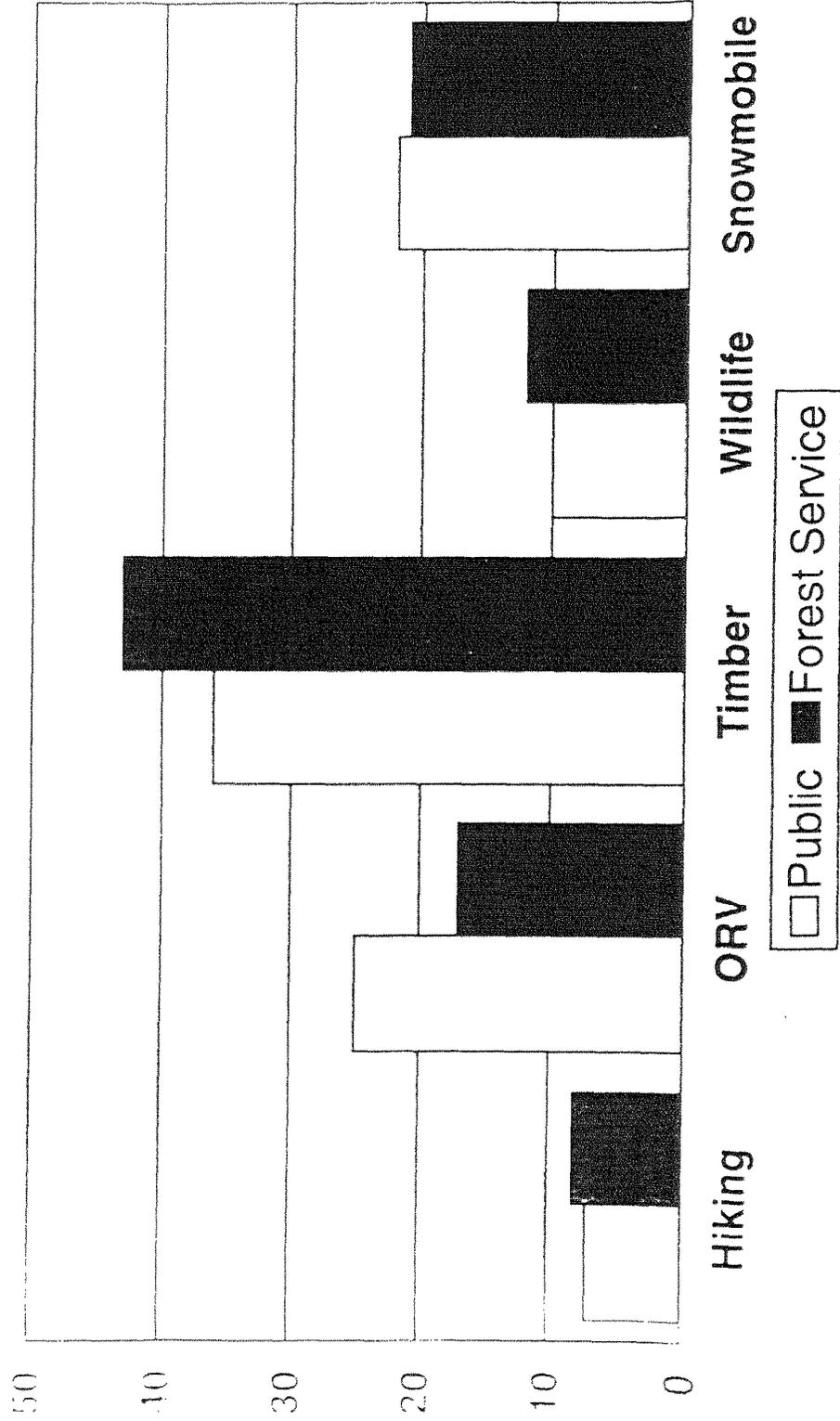
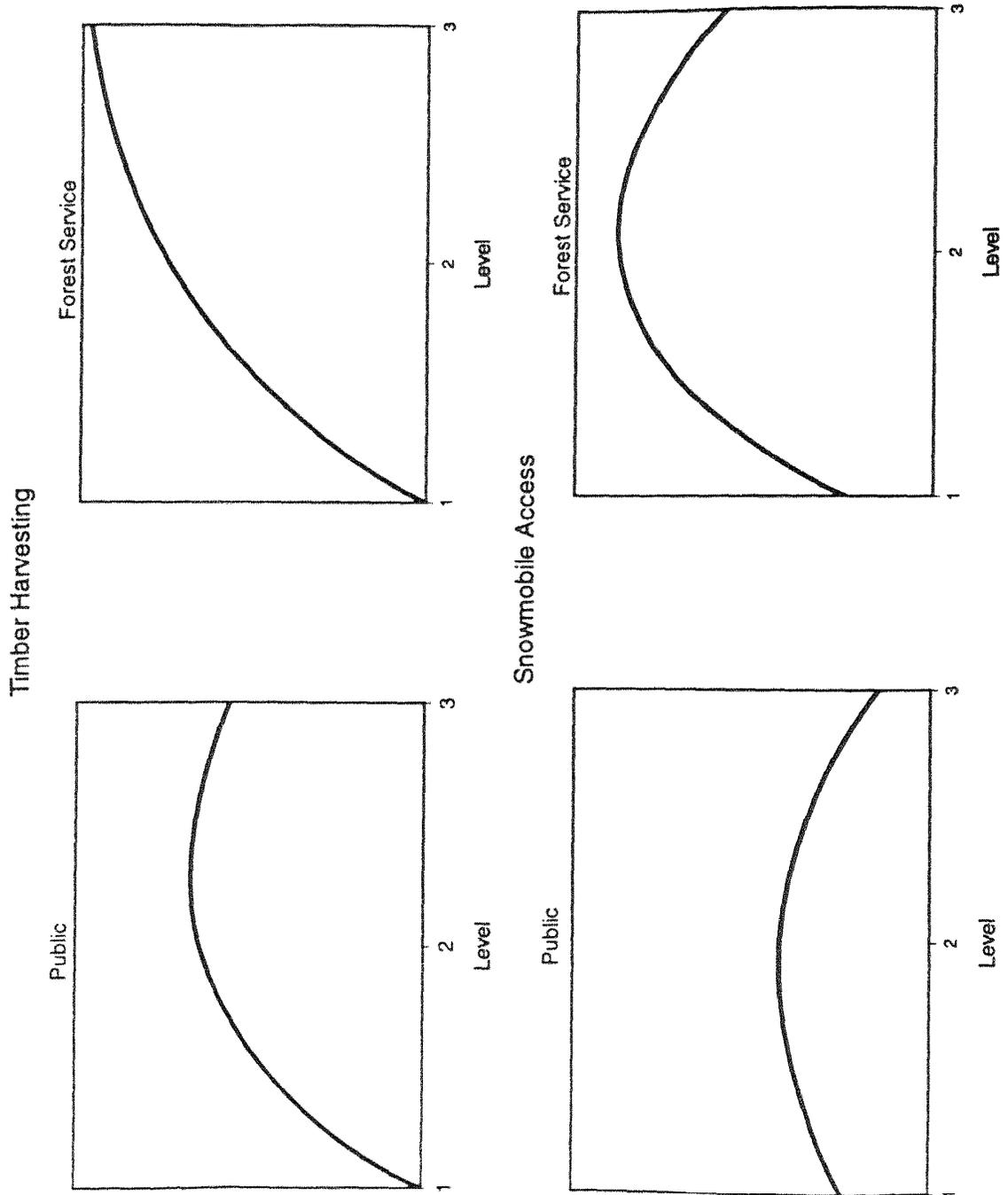


Figure 2. Part-worths for timber harvesting and snowmobile access.



part-worth for timber harvesting at level 2 is 14.066 [12.112(2) - 2.5395(2²)]. The total utility of any combination of attributes can be determined by summing the part-worths for each attribute level.

Since the part-worths are expressed on a common scale, the attributes can be compared by looking at the ranges of these utilities. The relative importance scores shown in Figure 1 were computed by taking the utility range for a particular attribute and dividing it by the sum of all the utility ranges.

Timber harvesting was clearly the most important attribute in the decisions for both the public and Forest Service employees, though more so for the Forest Service. Concerns about ORV access were considerably more important to the public than to the Forest Service, whereas differences in the level of snowmobile access offered in the area was about equally important to both groups. It is important to remember two things when interpreting the importance scores. First, they do not indicate whether increases in an attribute were favored or not, and second, they apply only within the context of the range of factor levels considered in the survey. For example, hiking in general may be very important to these respondents, but they did not consider the differences in the levels of the alternatives presented to them to be as important as the differences in the other attributes.

Figure 2 shows the part-worth scores for timber harvesting and snowmobile access. Both the public and Forest Service employees favored timber harvesting. In comments made during the sessions and responses to opinion questions regarding timber harvesting, the public indicated that they support harvesting. However, they were basically indifferent to an increase beyond level 2, whereas Forest Service personnel favored the maximum harvest level provided in the alternatives (harvesting some timber on 15-20% of the area over the planning horizon). Both groups favored maintaining the existing network of snowmobile trails over closure or extending the trail network. However, the estimated decrease in utility resulting from closing the area was much greater for the Forest Service than the public. The public considered snowmobiling to be a legitimate use of the area even though very few of the respondents participated in snowmobiling, which may explain the small decrease in utility resulting from closure.

Neither group favored opening the area to ORV use. The public was very concerned about the negative impacts that they perceived from ORV use. The estimated part-worth for this attribute was negative, relatively large, and highly significant. The Forest Service employees on the other hand were not nearly as concerned as evidenced by a negative but not statistically significant estimated part-worth.

The public respondents preferred a mixture of unbroken contiguous and more open forest habitats over either extreme. This is indicated by the relative size and significance of the quadratic term for the wildlife attribute. Many of the Forest Service employees indicated that they were concerned about wildlife habitat but weighted the timber harvesting attribute more heavily because they knew that harvesting timber would achieve habitat diversity.

Although estimation of the conjoint model yielded positive coefficients (part-worths) for the hiking attribute, they were not statistically significant for either group of respondents. As previously mentioned, this may be due to the relatively small differences in the levels for this attribute. Numerous other hiking opportunities exist nearby and throughout the region which may aid in explaining the relative apathy of respondents toward the hiking attribute.

The part-worths may be summed to yield the total utility of any combination of attribute levels. The optimal alternative for the public included timber harvesting, snowmobile access, and wildlife habitats at level 2, ORV access at level 1, and hiking at level 3. The only difference between this and the most preferred alternative for the Forest Service employees was a move to level 3 for timber harvesting.

Conclusions

There were many similarities in the preferences of the public and Forest Service personnel as well as some differences. The public was more concerned with conflicts on recreational trails and potential environmental degradation that might be caused by ORV's and to a lesser extent snowmobiles. Although both groups preferred maintaining the existing network of snowmobile trails, the Forest Service respondents expressed significantly greater dissatisfaction with the prospect of travelway closure. There was widespread support for timber harvesting with the Forest Service respondents, as expected, favoring more harvesting than the public. The optimal mix of attribute levels preferred by each group differed only with respect to timber harvesting and by a relatively small amount.

Although there is conflict and heated debate over management on some portions of the GMNF the Greendale and Utey units are not marked with controversy, which may help explain why the results reported here are characterized more by similarity than difference. The techniques are useful not only in enabling managers to understand their values and acceptable trade-offs but also in helping them see the differences and similarities between their views and the public's. Similar analyses can be used to assess differences and similarities in the preference structures of different groups of public respondents. Future work will examine the use of clustering and discriminant analyses to explore differences with respect to demographic or attitudinal variables. This may enable the Forest Service to better understand differences in the preferences and values of a diverse and often demanding population of stakeholders in national forest decisions.

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THE ROLE OF ANCILLARY SKILLS IN WILDLAND RECREATION ACTIVITY PARTICIPATION

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Abstract: Recent research has raised concerns that traditional activity instruction approaches for introducing children and youth to wildland recreation activities may be inadequate, particularly if the person is from a family that is disinterested in wildland recreation activities. This research tested whether swimming ability was related to having tried water-based wildland recreation activities. The results suggest the need to further explore what types of ancillary attitudes and skills increase the willingness of a person to readily adopt a new recreation activity.

Introduction

Park districts near large urban areas often offer instruction to children and youth on how to participate in wildland recreation activities. Many of these participants are from families who lack interest and involvement in traditional outdoor recreation. Recent research has raised questions about whether simply providing basic activity skills instruction will result in these youth adopting the activity as young adults. Encouraging increased participation in wildland recreation among nontraditional participants may be critical to wildland-urban interface park districts. Many of these districts are experiencing significant population increases among demographic groups that have traditionally been inactive in wildland recreation (Dwyer, 1994). Effectively introducing nontraditional audiences to wildland recreation activities can provide these groups with the many benefits of participation (see Driver, Brown & Peterson, 1991), increase support for natural resource-based park districts, and provide optimal opportunities to teach land-use ethics in natural resource settings.

A recent qualitative study of canoeists and kayakers indicated that adopting wildland recreation activities consists of a socialization process that encompasses several life stages (Bixler & Morris, 1997). Results suggest that youngsters who spent time with parents or peers who were outdoor enthusiasts, developed several important competencies in wildland environments. These include: wayfinding, travel skills, swimming skills, preference for wildland environments over built and semi-natural environments, and tolerance for weather extremes and other environmental irritants. The results paint a much richer picture of activity socialization than the general quantitative studies of the 1970s that documented that many outdoor recreation activities are learned in childhood

(Scott & Willits, 1989; Sofranko & Nolan, 1972).

Additional evidence can be found in the scattered literature on wayfinding and significant life experiences of conservation leaders that tend to validate the importance of the concepts identified by Bixler and Morris (1998) (Bixler & Floyd, 1997; Kaplan, 1976; Matthews, 1987; Chawla, 1988; Chawla, 1998; Saegart & Hart, 1979; Schroeder & Anderson, 1984; Mael, 1995; Nerlove, Munroe, & Munroe, 1971; Tanner, 1980; Ulrich, 1993). Unfortunately, few of these studies dealt specifically with recreation activity participation, suggesting the need to conduct empirical research using recreation participation and preference as key dependent variables.

This study reports preliminary results from a quantitative study that examined how childhood experiences are related to having been introduced to canoeing and kayaking. While the entire study examines a range of ancillary attitudes and skills, the results reported here only address swimming skills.

Method

Respondents consisted of 400 incoming new employees of a regional park district and 160 summer camp counselors. This convenience sample was used because recreation participation data documents that only a small percentage of the population is regularly involved in paddle sports (Dwyer, 1994). Consequently, a random sample of a population would need to be very large to contain a statistically adequate number of paddlers to contrast with non-participants. Because the sample is nonrandom, inferences beyond the sample should be made with caution. The sample contains few respondents who would prefer to work inside, thus avoiding the outdoors. Most park district and summer camp jobs require considerable outdoor work. Consequently there is potential in the analyses for Type II errors. Data were collected using a self-report questionnaire, administered in controlled group settings.

Respondents (n=560) were given a list of 20 wildland, outdoor and indoor activities and asked to report whether they had participated. Six of the items dealt with canoeing or kayaking and were varied by the types of water bodies where these activities often take place. Respondents indicated whether they had canoed on a lake, slow flowing river or whitewater river. Participation in kayaking was measured in an identical manner. Responses were coded to 0=have not tried, 1=have tried. For canoeing, 192 respondents had not canoed on a lake, 165 had not canoed on a slow-flowing river, and 312 had not canoed on a whitewater river. For kayaking, 320 had not kayaked on a lake, 367 had not kayaked on a slow-flowing river and 426 had not kayaked on a whitewater river.

Two clusters of respondents were identified, using three composite variables. These variables were: personal swimming skills, parental modeling of swimming behaviors and experience before the age of 16 swimming in natural bodies of water. The first composite variable (4 items) measured basic swimming skills and comfort in the deep end of a swimming pool. It was based on a true-false format and had KR-20 reliability coefficient of .68. The

second composite variable (4 items) measured parental involvement in swimming and modeling of swimming behavior to their children. These items also used a true-false format (KR-20=.56). The third variable was a measure of swimming experience in natural bodies of water (lakes, ponds, rivers) based on a scale from 0 to 4 where 0=no experience and 4=frequent experience (alpha=.74). In combination, the items reflect skill, social support and experience with aquatic wildland environments. All variables were standardized (z-scores) and subjected to K-means cluster analysis.

Chi-square analysis was used to test whether respondents assigned to the high swimming skills cluster were more likely to have tried canoeing and kayaking in each of the three water environments than those in the low swimming skills cluster.

Results

For both canoeing and kayaking in all three water environments, there were significant differences in having tried canoeing and kayaking (Table 1). For canoeing on lakes, 18.8% in the low water skills cluster had tried the activity, while 81.2% in the high water skills cluster had tried the activity. For canoeing on slow rivers, 19.9% in the low water skills cluster had tried the activity, while 80.1% in the high water skills cluster had tried the activity. For canoeing on whitewater rivers, 14.0% in the low water skills cluster had tried the activity, while 86.0% in the high water skills cluster had tried the activity. For kayaking on lakes, 16.4% in the low water skills cluster had tried the activity, while 83.6% in the high water skills cluster had tried the activity. For kayaking on slow rivers, 15.0% in the low water skills cluster had tried the activity, while 85.0% in the high water skills cluster had tried the activity. For kayaking on whitewater rivers, 13.6% in the low water skills cluster had tried the activity, while 86.4% in the high water skills cluster had tried the activity.

Table 1. Chi-square analysis of low/high water skills respondents by whether they have/havenot tried canoeing and kayaking.

Activity	Low Water Skills	High Water Skills	Chi-square	p-Level	Contingency Coefficient
Lake Canoeing: Have tried	64 18.8%	276 81.2%	31.9	.00001	.24
Slow River Canoeing: Have tried	74 19.9%	298 80.1%	31.6	.00001	.24
Whitewater Canoeing: Have tried	31 14.0%	190 86.0%	31.5	.00001	.24
Lake Kayaking: Have tried	35 16.4%	179 83.6%	20.0	.00001	.19
Slow River Kayaking: Have tried	26 15.0%	147 85.0%	18.2	.00002	.18
Whitewater Kayaking: Have tried	15 13.6%	95 86.4%	13.2	.0003	.16

Discussion and Conclusion

Results suggest the need to identify the ancillary skills that support the adoption of all wildland recreation activities. This study investigated one of the more obvious relationships, the role of perceived swimming competency and aquatic experiences in mediating participation in canoeing and kayaking. Understandably, people who can swim find the idea of getting into an easily capsized boat more appealing than do non-swimmers. Providing swimming experiences in natural bodies of water, not merely chlorinated swimming pools, is also important. There are undoubtedly other, more subtle ancillary skills and attitudes that mediate the development of interest, adoption and enduring involvement in a wildland recreation activity. The effectiveness of recreation programming, particularly for individuals from families that lack a tradition of participating in wildland recreation, may be positively impacted by increased awareness and sensitivity to the role of ancillary skills. If ancillary skills and attitudes must be learned simultaneously with fundamental skills, the student of the sport may be overwhelmed and lose interest. This suggests that parks and outdoor education centers should invest instructional resources in children and youth

over a long period of time to insure that ancillary skills and attitudes are developed along with the activity skills.

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THE 1996 FISHING, HUNTING, AND WILDLIFE-ASSOCIATED RECREATION SURVEY--RESULTS AND IMPLICATIONS

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Abstract: The 1996 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation was recently conducted by the Census Bureau for the US Fish and Wildlife Service. Ninth in the series, the survey has been conducted approximately every five years since 1955. The survey collects data on hunting, fishing, and nonconsumptive wildlife recreation participation and expenditures. In general, past surveys have shown hunting participation (number of participants) remaining relatively constant since 1980, while fishing and nonconsumptive participation have increased. The 1996 survey shows hunting participation continuing to hold constant, while fishing has stopped increasing and nonconsumptive wildlife recreation participation have decreased. Expenditures, however, have not followed the same trend as participation.

Introduction

The Fishing, Hunting, and Wildlife-Associated Recreation Surveys have been conducted approximately every 5 years since 1955. The surveys are paid for by funds from the Federal Aid in Sport Fish Restoration Program and the Federal Aid in Wildlife Restoration Program. Specifically, they are paid for by excise taxes on sporting arms, ammunition, fishing equipment, and motorboat fuel (U.S. Department of the Interior, 1997). The surveys are management oriented and are intended specifically to provide information for State Wildlife Managers. The surveys have shown consistent trends in participation in certain activities over the years, through 1990-91. Some interesting changes in these trends have come to light in the 1996 survey. The objectives of this paper are:

1. To provide information about the Fishing, Hunting, and Wildlife-Associated Recreation Surveys in general
2. To summarize results of the 1996 Survey

3. To compare selected results of the 1996 Survey to earlier surveys
4. To discuss some of the implications of the results of the 1996 survey

Methodology

The Fishing, Hunting, and Wildlife-Associated Recreation Surveys are conducted in two phases, usually by the Census Bureau. The first phase, the screening survey, collects demographic information as well as limited participation information. It is usually large, sampling as many as 116 thousand households and often gathering information on more than 200 thousand individuals. The survey is conducted in such a way that, after weights are applied to each observation, the results are representative of the population of the United States. The second phase is conducted using the screener sample as its population. The second phase consists of two surveys. It collects detailed participation and expenditure data on sportsmen (hunters and anglers), as well as on nonconsumptive wildlife recreationists (people who observe, feed, photograph wildlife and/or maintain areas for wildlife).

Early surveys used primarily personal interviews, switching to a combination of telephone and personal interviews about 1980. Increasing emphasis has been placed on telephone surveys due to cost considerations. Response rates over the years have generally been over 90%. The 1975 survey, however, was an exception. It was conducted by a private organization rather than the Census Bureau and it utilized a mail survey. It had the lowest response rate of all the surveys. And, in graphs of trends, it appears as a "bump on the curve".

The 1996 survey was conducted by the Census Bureau in a manner generally similar to the other surveys. There were some differences, however, resulting primarily from a budget constraint. The screener sample of 77,100 households was drawn from the 1990-91 survey sample rather than directly from the census samples used by the other surveys. Fewer screener questionnaires (44,000) were completed than in the last several surveys. There were 13,222 detailed sportsmen questionnaires completed, which is fewer than in the last several surveys. And only 9,802 nonconsumptive questionnaires were completed, which is less than half the number completed in the 1990-91 survey.

1996 Survey Results

Seventy-seven million people participated in wildlife-associated recreation in 1996 (Table 1). Most participated in residential wildlife watching, which is the new term given to what was formerly called nonconsumptive wildlife recreation, and includes observing, feeding, photographing, and maintaining natural areas for wildlife. Residential wildlife watching occurs within one mile of the home while nonresidential wildlife watching includes trips of greater than one mile from the home. The activity with the fewest participants was hunting. In terms of total days spent on activities, fishing was highest with 626 million days (Table 2). Participants in fishing and hunting coincidentally spent an average of 18 days per year on each activity.

Table 1. Participation in Wildlife-Associated Recreation in 1996 (millions of participants)

All Wildlife-Associated Recreation	77
Anglers	35
Hunters	14
Residential Wildlife Watching	61
Nonresidential Wildlife Watching	24

Table 2. Days of participation in Wildlife-Associated Recreation in 1996

	Millions of Days	Average Days Per Participant
Fishing	626	(18)
Hunting	257	(18)
Nonresidential Wildlife Watching	314	(13)

Over 100 billion dollars was spent on wildlife associated recreation, with sportsmen (anglers and hunters) spending the most (Table 3). Less was spent on wildlife watching and it is possible that opportunities for spending on this activity are fewer than for spending on hunting and fishing.

Table 3. Expenditures on Wildlife-Associated Recreation in 1996 (Billions of Dollars)

All Wildlife-Associated Recreation	101
Fishing	38
Hunting	21
Both Hunting and Fishing	14
Wildlife Watching	29

In terms of demographic characteristics, participants in different activities fall into distinctly different groups. A profile of several groups, compared to the population of the U.S. as a whole, is given in Table 4. Hunters are the most rural group with only 44% living in urban areas. In fact, participants in all surveyed activities tend to be more rural than the population of the U.S. as a whole (72% from urban areas). Males dominate hunting (91% male) and fishing (66% male). Females are more prevalent in the nonconsumptive activities. Hunters are least likely to have some college education (44%), and nonresidential wildlife watchers are the most highly educated group. Over half (54%) of nonresidential wildlife watchers had household incomes of \$40,000 or more. One may look at hunters as primarily white, rural males, who are less likely to attend college than the average U.S. resident but who, nevertheless, have higher incomes than the U.S. average. Nonresidential wildlife watchers are more urban, with the highest income and education levels of all groups.

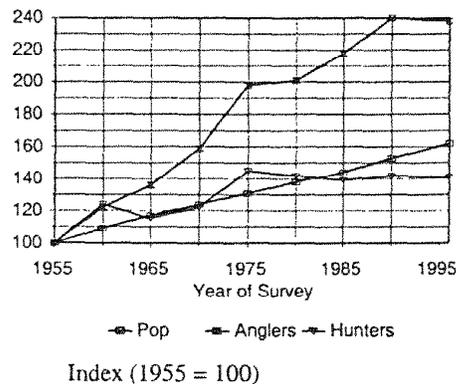
Table 4. Profile of Participants Compared to the U.S. Population in 1996 (Percent)

	U.S.	Hunt	Fish	N Res.	Res.
Urban	72	44	67	66	64
Male	48	91	66	50	46
College	48	44	54	65	56
\$40K+ income	39	47	49	54	47

Comparison of the 1996 survey with earlier surveys

Trends in hunting and fishing participation (number of participants) are presented in Figure 1. Participation in fishing increased at a rate faster than the population growth from 1955 to 1990-91, but stopped increasing from 1990-91 to 1996. Hunting participation increased with population until about 1975 and then leveled off and remained level through 1996. The 1975 bump in the trend line discussed earlier is evident in this graph.

Figure 1. Trends in Hunting and Fishing Participation



The trend in wildlife watching is presented in Figure 2. Detailed data were collected for these activities beginning in 1980. Residential wildlife watching increased slightly from 1980 to 1985, and then decreased in the subsequent surveys. This decrease was due primarily to a decrease in feeding wildlife. Nonresidential wildlife watching increased from 1980 to 1990 and was expected to continue increasing. However, the trend reversed and participation actually suffered a sharp decline in 1996.

Expenditures for the last two surveys (1990-91 and 1996) are compared in Table 5. The figures have been adjusted for inflation, and differ somewhat from figures in Table 3 because some expenditure categories were dropped so identical categories could be compared over time.

The response rate of the 1996 screener survey was 71% vs. over 90% for the past few surveys. This rate cannot be calculated from the figures given earlier because the Census Bureau drops vacant houses from the sample before calculating response rates. They have done this consistently over past surveys. Also, there were 9,802 completed

questionnaires for the 1996 wildlife watching survey, which is less than half as many as were completed for the 1990-91 survey. A technological change was also made in this survey. The 1996 survey was the first to use computer-assisted telephone interviewing and computer-assisted personal interviewing survey techniques with their corresponding automatic real time data checking.

Figure 2. Trends in Wildlife Watching Participation (Index of number of participants)

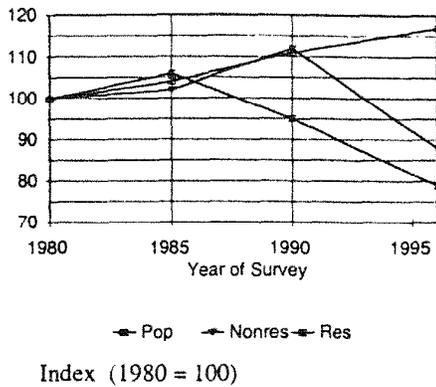


Table 5. Expenditures on Wildlife-Associated Recreation in 1996 (Million \$)

Activity	1991	1996	Percent Change
Hunting	14,187	20,329	+43
Fishing	27,589	37,673	+37
Wildlife Watching	21,242	25,654	+21

Conclusion

Even though participation remained constant for some activities or decreased in other activities, expenditures increased. One factor influencing the expenditures was an increase in days of participation by those who participated. The total number of days of hunting and fishing actually

increased during this period even though the number of participants remained almost constant. In the case of wildlife watching, the total number of days of participation did not increase, but it did not decrease as much as participation. Another factor contributing to the increase in expenditures was equipment purchases, which accounted for most of the increase. It should be remembered that the data collected for these surveys is for one year only and the year in which it was collected could have been an abnormal year. Many external factors, including consumer confidence and interest rates, can affect equipment purchases.

Participation in hunting remained almost constant as expected but participation in fishing stopped increasing while participation in wildlife watching decreased considerably. Decreases in participation mean decreases in the size of markets. Providers of goods and services to these markets will ultimately feel the effects of these decreases if they continue. Public agencies that allocate budgets based on the number of participants in an activity are likely to provide fewer facilities and services if they feel they are dealing with shrinking markets.

Finally, methodology can affect results and several significant methodological changes were made in the 1996 survey. In addition, methodological changes, usually driven by the availability of new technologies, tend to make the analyses of trends more difficult.

The 1996 survey results contained some surprises. Whether these are one time occurrences or new trends will not be known until future surveys are completed.

Acknowledgment

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RELATIONSHIPS BETWEEN VISITOR KNOWLEDGE OF "LEAVE NO TRACE" MINIMUM-IMPACT PRACTICES AND ATTITUDES TOWARD SELECTED MANAGEMENT ACTIONS

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Abstract: This paper is based on a study of National Forest users and compares the knowledge and attitudes among the various users of the Hickory Creek Wilderness, the Hearts Content Scenic Area and the Hearts Content Recreation Area in Allegheny National Forest. Specifically, visitors were asked about their self-rated level of knowledge of Leave No Trace minimum impact techniques. Their actual level of LNT knowledge was measured via a short quiz. Additionally, they were asked to respond to a series of management actions or policies addressing a variety of development options. Finally, the relationships between the variables were examined. The results of this study showed a number of significant relationships between LNT knowledge, trip purpose and support or opposition to wilderness management policies. All of the observed relationships were in the direction expected based on previous research and theory. This suggests that managers need to better inform users of the differing site management standards for developed recreation areas versus wilderness areas.

Introduction

Social and ecological impacts continue to be a major concern of recreation resource managers (Hammit & Cole, 1987; Hendee, Stankey & Lucas, 1990). One approach to managing visitor impacts has focused on attempting to change those visitor behaviors that tend to cause unacceptable impacts (Manfredo, 1992). Peterson (1985) suggested that wilderness management is 80-90 percent education and information and 10 percent regulation. An example of an initiative aimed at changing such behaviors is the "Leave-No-Trace" (LNT) minimum-impact skills and information program (Harman, 1997; McGivney, 1998; NOLS, 1997). Most wilderness areas have some type of minimum-impact education programs (Washburne & Cole, 1983).

Visitor behavior often impacts other visitors' experiences and may damage the resource base (Roggenbuck, 1992). Some management problems can be linked to misinformation (Hendee et al., 1990). Providing wilderness visitors and prospective visitors with information and education is a highly acceptable and desirable management action (Frome, 1985). As an indirect management tool, communication, including visitor education and persuasion, has shown great promise (Manfredo, 1992). Visitor acceptance of educational programs is rarely a concern, but effectiveness is often questioned (Petty, McMichael & Brannon, 1992). Cole, Hammond and McCool (1997) found hikers exhibited a significant increase in knowledge after exposure to environmental messages encouraging low-impact practices. Respondents' self-reported levels of knowledge, however, did not accurately reflect their level of knowledge as measured with a low-impact quiz. Before an Information and Education Plan (IEP) can be developed to address management problems, a baseline measure of visitor knowledge should be established.

Purpose

This paper reports on various user groups' level of knowledge of "Leave-No-Trace" minimum-impact principles, and the relationships between such knowledge and selected other variables. More specifically, we examined the following relationships: 1) Self-rated knowledge by actual knowledge as measured by a series of LNT questions; 2) Self-rated knowledge, actual knowledge and support for management actions by type of user (day user, camper, wilderness visitor); and 3) Visitors' level of LNT knowledge by user support or opposition for selected site management actions.

This study is part of a larger project designed to refine existing theoretical frameworks and enhance the conceptual understanding of the utilization of communication, persuasion and education as management techniques. The project is intended to serve as a case study demonstrating a methodology to identify gaps in visitor knowledge that would tend to reduce the effectiveness of communication and persuasion and provide generalized guidance for the development of a site-specific information and education plan.

Methodology

The study site was the Hickory Creek Wilderness Area (HWCA) and Hearts Content Recreation Area (HCRA) in the Allegheny National Forest (ALNF), located in northwestern Pennsylvania. The HCWA, totaling 8,663 acres, contains one designated trail, the Hickory Creek Trail (HCT), an 11.2 mile loop trail. Since inclusion in the NWPS, few public education or information programs have been developed or implemented. The Hearts Content Recreation Area is contiguous to the Wilderness and includes a developed campground and a day use/picnic area featuring an old growth forest with a short high standard interpretive trail.

Data were collected through a combination of brief on-site interviews and more in depth follow-up mail questionnaires. A random sample of visitors was selected

at trailheads, the campground and day use area between May and September, 1997. The survey procedures followed a modified Dillman (1978) approach that included the initial mailing of the follow-up survey, a postcard reminder and an additional mailing to nonrespondents. The on-site response rate was greater than 99% (n=269) and the follow-up survey response rate was 61% (n=155). Analysis procedures included chi square analysis and one-way analysis of variance.

Results

Visitors were asked to select one of three responses that best described their purpose for visiting on the day they were interviewed (Table 1). About one-third of respondents (36%) indicated they were visiting the Hickory Creek Wilderness and two-fifths (41%) were camping in the developed campground. The remaining 23% were day visitors to the Hearts Content Scenic Area. Although respondents could have had more than one of these purposes for their visits, forcing them to choose the primary purpose provided the mutually exclusive segmenting of visitors that was needed to compare these user groups' attitudes and knowledge.

Table 1. Purpose for Visiting the Study Area

Purpose	% of Respondents
To visit the Hickory Creek Wilderness	36%
To camp in Hearts Content Recreation Area	41%
To visit the Hearts Content Scenic Area	23%

Visitors were asked how they would rate their own knowledge of minimum impact/leave-no-trace outdoor skills and practices (Table 2). Nearly all visitors had at least heard of the LNT program and most reported their knowledge of it to be intermediate (40%) or advanced (37%). Only ten percent considered themselves to be either experts or novices.

Table 2. Self-Rated "Leave No Trace" Knowledge

Self-Rated Level of Knowledge	% of Respondents
Never heard of it	3%
Novice	10%
Intermediate	40%
Advanced	37%
Expert	10%

Responses to the specific questions used to measure actual knowledge of LNT principles varied, but the majority of respondents got most individual questions correct (Table 3). Visitors were more likely to correctly answer the true/false questions than the final two questions that asked for distances from trails and water sources one should observe for campsite locations.

Table 3. Responses to "Leave No Trace" Knowledge Questions

LNT Knowledge Question	True	False	No Answer
When hiking and encountering a horse party you should wait until the horses have come to a stop and then move quickly past them. (False)	37%	62%	2%
When camping in obviously impacted areas you should spread activities to places that have not been disturbed. (False)	23%	78%	0%
I do not need a permit to spend the night in the Hickory Creek Wilderness. (True)	72%	27%	1%
I cannot ride my mountain bike in the Wilderness, because it is not allowed. (True)	80%	17%	3%
In the wilderness you should never camp next to a stream. (True)	70%	28%	1%
If I wanted to ride my All Terrain Vehicle in the wilderness, I could do so as long as I stay on the trails. (False)	8%	83%	1%
When hiking in remote, lightly used locations of the Hickory Creek Wilderness it is best to camp on a site with no evidence of previous use to minimize your impact on the wilderness environment. (True)	38%	61%	1%
Building temporary benches by moving rocks and logs at your campsite is an accepted low-impact behavior. (False)	14%	85%	1%
When traveling on existing trails it is best to walk single file and stay on the main path to minimize impact. (True)	97%	4%	0%
In the Hickory Creek Wilderness, it is OK to camp in direct view of the trail because the area is so small. (False)	17%	80%	3%
	% Correct	Mean	
When camping in the Hickory Creek Wilderness how far from a stream or water source (in feet) should you camp? (100 feet)	30%	124 ft.	
When camping in the Hickory Creek Wilderness how far from an established trail (in feet) should you camp? (100 feet)	29%	121 ft.	

Note: Correct answer to each item is given after the statement in parentheses

The number of correct answers to the LNT "quiz" ranged from zero to 12 (100%), with most respondents answering between 6 and 10 questions correctly. The average score on the LNT questions was 7.4 questions out of 12 or about 62% correctly answered.

Table 4. LNT Knowledge Scores

LNT Score (# Correct)	% of Respondents
0	5%
1	2%
2	1%
3	1%
4	3%
5	4%
6	12%
7	15%
8	16%
9	20%
10	12%
11	7%
12	3%

Comparing the actual and self rated LNT knowledge measures revealed a significant relationship between the two. Those rating their own knowledge higher tended to score higher on the LNT quiz (Table 5). The number of correct responses ranged from 5.2 questions for those who

had no knowledge of the LNT program to 8.8 correct for those considering themselves experts.

Table 5. LNT Score by Self-Rated LNT Knowledge

Self-Rated LNT Knowledge (Perceived Knowledge)	LNT Score (Actual Knowledge)
Never heard of it	5.2
Novice	6.1
Intermediate	7.9
Advanced	7.8
Expert	8.8

F = 3.69, p = 0.007

LNT knowledge also varied by primary purpose for visiting the area (Tables 6 and 7). Day visitors to the Hearts Content Scenic Area were most likely to view themselves as novices and least likely to consider themselves advanced or expert in terms of LNT knowledge. Conversely, the Wilderness users were most likely to consider themselves advanced or expert and least likely to be novices or completely unaware of the Leave No Trace program. Campers at the developed campground were intermediate between the Wilderness visitors and day users in self-rated LNT knowledge.

Table 6. Self-Rated LNT Knowledge by Visitor Purpose

Purpose	Self-Rated Level of LNT Knowledge				
	Never Heard	Novice	Intermediate	Advanced	Expert
Visit Hickory Creek Wilderness	0%	2%	46%	41%	11%
Camp at Hearts Content Recreation Area	5%	12%	34%	39%	10%
Visit Hearts Content Scenic Area	6%	22%	41%	28%	3%

Chi-Sq = 14.6, p = 0.06

The same pattern was observed for actual LNT knowledge in relation to trip purpose (Table 7). Hickory Creek Wilderness visitors showed the highest knowledge scores, followed by campers and day visitors at the Scenic Area.

Table 7. LNT Score by Visitor Purpose

Purpose	LNT Score
Visit Hickory Creek Wilderness	8.5
Camp at Hearts Content Recreation Area	7.2
Visit Hearts Content Scenic Area	6.2

F = 8.81, p = 0.000

Visitors were also asked their opinions about a set of potential wilderness management policies or actions (Table 8). The policies receiving the most support were providing trash containers at the trailhead area (77% favored) and prohibiting radios and cellular phones in the Wilderness (56% favored). Trail improvements, including more trail blazes, more high quality trails, and more trail signs were generally favored, while providing more facilities for horse users and pit toilets at campsites were generally opposed by area visitors. Visitors were almost evenly divided on providing wooden bridges across streams and providing fireplaces at campsites.

Table 8. Visitor Support for Selected Management Policies or Actions

Policy/Action	Oppose	Neutral	Favor
Mark trails with more blazes.	24%	36%	41%
Prohibit radios and cellular phones.	18%	26%	56%
Patrol backcountry areas more.	10%	46%	44%
Build more high quality trails.	27%	28%	46%
Provide more facilities for horse users.	48%	47%	5%
Provide simple pit toilets at campsites.	41%	30%	29%
Restrict number of users or establish use limits.	29%	38%	33%
Provide wooden bridges across streams.	33%	39%	28%
Put up more trail signs.	26%	28%	46%
Prohibit horses and packstock.	20%	44%	35%
Provide fireplaces/cooking grates at campsites.	37%	24%	38%
Provide garbage/trash cans at the trailhead.	9%	14%	77%

There was a significant relationship between trip purpose and visitor support for three of the management policies/actions (Table 9). As expected, Wilderness visitors were least likely to favor facility improvements like

pit toilets and fireplaces at campsites and more trail signs, while day users were most likely to favor such improvements.

Table 9. Support for Management Policies by Visitor Purpose*

Policy/Action Statement	Purpose			Significance (ANOVA)
	Visit Wilderness	Camp in HCRA	Visit HCSA	
Mark trails with more blazes	3.2	3.2	3.5	Ns
Prohibit radios and cellular phones	3.7	3.6	3.4	Ns
Patrol backcountry areas more	3.3	3.3	3.6	Ns
Build more high quality trails	3.2	3.1	3.6	Ns
Provide more facilities for horse users	2.2	2.3	2.5	Ns
Provide simple pit toilets at campsites	2.5	2.8	3.2	0.02
Restrict number of users/establish use limits	3.0	3.0	3.0	Ns
Provide wooden bridges across streams	2.7	2.9	3.3	Ns
Put up more trail signs	3.0	3.3	3.7	0.01
Prohibit horses and packstock	3.1	3.3	3.3	Ns
Provide fireplaces/cooking grates at campsites	2.5	3.1	3.6	0.00
Provide garbage/trash cans at the trailhead	3.8	4.1	4.0	Ns

* Values are mean scores on a 5-point scale where 1=strongly oppose and 5=strongly favor.

Table 10. LNT Score by Support for Management Policies

Management Policy/Action	Mean LNT Score			Significance (ANOVA)
	Oppose	Neutral	Favor	
Mark trails with more blazes	8.3	7.8	7.2	Ns
Prohibit radios & cellular phones	7.7	6.7	8.2	0.009
Patrol backcountry areas more	7.8	8.0	7.2	ns
Build more high quality trails	8.0	7.5	7.6	ns
Provide more facilities for horse users	8.3	7.2	7.8	0.020
Provide simple pit toilets at campsites	8.5	7.5	6.8	0.003
Restrict number of users/establish use limits	8.0	7.8	7.4	ns
Provide wooden bridges across streams	8.6	7.4	7.2	0.010
Put up more trail signs	8.8	7.7	7.3	0.010
Prohibit horses and packstock	7.8	7.6	7.9	ns
Provide fireplaces/cooking grates at campsites	8.7	7.8	6.7	0.000
Provide garbage/trash cans at the trailhead	8.3	7.0	7.8	ns

Finally, support for management policies was examined in relation to knowledge of LNT principles (Table 10). Significant relationships were found for six of the twelve policies. Generally, those who opposed facility improvements of any type tended to have the highest LNT knowledge. Likewise, those who favored prohibiting radios and cellular phones in the wilderness tended to have the highest LNT scores.

Conclusions

Study results showed a number of significant relationships between LNT knowledge, trip purpose and support or opposition to wilderness management policies. All of the observed relationships were in the direction expected based on previous research and theory. LNT knowledge, both perceived and actual, tended to be highest for Wilderness users, followed by campers and then scenic area day users. Perceived and actual LNT knowledge were associated with each other. Management preferences were related to trip purpose. As expected, Wilderness users opposed most facility development (pit toilets, signs, fireplaces) and day users were most supportive. Management preferences were also related to LNT knowledge in the predicted direction. Visitors opposing facility development showed higher actual LNT knowledge scores.

Management Implications

Overall, different types of users showed different levels of LNT knowledge and management preferences. Management might focus their educational efforts on the less knowledgeable campers and day users to minimize impacts in the area. Conversely, while wilderness users tended to have a higher level of LNT knowledge than campers or day-users, this level may be lower than managers desire for effective application of LNT as a impact management tool. Results showed some user groups are apt to desire a higher level of site management than what is consistent with wilderness management principles. This suggests that managers need to better inform users of the differing site management standards for developed recreation areas versus wilderness areas.

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