



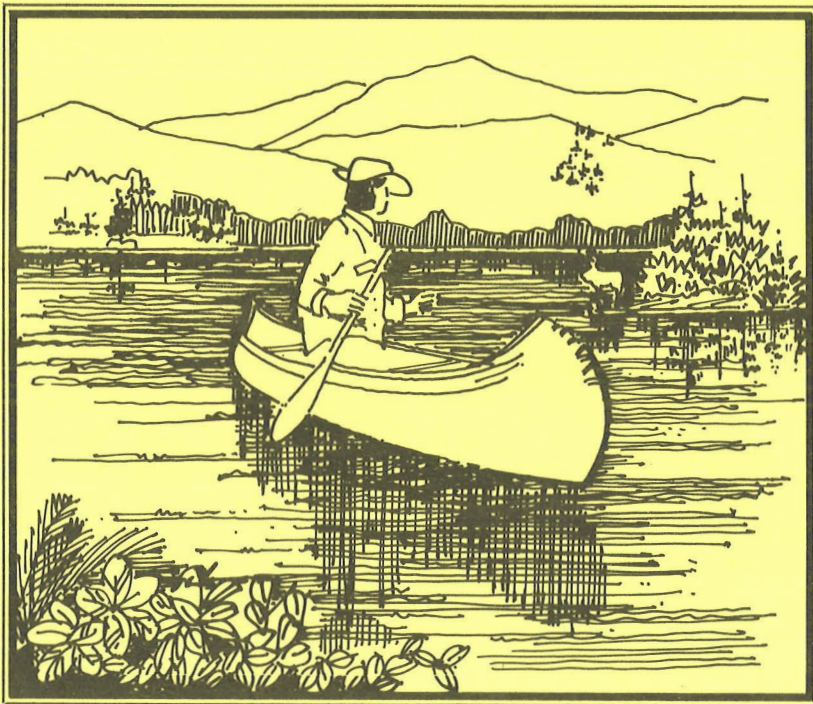
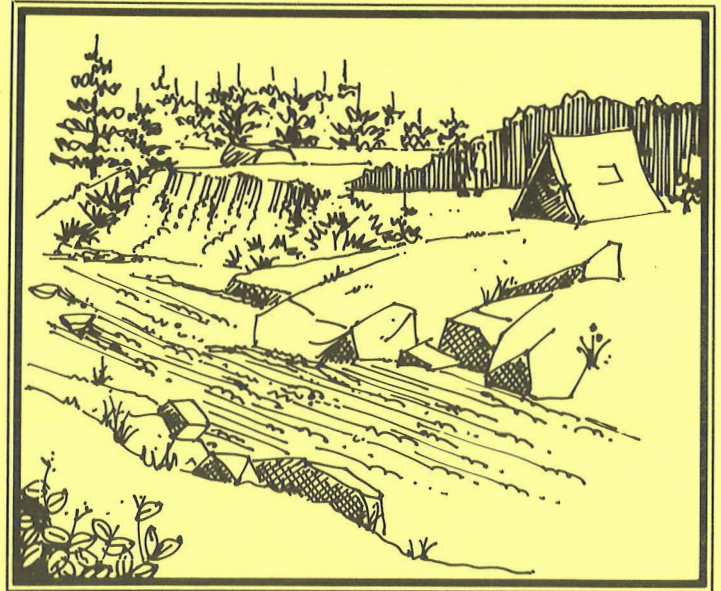
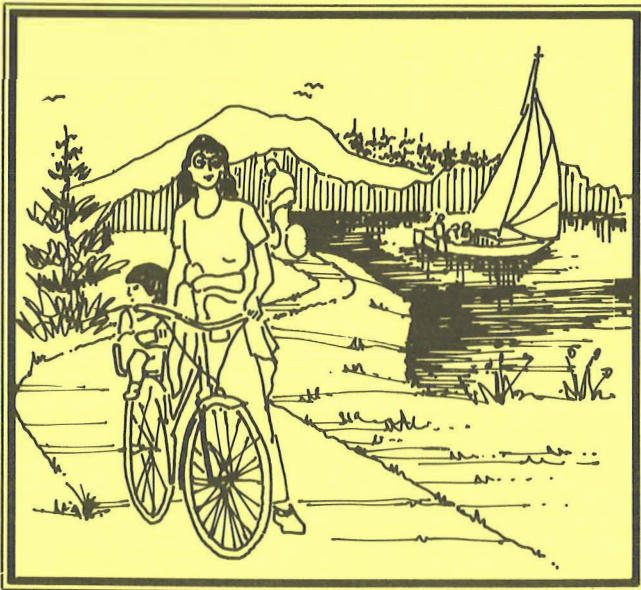
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Proceedings of the 1992 Northeastern Recreation Research Symposium

Northeastern Forest
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NORTHEASTERN RECREATION RESEARCH MEETING POLICY STATEMENT

The Northeastern Recreation Research meeting seeks to foster quality information exchange between recreation and travel resource managers and researchers throughout the Northeast. The forum provides opportunities for managers from different agencies and states, and from different governmental levels, to discuss current issues and problems in the field. Students and all those interested in continuing education in recreation and travel resource management are particularly welcome.

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PROCEEDINGS of the 1992 NORTHEASTERN RECREATION RESEARCH SYMPOSIUM

April 5-7, 1992

**State Parks Management and Research Institute
Saratoga Springs, New York**

Compiled and Edited by:

Gail A. Vander Stoep, Michigan State University

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***KEYNOTES and
GENERAL SESSIONS***

MANAGING TOURISM IN WORLD PARKS AND PROTECTED AREAS

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While protected areas and the natural and cultural resources they contain are major attractions for tourists, inappropriate tourism developments and visitor overuse can also degrade a protected area, with unanticipated economic, social and ecological effects on surrounding lands and local communities. This paper is a summary report on recommendations on tourism, including research and training needs, which derive from workshop proceedings and technical papers of the IVth World Congress on National Parks and Protected Areas held in Caracas, Venezuela in February 1992.

Background

On an international scale, tourism has been experiencing dynamic growth for over 20 years, and is now recognized as the largest civilian, or non-military industry in the world. Data compiled by the World Tourism Organization indicate that in the year 1989 an estimated 420 million travelers in the world spent approximately \$40 billion on vacation travel and associated tourism activities. (Ceballos-Lascurain, 1992). About \$ three billion of this amount can be attributed to this type of travel to the national parks of the United States.

That component of conventional tourism undergoing the fastest growth, and of particular interest and concern to the international conservation community, is a form of nature or adventure travel to the world network of national parks, wildlife preserves, world heritage sites and other protected areas. This type of travel is commonly referred to as ecotourism.

Ecotourism is defined by the International Union for the Conservation of Nature (IUCN, or the World Conservation Union) as that segment of tourism that involves traveling to relatively undisturbed natural areas with the specific objective of admiring, studying, and enjoying the scenery and its wild plants and animals, as well as any existing cultural features, both past and present, found in these areas (Ceballos - Lascurain, 1992). It can also be defined as any type of tourism that advances or supports the conservation of natural and cultural resources of protected areas.

While a large segment of the multi-billion-dollar tourism industry takes place within or between developed nations, including those of western Europe, Canada, the United States and Japan, many of the less-developed nations of the world are seeking to secure or attract a larger share of overall tourism revenues to their respective economies. In particular, their goal is to attract tourists from countries with affluent population sectors that can afford to travel (Abrahams, 1983).

As a sustainable economic activity, ecotourism holds the attractions of generating foreign exchange, providing employment and being a major diversifier of national economies. Lodges or hotel operations, for example, purchase a variety of goods and services that have important secondary effects on the entire economy. Also, an incentive may be provided for making transportation and other infrastructure improvements in rural areas.

With the tourism industry itself projecting major increases in annual revenues from global nature travel over the next decade,

tourism can be expected to have a significant influence on the development and management of the world's protected areas. The role of such areas is therefore likely to evolve from passive nature preserves to that of becoming a strategy for attaining national and regional planning goals (Giannecchini, 1992).

The issue of tourism in protected areas is currently recognized as one of the most critical conservation concerns of the decade, and was appropriately incorporated as a major issue area to be addressed at the Fourth World Congress on National Parks and Protected Areas that was held in Caracas, Venezuela in February 1992. Under the sponsorship of the World Conservation Union, World Wildlife Fund, United Nations Environment Program, and the governments of Venezuela, United States, Canada, Sweden and Australia, the purpose of the Congress was to promote the effective management of the world's natural areas so that these can make their optimum contribution to sustaining human society. In addition, specific organizational objectives were (IUCN, 1992):

- i. to demonstrate that protected areas can be a focal point of much more broadly based rural development initiatives which can bring genuine benefits on a long-term basis to rural economies; and,
- ii. to demonstrate the value of protected areas within wider strategies for the conservation and sustainable use of the Earth's natural resources.

While the subject of tourism was not the area of much scholarship or research a decade ago, the current debate on the role of tourism in protected area management has been since characterized as a "raging controversy". The protagonists are those who envision tourism as an important tool for conservation and sustainable economic development, and others who see such benefits outweighed by adverse impacts on natural and cultural environments associated with protected areas (Budowski, 1992).

Some Environmental Trade-offs of Ecotourism

Although it is apparent that the scenic, wildlife, historic, vegetative and spiritual resources of various protected areas of the world have become, or are being actively promoted as major attractions for tourists, it is likewise apparent that inappropriate development and visitation levels can have unanticipated adverse effects on the natural and cultural fabric of the protected area itself as well as on local communities. There are concerns also that discussions of ecotourism can possibly become distorted as well as elitist, short-sighted, anti-democratic and unsustainable (Machlis and Bacci, 1992).

Selected case examples from the proceedings of the Caracas Parks Congress elucidate some of the types of social, economic and ecological concerns associated with tourism in protected areas.

In Nepal's Sagarmatha National Park (Mount Everest), for example, one of the world's most popular ecotourist destinations, current visitation levels in the order of 250-thousand people are causing chronic problems of solid waste disposal, pollution, fuelwood supply and associated landscape degradation (Banshota, Byers and Sherpa, 1992). At the same time, it is realized that very little is known about the perceptions and attitudes of western tourists, or the associated cultural impact of their behavior on the local people. Apart from these problems, however, a goal of the Nepalese tourism sector is to increase the number of tourists and mountain trekkers to one million by the year 2000 (Robinson, 1992).

Other types of environmental trade-offs associated with managing tourism in the world's protected areas are described as follows:

- In the Galapagos archipelago of Ecuador, though still one of the most unspoiled places on Earth, the natural and cultural integrity of the area is being severely threatened by rapid

tourism growth, the steady increase in modern development, and the introduction of domestic animals and exotic vegetative species (MacFarland, 1991).

- Tourism in the habitats of endangered apes in the African nations of Uganda, Rwanda and Zaire is causing concern over risk of possible disease transfer, and the loss of apes as a flagship species for funding conservation of habitats for this and other species (Aveling and Wilson, 1992).
- In Antarctica, effects of tourism have become identified with pollution of marine environments, disturbance of wildlife, and the disruption of scientific research (Marsh, 1992).
- Studies on the role of ecotourism in the Pacific Island nations of Micronesia, Melanesia and Polynesia point to problems associated with strongly differing perspectives of local communities and the national economic development sectors (Valentine and Cook, 1992).
- The Bunaken Manado Tua Marine Park and other marine parks in Indonesia lack adequate manpower and fiscal resources for proper stewardship, yet significant expansions are planned as a priority objective of tourism development (Palet, Bisson and Usher, 1992).
- And, in the High Peaks Wilderness Area of New York State's Adirondack Park, the largest parkland in the contiguous United States, many years of continued high use levels now require a prescription of visitor management measures and a program of ecological restoration for more severely impacted alpine summits, trails, campsites and other areas (Cobb, 1992).

Ecotourism Success Models

Although some countries are experiencing adverse impacts on their national parks and protected areas, others appear to be successfully integrating tourism into the management of these areas. Kenya and Costa Rica are examples of two countries that are cited as being particularly successful in gaining recognition as world-class ecotourism destinations, and which are suggested as models of effective cooperation between private and public tourism interests (Eagles, 1992). In the case of the African Republic of Kenya, tourism has recently overtaken coffee and tea as the primary earner of foreign exchange. This sector of the national economy has increased revenue from \$55 million in 1971 to \$390 million in 1988.

In the second case example of Costa Rica, in Central America, tourism ranks behind coffee and banana production as the largest source of foreign income. This country's ability to attract tourists is associated with its unique natural landscape and diverse ecology. The national parks and protected areas of Costa Rica consist of a system of 34 units covering about 34 percent of the land area of the country. This is one of the highest such percentages in the world. The parks are also found to be well managed by a staff of dedicated and trained personnel. In the year 1976, tourism earned \$57 million in foreign exchange, and \$207 million in 1989 (Eagles, 1992).

Other examples of successful ecotourism ventures point to its role in furthering conservation ideals.

- In the case of Canada's Northwest Territories, aboriginal societies, tourism interests, and conservation agencies are finding that varying goals can be realized through cooperative action (Seale, 1992). This is due in part to the common realization that long-term sustainable development of high quality tourism experiences is seen by all as dependent upon environmental protection measures as well as a continued welcoming attitude and respect between local tourism officials and the people of host communities (d'Amore, 1992).
- In the African nation of Zimbabwe, wildlife-based tourism is increasing, with a growing market in western Europe and

North America, that is due, in part, to the recognized contribution of safari operators and professional hunters to tourism. Foreign revenue from safaris increased from \$85 thousand in 1985 to \$9 million in 1990 (Heath, 1992).

- Similarly, with the scenic splendor that characterizes the national parks of New Zealand being the primary selling point for the tourism industry in this island nation effective partnership linkages between the industry and park management have remained strong form many years (McSweeney, 1981).

And, finally, in the Greater Yellowstone Ecosystem of the northern Rocky Mountain Region of the United States, and including Yellowstone National Park, efforts to conserve this wild landscape and achieve a balance between natural resource use and protection are proving successful. Ultimately this ideal balance would sustain the diversity and vitality of wildlife populations, allow natural ecological processes to function with minimum intervention, and provide for a diversified economy that is characterized by a minimum adverse environmental impact and a high quality of life for people in the region. If successful efforts continue, an ideal model for whole ecosystem management on a regional basis could become a reality in the same manner that Yellowstone has been for traditional national park management (Glick, 1992).

The Draft Recommendations

Against this backdrop of technical papers, workshops and discussions on the subject of "Tourism in Protected Areas", 11 recommendations were drafted for incorporation into the "Caracas Action Plan" of the Fourth World Congress on National Parks and Protected Areas. These were (IUCN and Valentine, 1992):

- Global, national and local agencies and organizations concerned with protection of natural areas need to adopt policies to make tourism a conservation tool;
- Protected area managers need to be provided with the resources to manage tourism associated with protected areas;
- Policies must be implemented which ensure that socio-economic benefits accrue to local people through their active participation in tourism associated with protected areas;
- Protected area agencies and the tourism industry must cooperate to adopt codes of practice, guidelines and techniques which are compatible with long-term protected area management plans, enhance the visitor experience, and are consistent with, and reinforce conservation objectives of protected areas;
- In developing greater cooperation between the tourism industry and protected area management, the primary consideration must be conservation of the natural environment and the quality of life of local people;
- Natural resource and tourism authorities need to develop and implement national tourism plans which incorporate respect for the natural and cultural integrity of protected areas and local communities;
- Revenue generated from tourism in protected areas should be recycled for protection and management of the resource;
- Protected areas agencies and tourism industries need to carry out on-site studies to assess appropriate levels of impact for the world's protected areas; obtain and monitor statistical information on tourism and recreation activities and their social, cultural, economic and environmental impacts; and, define the best locally appropriate management actions for protected areas;

- ix. Tourism in each protected area should reflect the area's intrinsic environmental values, recognizing that some areas may be inappropriate as destinations for public visitation;
- x. Education and training programs must be initiated and implemented for guides and tourism managers, and tourism programs should contribute to conservation education initiatives; and,
- xi. Tourism should be a part of a sustainable regional management strategy that offers a variety of development alternatives for local people as well as for maintaining biological diversity.

Conclusion

The recommendations on managing tourism in protected areas provide a framework for policy and planning. However, since tourism in protected areas is a new and emerging area of study in the field of natural resources conservation, and its ecotourism dimension, in particular, has become a popular, but poorly understood concept, the recommendations also serve to identify needs and opportunities for applied research and training. Case studies on ecotourism, from varying natural and cultural settings, for example, are being sought by the World Conservation Union to broaden understanding of the risks, opportunities and limitations of ecotourism as a tool for conservation and sustainable economic development.

Also, for ecotourism to be successful, it must gain the support and understanding of the travel industry, protected area managers and local people (Blangy and Wood, 1992). Educational and training programs therefore need to be developed and made available to these diverse interests. The development of a cadre of professional guides from communities in or near protected areas is an example of a type of low-impact economic venture that could result in important benefits from the design of good educational and training programs.

Finally, the master planning process for national parks and protected areas must be refined to incorporate the appropriate role of tourism as a visitor management strategy for conservation. This should require, as a minimum, the development of environmental education materials and interpretive methods and facilities that can enrich the visitor experience as well as foster an understanding of resource management practices and conservation ideals. Equally important to the planning process is the development or adaptation of techniques, such as the "Visitor Impact Management Process" of the National Parks and Conservation Association (Loomis and Graefe, 1992), to address the issue of carrying capacity.

The basic guideline for both management and research, however, is to find ways in which tourism can effectively enhance the contribution of protected areas to sustaining human society without compromising the very natural and cultural systems they were established to protect.

Literature Cited

- Abrahams, E. Anthony. 1983. Tourism promotion: A shared place in the sun. *Parks*. (7)4: 12-13.
- Aveling, R.; Wilson, R. 1992. Tourism in the habitat of the Great Apes: Costs and benefits. In: Abstracts, Proceedings of the IVth World Congress on National Parks and Protected Areas (IVth WCNPPA Proceedings); 1992 February 10-21; Caracas, Ven. Caracas: World Conservation Union (IUCN): 14.
- Banskota, K.; Byers, A.; Sherpa, M. 1992. Contemporary tourist impacts on three sides of Everest: Examples from Sagarmatha National Park, Nepal. Abstracts, IVth WCNPPA Proceedings, IUCN: 16.
- Blangy, S. and Wood, M. 1992. Developing and Implementing Ecotourism Guidelines for Wild Lands and Neighboring Communities (Unpublished Draft). N. Bennington, VT: The Ecotourism Society, 8p.
- Budowski, G. 1992. Ecotourism in tropical countries: The pros and cons. Abstracts, IVth WCNPPA Proceedings, IUCN: 21.
- Ceballos-Lascurain, H. 1992. Overview on ecotourism: What it is and how it differs from other kinds of tourism. Abstracts, IVth WCNPPA Proceedings, IUCN: 28-29.
- Cobb, T. 1992. A case study on visitor management issues and recreation carrying capacity in the High Peaks region of New York State's Adirondack Park - USA. Abstracts, IVth WCNPPA Proceedings, IUCN: 55.
- d' Amore, L. 1992. Ethics and guidelines for sustainable tourism. Abstracts, IVth WCNPPA Proceedings, IUCN: 35.
- Eagles, P. 1992. Marketing to the ecotourist. Abstracts, IVth WCNPPA Proceedings, IUCN: 79.
- Giannecchini, J. 1992. Parks and tourists: An evolving partnership. Abstracts, IVth WCNPPA Proceedings, IUCN: 98.
- Glick, D. 1992. Greater Yellowstone tomorrow: Charting a course for the Greater Yellowstone ecosystem. Abstracts, IVth WCNPPA Proceedings, IUCN: 98-99.
- Heath, R. 1992. The growth in wildlife-based tourism in Zimbabwe. Abstracts, IVth WCNPPA Proceedings, IUCN: 64.
- IUCN Staff. 1992. Congress objectives: Parks for Life Program. IVth WCNPPA Proceedings, IUCN: 21.
- IUCN Staff; Vallentine, P. 1992. Social, economic, and political issues: Tourism and protected areas. Congress Recommendations (Unpublished Draft); IVth WCNPPA Proceedings, IUCN: 8p.
- Loomis, L.; Graefe, A. 1992. Overview of NPCA's visitor impact management process. Abstracts, IVth WCNPPA Proceedings, IUCN: 153.
- MacFarland, Craig. 1991. The Enchanted and Endangered Galapagos Islands: The Opportunity to Create a Model for Ecotourism. Moscow, ID: Charles Darwin Foundation for the Galapagos Islands, 7p.
- Machlis, G.; Bacci, M. 1992. Is Ecotourism Ideologically Biased, Elitist, Short-Sighted, Anti-Democratic and Unsustainable? (Unpublished Manuscript), IVth WCNPPA 2p.
- Marsh, J. 1992. Tourism in Antarctica and its implications for conservation. Abstracts, IVth WCNPPA Proceedings, IUCN: 166.
- McSweeney, Gerry. 1981. Glaciers and tourism in New Zealand's Westland National Park. *Parks* (6)3: 11-14.
- Paleta, R.; Bisson, J.; Usher, G. 1992. The role of ecotourism in supporting the management of the Bunaken Manado Marine Park, Indonesia. Abstracts, IVth WCNPPA Proceedings, IUCN: 196.
- Robinson, D. 1992. Socio-cultural and environmental impacts of mountain tourism in the Himalaya region of Nepal. Abstracts, IVth WCNPPA Proceedings, IUCN: 226.
- Seale, R. 1992. Aboriginal societies, adventure tourism and conservation: A case of Canada's Northwest Territories. Abstracts, IVth WCNPPA Proceedings, IUCN: 248.
- Valentine, P.; Cook, J. 1992. Community-based ecotourism and nature conservation in the Pacific. Abstracts, IVth WCNPPA Proceedings, IUCN: 286.



ENVIRONMENTAL CONCERN

OUTDOOR RECREATION, ENVIRONMENTAL ATTITUDES AND ENVIRONMENTALLY RESPONSIBLE BEHAVIOR: PAST AND FUTURE DIRECTIONS FOR RESEARCH

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Empirical research conducted from 1971 to 1987, which focuses on the linkages between outdoor recreation activity participation, environmental attitudes and environmentally responsible behavior, is reviewed and demonstrates progressive modifications and improvements in hypotheses, measurement and analysis. Issues relevant to this line of research, research needs, and future importance are discussed.

Introduction

Certain research conducted in the 1970s through the 1980s relates to the suggestion that the emphasis on outdoor recreation in our society was an important factor in the emergence of the contemporary environmental movement and the resulting rise of public concern with environmental quality (Gale 1972). Outdoor recreation was and is an important leisure activity, and on occasion, persons who joined together to enjoy outdoor recreation activities formed groups to actively defend a favorite recreation area or other natural resource which was crucial to their continued enjoyment of their outdoor pursuit. Involvement in outdoor recreational activities may create an awareness of environmental problems by exposing people to instances of environmental degradation, create a commitment to the protection of valued recreation sites, cultivate an aesthetic taste for a "natural" environment which encourages opposition to environmental degradation, and expose outdoor recreationists to informational and educational programs stressing the importance of the quality of the environment (Dunlap and Heffernan 1975). Limited empirical data exist which support the notion that membership in outdoor recreational organizations leads to active involvement in the environmental movement (Faich and Gale 1971).

Past Empirical Studies

The relationship between outdoor recreation and environmental attitudes was first studied empirically in Minnesota in 1971. Knopp and Tyger (1973) investigated attitudinal differences between cross-country skiers and snowmobilers to account for the conflicts in recreational land use between them by utilizing highly specific, Likert-type items to measure environmental attitudes and to assess views on recreation land management issues. Their results supported the hypotheses that 1) people who engage in motorized forms of recreation are less likely to have environmentalist values than those who prefer self-propelled forms of recreation, and 2) people who engage in motorized forms of recreation are less likely to understand or sympathize with the concept of setting aside specific recreation areas for distinct purposes than those who prefer activities with less environmental impact.

The Dunlap-Heffernan Thesis

The most influential research in this area was the work of Dunlap and Heffernan (1975) with data from a 1970 Washington state survey. In order to address the question of whether involvement in outdoor recreation leads to increased environmental concern among the general public, three

hypotheses were developed and tested. The Dunlap-Heffernan Thesis, as this came to be known, has been reexamined by various researchers through progressive modifications in hypotheses, measurement, and analysis (Jackson 1989).

Dunlap and Heffernan examined whether behavior, participation in outdoor recreation activities, influences attitudes and values—environmental concern. Therefore, behavior was treated as an independent variable in that the behavior in question, participation in outdoor recreation, seemed likely to have preceded environmental concern. Different types of outdoor recreation activities were identified based on the distinction pointed out by Hendee (1969a). Consumptive activities (fishing and hunting) were those taking something from the environment, reflecting a "utilitarian" orientation of nature viewed as existing for man's utilization. Appreciative activities (hiking, camping, and visiting state parks and scenic areas) were attempts to enjoy the natural environment without altering it, reflecting a "preservationist" orientation. Dunlap and Heffernan hypothesized 1) that participation in outdoor recreation is positively associated with environmental concern, 2) that participation in "appreciative" activities is more strongly associated with environmental concern than that for participation in "consumptive" activities, and 3) that there is a stronger association between participation in outdoor recreational activities and concern for protecting aspects of the environment necessary for pursuing such activities than between participation and more "global" environmental concerns. When these hypotheses were empirically tested, the first received mixed and generally weak support, while the second and third received substantial support, although the magnitude of the associations was fairly low.

Dunlap and Heffernan suggested if involvement in outdoor recreation tends to increase environmental concern and possibly even stimulate pro-environmental actions, this bodes well for the future of pro-environmentalism in our society. Environmental concern will be strengthened if it is associated with a basic structural feature of our society such as increased leisure time devoted to outdoor recreation. Dunlap and Heffernan stated that it seems reasonable to believe that environmental concern might be translated into support for "pro-environmental" candidates and ballot measures designed to protect the environment, and that such support may become crucial as environmental issues increasingly become political issues. Outdoor recreationists may constitute a potential constituency for environmental activism.

However, such statements were made with "guarded optimism" for the following reasons: 1) observed associations between outdoor recreation and environmental concern were generally quite modest—it appeared that increased participation in outdoor recreation was likely to significantly increase concern for fairly specific environmental goals, but the degree to which concern will extend to more distant or "global" issues appeared very slight; 2) although participation in appreciative activities was increasing, and there was considerably stronger associations between appreciative activities and environmental concern than those for consumptive activities, there were still substantial numbers of participants in consumptive activities; and 3) a third type of outdoor recreation activity which was growing rapidly was not examined in the study due to data deficiencies—that of motorized activities—snowmobiling, trail biking, and all terrain vehicle use. Involvement in these types of activities may create a lack of concern for environmental quality in that these may be "exploitive" or even "abusive" of the environment. Dunlap and Heffernan's results, although weak, were intriguing enough to stimulate further investigation of the relationship between outdoor recreation participation and environmental concern.

Subsequent Empirical Studies

Further research of the hypothetical relationships of the Dunlap-Heffernan Thesis generated weak and mixed results. One study re-examined Dunlap and Heffernan's first and second hypotheses using data from a 1974 rural-based survey in

Wisconsin (Geisler, Martinson and Wilkening 1977). In this study both the independent and dependent variables were measured more broadly than in the earlier study. Geisler, Martinson and Wilkening added an "abusive" category, represented by snowmobiling, to the measure of outdoor recreational activity. The indicators of environmental concern, defined as support for public action, were complemented with several items dealing with the awareness of various environmental issues such as stream, lake, noise and air pollution, wildlife reduction and soil erosion. Geisler *et al.* argued that this broader conceptualization of environmental concern permitted a comparison of cognitive states with actual support for public action to protect the environment, and by inference, to enhance recreation. Although there was some support found for the first hypothesis, that environmental concern was associated with outdoor recreation participation, and some evidence for the second hypothesis, although weaker than the first, it was found that environmental concern was affected more strongly by respondent characteristics, such as socioeconomic status, education, age and place of residence, than by recreational habit. Geisler *et al.* concluded that their study questioned the generalization that specific types of recreation produce varying degrees of environmental concern with regard to natural resources.

Pinhey and Grimes (1979) conducted a study in Louisiana in 1974 to further test the hypotheses proposed by Dunlap and Heffernan. They found only weak and inconsistent relationships between outdoor recreation participation and environmental concern. Active participants in outdoor recreation activities were more likely than non-active participants to cite ecological or recreational reasons for evaluating Louisiana's natural marshlands as valuable, however this association was assessed as being weak to moderate. There was no difference between active participants and inactive participants with regard to preferences for preservation versus other uses of these natural areas. Furthermore, consumptive and appreciative recreationists did not differ on either measure of environmental concern. Further analysis indicated that individual characteristics (socio-economic variables) as well as time and place were more important influences on environmental concern than types of recreational activities, although these too were rather weak predictors. Pinhey and Grimes concluded that their results were more consistent with those reported by Geisler *et al.* than those found by Dunlap and Heffernan. However, Van Liere and Noe (1981) criticize the operationalization of environmental concern as valuing natural marshlands as a major weakness of this study in that it is a too restrictive measure of environmental concern. Methodological and conceptual shortcomings common to all these early studies make appropriate comparisons questionable.

Van Liere and Noe (1981) replicated Dunlap and Heffernan's original study with research among visitors to Cape Hatteras National Seashore. Two hypotheses were examined in this study: 1) involvement in outdoor activity was hypothesized to be positively associated with pro-environmental attitudes, and 2) different types of outdoor recreation were expected to have varying levels of association with pro-environmental attitudes. Stronger measures were utilized for both of the variables. Involvement was measured using two questions directed at examining 1) the average number of hours per day spent in each of several activities and 2) the number of days during a visit participants engaged in the activity. Van Liere and Noe felt this more accurately reflected involvement in several activities during the course of a visit to a park. However, they were quick to point out potential problems associated with respondent recall. Environmental orientation was measured by a 12-item "New Environmental Paradigm" (NEP) scale developed by Van Liere and Noe (1978) which asked respondents to express their general orientation toward the environment rather than awareness or concern about specific environmental problems. Ideas contained in the NEP involve the image of nature presenting a balanced system, the notion that humans are part rather than master of the ecological order, and the suggestion that growth may need to be limited in the future to protect the

environment. These concepts differ greatly from the more traditional "Dominant Social Paradigm" (DSP) (Dunlap and Van Liere 1984) which has historically characterized American culture and focuses on the anthropocentric notion that nature exists solely for human use, that people are exempt from the ecological constraints of other species and that growth and progress are universally desirable (Scott and Willits 1991). Measuring this broader "world view" was thought to be important because, as Van Liere and Noe rationalized, it is exactly these beliefs (such as "the balance of nature is delicate and easily upset") which participation in outdoor recreation is implied to arouse and cause to be internalized, and ultimately generalized to concern about specific environmental problems. The NEP scale, as a multiple-item scale, was also viewed as more reliable than single-item measures used in earlier studies.

The terminology used by Van Liere and Noe—"environmental attitudes" instead of "concern"—represents an important conceptual shift (Jackson 1989). In asking respondents to express their general orientation or attitude toward the environment, rather than awareness or concern about specific environmental problems, this was the first real effort to conceive of environmental attitudes as values, and to examine deeper influences that might explain recreational choice instead of more superficial perceptions regarding concern which emanate from it. Thus, Van Liere and Noe recognized that outdoor recreation participation could be viewed as a dependent variable which is influenced by environmental attitudes.

Despite these improvements in conceptualization and methodology, Van Liere and Noe found little support for a positive association between outdoor recreation participation and pro-environmental attitudes, and some weak support for a positive and stronger association between participation in appreciative activities and pro-environmental attitudes than the associations for consumptive or abusive outdoor recreational activities.

Van Liere and Noe suggested three possible reasons for their findings. First, it was possible that the hypotheses were true and that further improvements in measurement and study design would lead to higher levels of association. However, they noted that higher correlations would not improve the understanding of the more general issue—How is outdoor recreation participation related to the development of a general pro-environmental orientation? Second, a possible conclusion was that outdoor recreation participation was not significantly associated with environmental attitudes because of the relatively low associations. However, Van Liere and Noe's results suggest that the associations, although low in magnitude, were not spurious. A third conclusion, favored by Van Liere and Noe, was that environmental attitudes and outdoor recreation participation are linked in ways important to understanding the development of pro-environmental orientations, but the linkage is much more complex than assumed in the Dunlap-Heffernan Thesis. They suggested that research focus on specifying more complex models linking the two variables of outdoor recreation participation and environmental attitudes.

Allen and McCool (1982) stated that no one can deny the nearly universal public concern over the environment. Yet connected to this concern are far lower levels of actual behavior aimed at conserving resources and reducing pollution. They pointed out that discrepancies between attitudes and behavior have been found regarding air pollution, water resource use, litter clean-up, paying for pollution abatement, and commitment to environmental movements. Allen and McCool suggested that actual behavior, not attitudes or concern, should be the focus in research designed to improve relations between people and the environment, and reported on three complementary studies which examined relationships between outdoor recreation participation and energy conservation or environmentally responsible behavior.

The results of Study 1 suggest that people not exposed to natural environments through recreation may find it difficult in a

largely urban, technologically dependent society to develop a practical notion of ecology that could inspire ecologically responsible behavior. Exposure to natural environments may contribute to the development of a sound environmental ethic. It does seem possible that underlying environmental values and attitudes may motivate both conservation behavior and certain types of outdoor recreation participation. The results of Study 2 suggest that conservation actions occur in clusters of related behaviors which are independent of each other. Four dimensions of ecologically responsible behavior were identified: 1) political activity, 2) home modification activity, 3) recycling efforts, and 4) consumer behavior. When these ecologically responsible behaviors were correlated with recreation participation, Allen and McCool found that appreciative/low consumptive activities (gardening, bird watching, fishing and picnicking) had the highest correlation, followed by active/low consumptive activities (backpacking, hiking, canoeing, cross-country and downhill skiing, and rock climbing), followed by active/consumptive activities (dirt biking, off-road driving, horseback riding, snowmobiling and hunting). Additionally, Allen and McCool pointed out that participants in active/low consumptive activities were often the most vocal environmentalists in the community. The results of Study 3 were somewhat contradictory to Studies 1 and 2, suggesting that the relationships between recreation participation and ecologically responsible behavior may be more complex than previously thought. Cross-country skiers in the study sample tended to report a lifestyle more centered around leisure which was more energy consumptive than that for snowmobilers. Skiers took more vacations than snowmobilers and tended to travel further on those vacations.

Allen and McCool suggested that contact with natural environments and their apparent processes may contribute to the development of an environmental ethic which can lead to environmentally responsible behavior—the closer the activity to the land, its intricacies and ecology, the greater is the potential for learning. Their data suggest associations, but not true cause-effect relationships. However, relationships exist most strongly for appreciative/low consumptive activities and environmentally responsible behavior. Yet, there are some intervening variables, some type of leisure lifestyle factors, which may interact with conservation behaviors to indicate seemingly contradictory behaviors. Cross-country skiers, found to have higher socioeconomic status than snowmobilers, had more awareness of the environment than snowmobilers, but were greater in energy consumptive behavior in their leisure lifestyles. Thus, Allen and McCool identified an interesting interaction—individuals having high socioeconomic status pursue their leisure lifestyle while adapting ecologically responsible behaviors at home and work. Individuals at lower levels of socioeconomic status restructure their leisure behavior, but maintain traditional patterns of home and work energy consumption.

Jackson (1986) conducted a study in Edmonton and Calgary, Canada in 1984, and addressed some of the measurement problems discussed by Van Liere and Noe. The objective of this study was to interpret the relationship between attitudes towards the environment and preferences for different types of outdoor recreation activity within the context of the diverging values of the "consumer" and "conservative" societies. Jackson formulated two hypotheses based upon those originally developed by Dunlap and Heffernan (1975): 1) participants in appreciative (self-propelled) activities will exhibit stronger pro-environmental attitudes than participants in extractive and mechanized activities, and 2) there will be a stronger association between outdoor recreation participation and attitudes towards specific aspects of the environment necessary for pursuing such activities than between outdoor recreation participation and attitudes to more "distant" and general aspects of environmental issues.

In this study, a more comprehensive 21-item scale was designed to measure environmental attitudes which included items from Van Liere and Noe's (1981) NEP scale and several items from

Dunlap and Van Liere's (1984) "Dominant Social Paradigm" (DSP) scale. Respondents' scores on the environmental attitudes scale were factor analyzed to identify the dimensions of environmental attitudes and values that best distinguished among recreation categories. The four factors which emerged were labeled "Negative consequences of growth and technology," "Relationship between mankind and nature," "Quality of life," and "Limits to the biosphere." A six-item recreational attitude scale was also developed to test the second hypothesis. Additionally, a more direct set of comparisons between types of recreational activity was made—analysis was confined to eight outdoor activities, classified into three groups: self-propelled activities (cross-country skiing, hiking, and canoeing), mechanized activities (snowmobiling, motor biking, and dirt biking), and extractive activities (hunting and fishing). Tests of differences in attitudes were conducted on the basis of 26 "exclusive pairs" of activities by comparing people who had participated exclusively in one or the other of each pair of activities.

The results of the study supported the original Dunlap-Heffernan Thesis that participation in different forms of outdoor recreational activities is related to environmental attitudes. People who prefer self-propelled activities more frequently hold environmental attitudes consistent with the "New Environmental Paradigm" than participants in consumptive and mechanized activities, who tend to express weaker pro-environmental attitudes and even anti-environmental attitudes. Furthermore, Jackson found the dimensions of attitudes which best distinguished among the different types of recreationists, views on the quality of life and the man-nature relationship, to be those precisely which simultaneously differentiate between the values of the "consumer" and "conservative" societies.

In a further expansion of the study, Jackson (1987) compared views on the preservation of resources versus their development for recreation among the participants in the three types of outdoor recreation—appreciative, consumptive, and mechanized activities. The results indicated a stronger preservationist orientation among participants in appreciative activities, whereas, with the exception of hunters, participants in consumptive and mechanized activities held stronger pro-development views. Jackson did not attribute these differences to the simultaneous variations in socioeconomic characteristics or environmental attitudes among the recreational groups. Rather, the findings suggested that differences in outdoor recreational activity preferences represent an important source of variation in views about appropriate levels of preservation versus development. Recreationists whose satisfaction is dependent on a relatively untouched, natural environment prefer resources maintained in their natural, unaltered state. Mechanized recreationists more strongly support development of natural resources for recreational purposes, even though such development may sacrifice natural environmental quality. Thus, people who participate in different and often conflicting forms of outdoor recreation developed diverging preferences about the desirable level of preservation of land resources in Alberta and the extent to which such resources should be developed to provide outdoor recreation opportunities.

Issues, Research Needs and Future Directions

The preceding studies demonstrate the likelihood that environmental attitudes and outdoor recreation are linked in ways that are important to understanding the development of pro-environmental attitudes and orientations. However, this linkage must be much more complex, influenced by other intervening variables, than is assumed in the Dunlap-Heffernan Thesis. Hays (1987), in examining the growth of the environmental movement in the United States, points out that ideas that emerged among environmentalists were far more pragmatic, often a mixture of contradictory tendencies that precluded a commitment to a single system of thought or utopian vision. Environmentalists were keenly aware that people balanced views about work, on the one hand, and consumption and quality of life, on the other. If Hays is correct, attempts to predict who is an environmentalist or who holds a

pro-environmentalist orientation, based on personal rejection of the "Dominant Social Paradigm" and adherence to the "New Environmental Paradigm," are prone to have difficulty explaining high proportions of variation. This may be one reason why the research findings on the linkage between outdoor recreation participation and environmental concern/attitude have been mixed and of low magnitude, suggesting a need for tighter measures of environmental orientation.

At issue also is the generalizability of the research findings. Hays (1987) discusses the regional variation in the growth of environmental concern, noting regions of environmental strength in California, New England and New York, the upper Great Lake states, the Chesapeake Bay states, the Pacific Northwest, and northern Rocky Mountain states. Regions weak in environmental interest include the Plain states, Texas and the Southwest, the South (especially the southern Gulf states), and the industrial states of the Mid-Atlantic and Midwest regions. Hay's analysis of these regional variations in environmental strength and interest are based on citizen organizations and activities, state governmental agencies and their policies, the activities of state legislatures, public opinion polls in the states, and newspaper accounts of environmental issues. As a result, place of residence in terms of regional location, may effect individuals' orientations to the environment. Furthermore, there is some evidence that rural-urban differences exist regarding environmental concern (Tremblay and Dunlap 1978; Van Liere and Dunlap 1980) along with rural-urban differences reflected in outdoor recreation participation (Hendee 1969b). These differences need to be taken into consideration in future research.

In four of the research studies, environmental concern or attitudes are perceived as dependent on behavior in the form of outdoor recreation participation (Knopp and Tyger 1973; Dunlap and Heffernan 1975; Geisler, Martinson and Wilkening 1977; Pinhey and Grimes 1979). Van Liere and Noe (1981) conceptualize outdoor recreation behavior as dependent on environmental attitudes. Allen and McCool (1982) and Jackson (1986, 1987) conceptualize these linkages as being much more complex, influenced by other intervening variables. Perhaps what is needed is development of an understanding of the intervening processes which generate environmental concern. What needs to be identified are those influences which might cause individuals to interpret their outdoor experiences in a manner that creates awareness and concern about the environment and causes them to manifest that concern in their actual behavior (Van Liere and Noe 1981).

Elaborating further on a model proposed by Allen and McCool (1982) to show the relationships between participation in outdoor recreation activities and ecologically responsible behavior, perhaps participation in certain outdoor recreation activities leads to the development of a personal environmental ethic, which in turn leads to more environmentally responsible behavior in terms of environmentally benign or beneficial outdoor recreation participation. The closer the activity to the land, the greater is the potential for learning. Through involvement and exposure to certain outdoor recreation activities in the natural environment, participants may become increasingly aware of environmental sensitivity and their own personal and others' impact on the environment. This may lead to the development of a personal environmental ethic, creating a commitment to the protection of valued recreation sites which may develop further to other, more "global" pro-environmental orientations. Development of an environmental ethic may intrinsically motivate an individual to minimize their own personal impact on the environment, and thus, provide the impetus for ecologically responsible behaviors in that environment. Involvement and exposure in outdoor recreation provide opportunities for learning, which may lead to greater awareness and understanding, resulting in environmental concern which leads to action.

Further research is needed to test the relationships proposed in this model. Of great interest are the components of the outdoor recreation experience, perhaps highly activity-specific or perhaps common across many activities, which generate increased awareness of environmental sensitivity and personal impacts. How and in what ways does outdoor recreation activity lead to increased awareness? Does participation in certain outdoor recreation activity experiences lead to more increased awareness than participation in others? Hays (1987) states that the most widespread source of emerging environmental interest was the search for a better life associated with home, community, and leisure. Self-development became an important value which drove persons to seek a higher quality of life for themselves and their children through creative arts, outdoor recreation activities, summer camps and family vacations. According to Hays, the environmental quality of life is to be understood simply as an integral part of the drives inherent in persistent human aspiration and achievement. A research focus needs to be developed which examines the possible influencing variables of recreational socialization during childhood, when many individuals experience their first outdoor recreational experience. Satisfying and rewarding childhood experiences may influence the individual to continue participation, to fully integrate an outdoor recreation activity into their lifetime leisure repertoire.

Also at issue are "value judgments" associated with identifying different types of outdoor recreation activities as being exclusively consumptive, appreciative, abusive or exploitive in relation to the environmental attitudes of social groups in which the activity is shared. Bryan (1977, 1979) found that recreationists can vary from very general to highly specialized. As the level of specialization increases, attitudes and values about the activity change. Focus may shift from consumption to preservation and emphasis on the nature and setting of the activity. Thus, individuals participating in the same activity can vary from consumptive and possibly abusive, to appreciative orientations with regard to the environmental setting. This suggests future research on an alternative hypothesis: pro-environmental orientation is associated with the level of recreation specialization, which takes into account social factors which give an activity meaning (Van Liere and Noe 1981) and indicates the need for stronger measures of outdoor recreational involvement. Furthermore, perhaps the critical issue is not the activity *per se*, but rather its meaning and function for the participant and the form and organization in which participation occurs. What is the affective element in participation? Challenge? Risk? Mastery? Achievement? The potential differences in specialization may be variables associated with a pro-environmental orientation. Additionally, as pointed out by Allen and McCool (1982), outdoor recreationists participating in supposedly "appreciative" activities may actually be consuming greater amounts of energy, which can be considered ecologically irresponsible behavior, than those participating in mechanized or consumptive activities. Furthermore, as the level of outdoor recreation specialization increases, participant demand for and utilization of specialized equipment increases.

Measurement of environmental concern, attitudes and orientations is also of concern in this research. Allen and McCool (1982) pointed out existing discrepancies between attitudes and behavior and suggested that actual behavior, not attitudes or concern, should be the focus in research designed to improve relations between people and the environment. This points to possible shortcomings in the use of the more "global" DSP and NEP scales to measure environmental concern and attitudes as being potentially problematic and perhaps inapplicable in representing environmentally responsible behavior. Better indicators of environmental attitudes and concern need to be incorporated into this research. Reporting of actual environmentally responsible behavior may be much more relevant and meaningful to participant respondents. In order to measure an energy-efficient lifestyle, for example, respondents could be queried as to whether they drive less, use mass transit, car pool, purchase efficient vehicles, keep their

vehicle tuned and tires properly inflated, use energy efficient appliances, turn off lights when not in use, install compact fluorescent bulbs, insulate and weather-proof their home, and so forth. As to their ecologically responsible behavior, respondents could be asked if they recycle wastes, plant trees, garden organically at home, avoid the use of CFCs, shop ecologically, vary their diet, and get environmentally involved locally, nationally, and globally.

Additionally, there is a need to examine a wider range of recreational activities. The growing interest and participation in alternative tourism or ecotourism, which utilizes the natural environment for recreation and leisure, represents an industry whose ventures capitalize on the increasing global concern with disappearing cultures, lifestyles, and ecosystems (Johnston 1990). Socially responsible tourism and outdoor recreation are often linked with the concept of sustainable development which may be a direct manifestation of the contemporary environmental movement.

Implications

Research which examines the linkages between outdoor recreation participation and the development of pro-environmental attitudes and ecologically responsible behavior will continue to be relevant and important in the future for many reasons. Environmental consciousness of the American people will continue to be a driving force behind all aspects of life (Jernstedt 1992). As Jackson (1987) points out, different types of outdoor recreation represent diverging constituencies of support for resource protection and development. If our society is moving more towards a "conserver" society from a more traditional "consumer" society, as many writers argue (Jackson 1989), the possibility exists for anticipating changes in public views about resource development and preservation. This may be especially relevant for managers of outdoor recreation resources and professionals involved in the delivery of outdoor recreation services, in terms of effective decision making and policy formulation to meet the public's felt needs and expressed desires.

What will leisure behavior be like in a "conserver" society? According to Spry (1980), the conserver society places increasing emphasis on leisure time as an opportunity for enhancement of human quality and the enrichment of creative experience, rather than as an opportunity for the elaboration of entertainment, escalation of self-indulgence, and multiplication of apparatus. It is likely that recreation and leisure in a "conserver" society will be decentralized, small-scale, individualistic, and oriented towards the non-consumptive enjoyment of the natural environment with a minimal amount of environmental impact (Jackson 1989). Such participant behavior would demand lower levels of equipment and little or no mechanization and therefore tend to be low in energy use per person or per recreational engagement. Personal, long-term, physical and mental development would be the goal of such leisure activity. If such a notion is correct, then the emergence of new and more popular forms of leisure behavior and recreational activity may be understood as a manifestation of the restructuring of societal values and behaviors, perhaps as a direct result of changing perceptions of ecological limits and resource constraints (Jackson 1989). Although somewhat speculative, such social and attitudinal changes are likely to result in new and emerging patterns of leisure activity. These will affect personal spending on recreation and preferences about the quantity, quality, location and management of public and private outdoor recreation resources. Because of these influences, social and attitudinal changes must be recognized and acknowledged by managers and practitioners. The knowledge of the relationship between outdoor recreation participation and environmental attitudes can assist recreation policy makers and planners in anticipating future trends in outdoor recreation participation.

Outdoor recreation resource managers must also be aware that with more emerging outdoor recreation activities considered to be appreciative and low- or non-consumptive, more and more

demands will be placed on the natural environments in which such activities occur. With more use of natural recreation areas there will be more associated environmental impact, not only affecting the integrity of the land, but also affecting the quality of the experience for the user. This will require the use of innovative and effective, direct management techniques and strategies, in order to minimize associated impact. However, rules and regulations by themselves are not the answer (Hampton and Cole 1988). Leopold (1949) questioned the effectiveness of regulation over forty years ago when he stated that obligations have no meaning without conscience, and the problem we face is the extension of the social conscience from people to land. Appropriate behavior emanates from an understanding of and respect for the land, an inherent set of values within the individual user—a wildland ethic. It will be increasingly important to incorporate indirect management techniques and strategies through informational and educational programs in order to encourage appropriate user behavior.

Certain forms of outdoor recreation activity are surmised to be more environmentally benign or perhaps even beneficial than others. If environmental quality and protection are important to the future of humankind and all life on planet Earth, shouldn't such activities be encouraged? Can participation in certain activities be encouraged through direct and indirect management techniques and strategies? What are the opportunities for effective leisure education and environmental interpretation to positively affect peoples' participation resulting in environmentally responsible leisure behavior? McAvoy (1990) notes that the park and recreation professional's philosophy of service must be grounded in ecological principles, not merchant values. The professional's primary responsibility must include educating the public as well as catering to their immediate expressed desires. Leisure service professionals can have a major impact on the environmental stewardship practices of their agencies and the parks and recreation movement in general, and be the environmental conscience of park and recreation organizations if they have a common set of guiding principles, a common set of environmental ethics.

Literature Cited

- Allen, S.; McCool, S.F. 1982. Energy conservation, recreation participation, and ecologically responsible behavior. In: Forest and river recreation: research update. St. Paul, Minnesota, University of Minnesota Agricultural Experiment Station, Miscellaneous Publication 18: 111-114.
- Bryan, H. 1977. Leisure value systems and recreational specialization: the case of trout fishermen. *Journal of Leisure Research* 9 (3): 174-187.
- Bryan, H. 1979. Conflict in the Great Outdoors. University of Alabama, Bureau of Public Administration, Sociological Studies, No. 4.
- Dunlap, R.E.; Heffernan, R.B. 1975. Outdoor recreation and environmental concern: an empirical examination. *Rural Sociology* 40 (Spring): 18-30.
- Dunlap, R.E.; Van Liere, K.D. 1984. Commitment to the dominant social paradigm and concern for environmental quality. *Social Science Quarterly* 65: 1013-1028.
- Faich, R.G.; Gale, R.P. 1971. The environmental movement: from recreation to politics. *Pacific Sociological Review* 14 (July): 270-287.
- Gale, R.P. 1972. From sit-in to hike-in: a comparison of the civil rights and environmental movements. In W.R. Burch Jr., N. Cheek Jr., and L. Taylor (eds.), *Social Behavior, Natural Resources, and the Environment*. New York: Harper and Row: 280-305.
- Geisler, C.C.; Martinson, O.B.; Wilkening, E.A. 1977. Outdoor recreation and environmental concern: a restudy. *Rural Sociology* 42 (Summer): 241-249.

- Hampton, B.; Cole, D. 1988. *Soft Paths: How to Enjoy the Wilderness Without Harming It*. Harrisburg, PA: Stackpole Books. 173 p.
- Hays, S.P. 1987. *Beauty, Health, and Permanence: Environmental Politics in the United States, 1955-1985*. New York: Cambridge University Press. 630 p.
- Hendee, J.C. 1969a. Appreciative versus consumptive uses of wildlife refuges: studies of who gets what and trends in use. *Transactions of the Thirty-Fourth North American Wildlife and Natural Resources Conference*; Washington, D.C.; Wildlife Management Institute.
- Hendee, J.C. 1969b. Rural-urban differences reflected in outdoor recreation participation. *Journal of Leisure Research* 1 (Autumn): 333-341.
- Jackson, E.L. 1986. Outdoor recreation participation and attitudes to the environment. *Leisure Studies* 5: 1-23.
- Jackson, E.L. 1987. Outdoor recreation participation and views on resource development and preservation. *Leisure Sciences* 9: 235-250.
- Jackson, E.L. 1989. Environmental attitudes, values, and recreation. In E.L. Jackson and T.L. Burton (eds.), *Understanding Leisure and Recreation: Mapping the Past, Charting the Future*. State College, PA: Venture Publishing: 357-383.
- Jernstedt, R. 1992. Americans will back their green feelings with greenbacks. *Trilogy* 4 (3): 72-75.
- Johnston, B.R. 1990. Breaking out of the tourist trap. *Cultural Survival Quarterly* 14 (1).
- Knopp, T.B.; Tyger, J.D. 1973. A study of conflict in recreational land use: snowmobiling versus ski-touring. *Journal of Leisure Research* 5: 6-17.
- Leopold, A. 1949. *A Sand County Almanac*. New York: Oxford.
- McAvoy, L. 1990. An environmental ethic for parks and recreation. *Parks & Recreation* 25 (10): 68-72.
- Pinhey, T.K.; Grimes, M.D. 1979. Outdoor recreation and environmental concern: a reexamination of the Dunlap-Heffernan thesis. *Leisure Sciences* 2 (1): 1-11.
- Scott, D.; Willits, F.K. 1991. Environmental concern of Pennsylvania citizens: data from a statewide survey. University Park, PA: The Pennsylvania State University, Department of Agricultural Economics and Rural Sociology, A.E. & R.S. 219. 26 p.
- Spry, I.M. 1980. The prospects for leisure in a conserver society. In T.L. Goodale and P.A. Witt (eds.), *Recreation and Leisure: Issues in an Era of Change*. State College, PA: Venture Publishing: 141-153.
- Tremblay, K.R.; Dunlap, R.E. 1978. Rural-urban residence and concern with environmental quality: a replication and extension. *Rural Sociology* 43: 474-491.
- Van Liere, K.D.; Noe, F.P. 1978. The 'new environmental paradigm': a proposed measuring instrument and preliminary results. *Journal of Environmental Education* 9 (Summer): 10-19.
- Van Liere, K.D.; Dunlap, R.E. 1980. The social bases of environmental concern: a review of hypotheses, explanations, and empirical evidence. *Public Opinion Quarterly* 44: 43-59.
- Van Liere, K.D.; Noe, F.P. 1981. Outdoor recreation and environmental attitudes: further examination of the Dunlap-Heffernan thesis. *Rural Sociology* 46 (Fall): 505-512.

CHARACTERISTICS AND TRAINING NEEDS OF NEW HAMPSHIRE'S LOCAL CONSERVATION DECISION MAKERS

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Town officials in New Hampshire responsible for natural resource planning were surveyed to ascertain their characteristics and desired training. Most respondents had received some training related to their responsibilities. Water resources, land use, legal issues, administration, and town planning were topics mentioned most often for future training sessions. Such results are important for training future town officials.

Introduction

Human activity has been shaping New Hampshire's landscape since the first settlers came to the area in the 1600's. Most of the land was cleared for agriculture and other uses by the late 19th century, with farms and small communities dominating the landscape (Baldwin 1990). By 1900, however, land use patterns had begun to change, and forests began to reclaim many unused fields. Today, New Hampshire is 87 percent forested (Frieswyk and Malley 1983).

Population patterns have changed as well, particularly during the last 20 years. Between 1970 and 1980, New Hampshire's population grew from 737,000 to 920,000, a 24.8 percent increase. Much of this growth, about 60 percent, was concentrated in the southeastern counties of Rockingham and Hillsborough (Luloff et al. 1985). The Census Bureau estimates that the 1990 population was 1.1 million (Bureau of the Census 1990). This continued trend of rapid population growth contributes to the pattern of land use conversion for development, particularly of forested land (Befort et al. 1987a and 1987b).

New Hampshire has a long tradition of local autonomy over many government functions. Residents have long indicated that local officials should be sensitive and responsive to the needs and desires of the people (Hulcher 1973). Such responsiveness contributes to strong faith in local government. It also reflects the fact that town officials and the impacts of their decisions are highly visible.

Importantly, the opportunity to be involved at the local level extends to land use issues. In 1971, Russell E. Train, Chairman of the Council on Environmental Quality, observed: "Land use is the single most important element affecting the quality of our environment which remains substantially unaddressed as a matter of national policy," (Hulcher 1973). Reflecting the attitude of a majority of Americans, many New Hampshire citizens contend that the issue should not be handled at the national level. With increasing population pressure, land use

policy and control issues have been raised in virtually all of the state's towns.

Given New Hampshire's rapid growth and the resulting fragmentation of the state's undeveloped lands, town officials are under increasing strain to meet the demand for new levels of environmental concern, planning, and protection. This study examines the level of natural resource knowledge and information needed by local officials serving as conservation decision-makers in New Hampshire. These include members of conservation commissions, planning boards, and zoning boards of adjustment. This study differs from others in that it examines volunteer local officials, rather than municipal officials or bureaucrats, and it addresses natural resource issues. It is aimed at determining the local officials' sociodemographic characteristics and natural resource training and information needs, as perceived by the officials. Such information is necessary if successful training programs are to be developed and implemented.

Descriptions of Local Boards

New Hampshire has a long tradition of local autonomy over government functions including land use. Eighteen larger communities have moved away from this organizational structure and adopted city/town council governing bodies. The remainder of New Hampshire's 234 towns, however, have retained local control with volunteers filling most positions, including those on the boards included in this study.

The conservation commission movement began in Massachusetts in the late 1950's as a way of including citizens in the environmental planning and management process. The number of conservation commissions has grown steadily in the Northeast, because they have proved to meet regional needs. Conservation commissions in New Hampshire are established by majority vote at the town meeting, and consist of three to seven residents (the seventh member is ex officio from the board of selectmen) serving three-year staggered terms (University of New Hampshire Cooperative Extension 1975; New Hampshire Revised Statutes Annotated 36-A:3). Conservation commission members are appointed by selectmen in towns, and by mayors in cities.

Conservation commissions are charged with ensuring the proper utilization and/or protection of the natural and watershed resources of the town. They may conduct research into local areas, coordinate ad hoc groups with similar goals, and print and distribute literature. They also must maintain an index of all open areas and wetlands, and may recommend a program for better promotion, development, or utilization of such areas. Conservation commissions keep records of their meetings and actions, and file an annual report with the town. They also file an annual report of local dredge and fill applications with the State Wetlands Board.

Planning boards are established by majority vote at town meetings. They consist of four to eight residents appointed by the selectmen or mayor, plus one selectman (or mayor) serving as an ex officio member. The number of members varies with the local government structure, while the length of terms varies from four to six years (N.H.R.S.A. 673:2). Within six months of assuming office, all non-ex officio members of a planning board are encouraged to complete at least six hours of training for this position. The training is designed and furnished by the Office of State Planning (N.H.R.S.A. 673:3-a), or through mutual agreement with the regional planning commissions. Planning board responsibilities include preparing and periodically amending the community master plan, and promoting interest in and understanding of the plan. They can develop, publish, and distribute the plan with related investigations, maps, and reports (N.H.R.S.A. 674:1, I). The planning board may make recommendations to town or city officials for town development, and for amendments of the zoning ordinances or zoning map (N.H.R.S.A. 674:1, II and V). They can propose zoning ordinances for consideration at town meetings, with at least two public hearings on the proposed

ordinance prior to the town meeting. Subject to authorization by town meeting, the planning board may adopt and administer land subdivision control regulations, and prepare and update the official town map (N.H.R.S.A. 674:1, II and V; University of New Hampshire Cooperative Extension 1975).

Zoning boards of adjustment are established by majority vote at town meetings, and consist of five residents serving staggered five-year terms. Members are appointed by the selectmen or mayor (N.H.R.S.A. 673:3, I). A zoning board of adjustment adopts its own rules of procedure, and keeps records of all meetings, which are public (N.H.R.S.A. 673:17). Like planning board members, any non-ex officio member of the zoning board of adjustment is encouraged to complete at least six hours of training for his/her respective position within six months of assuming office. As with the planning boards, this training is designed and furnished by the Office of State Planning (N.H.R.S.A. 673:3-a), or through mutual agreement with the regional planning commissions. Zoning boards of adjustment hear and decide appeals and special exceptions to zoning ordinances and administer special provisions as required by ordinance. They hear appeals in cases where there is an alleged error in an administrative order made in the enforcement of a zoning ordinance.

Methods

The data for the study were obtained through a mail survey procedure patterned after the Total Design Method (Dillman 1978). One hundred of New Hampshire's 234 towns were randomly selected as sampling sites. Lists of members for all three boards were obtained for each of the 100 towns through state associations, regional planning commissions, and telephone calls and letters to individual towns. Three members each from the conservation commission, planning board, and zoning board of adjustment were randomly selected from the lists of each town. Since not all towns maintain all three boards, nor do they always have three members on a given board, the sample population totaled 789 rather than 900.

Twenty-nine of the 789 members in the sample population were eliminated because they were no longer serving on the boards. Of the remaining 760 members, 556 returned completed questionnaires for a response rate of 73.2 percent. Response rates for the individual boards were 72.2 percent for Planning Board members, 73.8 percent for Zoning Board of Adjustment members, and 72.8 percent for Conservation Commission members. Geographically, the response ranged from 72.6 percent for the northern four counties, to 73.5 percent for southern New Hampshire.

Results

Sociodemographic Characteristics

The results of the survey demonstrate the extent of the interest in training among board members, as well as the issues currently facing the three boards.

Age and Gender. The respondents were 48.2 years old, on average, with a range of 24 to 84 years. The majority, 73.2 percent, were male. Very similar characteristics for New Hampshire local officials were reported by Luloff et al. (1984), and Luloff et al. (1991). Age and gender did not vary significantly among the boards.

Occupation. Most local officials were employed in professional positions (44 percent), such as business, medicine, and law. Nineteen percent were retired, 11 percent held blue collar positions such as carpentry or road construction, and 7 percent worked in natural resource positions such as foresters and wildlife biologists.

Education. Eighty-five percent of the responding local officials have attended college. Of those who attended college, 65 percent completed college, and 24 percent attained a graduate degree. On average, 15 percent completed high school or less.

The proportion of officials who had completed college was similar across the boards and regions of the state.

Length of Service and Length of Residence. Conservation commission members had served for an average of 4.5 years, while planning board and zoning board of adjustment members had each served for an average of 4.9 years. These differences were not significant. Board members had lived in their current towns for an average of 18.9 years, with a range of 1 to 74 years. Conservation commission members were town residents for the shortest period of time -- an average of 15.1 years. They were followed by planning board members and zoning board of adjustment members at 20.6 years each. Conservation commission members' length of residence differed significantly from that of planning board members and zoning board of adjustment members ($p < .05$).

Previous Training

Members of the three boards differed sharply in previous training; average attendance among all board members was 57 percent. On average, conservation commission members were most likely to have attended formal training (61 percent), followed by planning board (60 percent) and zoning board of adjustment members (48 percent). The attendance rate of conservation commissioners and planning board members was not significantly different. However, officials on conservation commissions and planning boards were each more likely to have attended training than were officials on zoning boards of adjustment ($p < .05$).

Topics of Previous Training Attended

Conservation commission members most frequently attended training on wetlands/water resource protection. They were significantly more likely to attend water resources sessions than were their counterparts on other boards ($p < .05$). Eighty-two percent of all conservation commission members attended these sessions, which was twice the percentage of conservation commission members who attended training on any other topic. Other important subjects included zoning and other land use controls, land acquisition, and land use planning (Fig. 1).

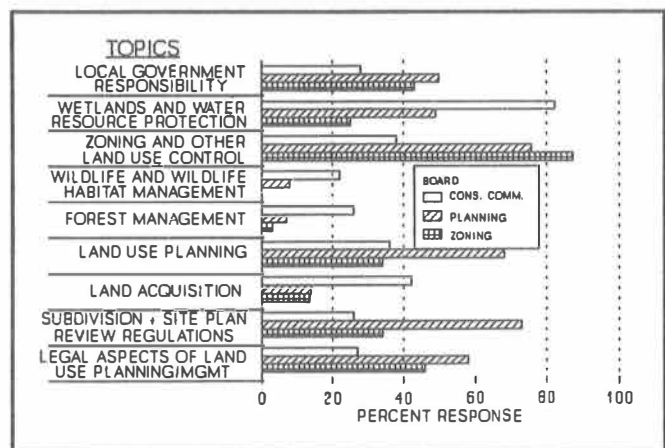


Figure 1. Topics of training attended for all board members.

Planning board members attended training on zoning and other land use control, land use planning, and subdivision and site plan review regulations with similar frequency. They were significantly more likely to attend training on land use planning and subdivision and site plan review regulations than were officials on the other two boards ($p < .05$). Sessions on legal issues, local government responsibilities, and wetlands/water resource protection were also attended by an average of at least one-half of the planning board members. Zoning board of adjustment members most frequently attended training on zoning and other land use control. Across the state, 25 to 55 percent of zoning board of adjustment officials

attended sessions covering legal issues, local government responsibilities, land use planning, and subdivision and site plan review regulations. In addition, a few officials, on each of the boards and from across the state, had attended training covering soils and gravel pit regulations.

Desired Training

Respondents were also asked to identify any desired training (Fig. 2). In contrast to the variation found among board members who had previously attended training, the number of officials currently serving on the three boards who requested additional training did not differ at the $p = .05$ level.

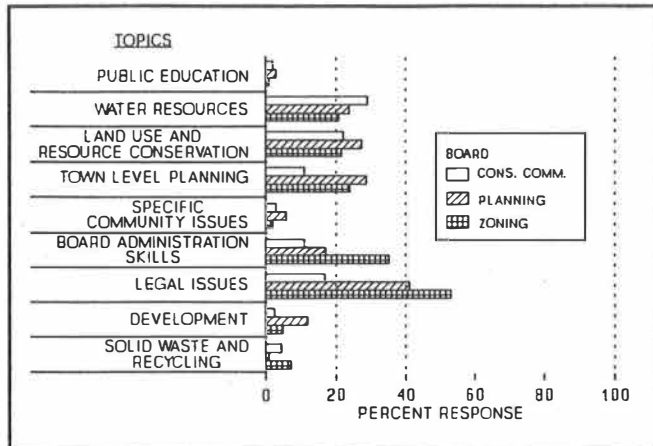


Figure 2. Topics of training desired for all board members.

Respondents were also asked to indicate the training topics or information they would like to receive. The number of officials who named a particular topic was calculated as a percentage of the 62 percent who indicated that they would like additional training.

Water resources was the most frequently requested topic among conservation commission members, mentioned significantly more than often than by members of either remaining board ($p < .05$). Eighty-two percent of these officials, however, indicated that they had attended training on this topic in the past three years. The next most popular training topic for conservation commission members was land use and natural resource conservation issues.

For planning board and zoning board of adjustment members, the most important topic for additional training and/or information was legal concerns. Interestingly, although this is a current issue for these boards, they did not consider it as a major future issue. About 60 percent of planning board and 45 percent of zoning board of adjustment officials had attended training on this topic during the past three years.

Town level planning was the second most important for planning boards. Although only 28 percent requested additional training in this subject, over 70 percent have attended training related to this topic in the last 3 years. The officials also saw town level planning as a less important issue in the future, although they believe that development will become more important in the future. A similar percentage of planning board officials requested training on land use and natural resource conservation concerns, and water resources.

For zoning board of adjustment members, the second major area of training and/or information needs was board administration. They cited it more frequently than either of the other boards. Their higher level of response differed significantly ($p < .05$) from that of conservation commission members, though not from planning board members. Moreover, 43 percent of zoning board of adjustment members had attended such training during the past three years.

Two issues absent from the training needs were development and solid waste. As discussed earlier, these officials were not as sensitive to the solid waste issue as other New Hampshire citizens and officials. The lack of training/information requests on the issues surrounding development was surprising, however, given that it is among the top current issues for both the planning board and zoning board of adjustment members.

Morris et al. (1988) conducted a study to document the planning efforts of New Hampshire's communities. Town selectmen, planning board officials, and city managers were surveyed in each of the 234 towns. One hundred fifty-eight communities returned the survey. In terms of information needs, 49 percent wanted more information on ground water/aquifer protection, 37 percent were interested in watershed protection information, and 27 percent each wanted more education on hazardous waste and land use planning. Except for hazardous waste, the degree of correspondence among the Morris et al. (1988) study and this one is notable. This is especially true for planning board and zoning board of adjustment members, who rated water resource concerns lower than did conservation commission members.

In 1989, the Society for the Protection of New Hampshire Forests conducted a survey of New Hampshire officials and residents (Dobbs 1990; Watkins 1990). They asked 300 "fellow conservationists", which included conservation commission chairpersons, to identify helpful information and training topics from checklists that emphasized local land protection through non-regulatory means. Of 66 questionnaires returned, 64 percent were interested in managing conservation lands, 62 percent in conservation easements, 58 percent in wetlands delineation, 56 percent in groundwater and aquifer protection, and 42 percent mentioned community land use planning. These issues of interest correspond well to training/information requests by officials in this study.

Time Served on the Board Compared to Training Requests

Other factors may influence local officials' training or information requests. In an effort to determine the best timing for training, training requests were compared to the amount of time members had served on their commission or board.

Each board shows a slightly different pattern. Conservation commission members most often requested additional training while in the two to five year bracket. Planning board members requested it most during their first year, and declined thereafter. Zoning board of adjustment members' requests peaked after serving for ten years. This trend follows written comments on the surveys as well. It seems to take time for conservation commission members to understand what resources are important in their community, and to become familiar with their responsibilities and authority. After the first year, they know what to ask for. Planning board members have a more closely defined role, and thus require specific training at the start. Zoning board of adjustment members show a relatively consistent level of training requests until they have served for over ten years, when requests increase. This may be due to the increasing complexity of the regulations and appeals over time, and the members' need to be familiar with them. In addition, they may have a greater level of recognition of the complexities of a given issue, due to their experience on the board.

Delivery of Training and Information

The survey also examined how best to deliver training and information. Approximately two-thirds of the local officials answered these questions. The most popular format for presenting training was a single evening or single weekend day session. Officials preferred a combination of indoor and outdoor activities as appropriate to the topic, and stated that a lecture was the best way to get information across. Many officials mentioned that handouts were helpful, so that they could later refresh their memories and show them to fellow board members who could not attend. They were willing to travel an average of 27 miles (one way) to attend a session. Eighty-five percent of those responding said that it would be helpful to have

sessions available on videotape, for use at home or to show at meetings to those who could not attend.

Discussion and Implications

New Hampshire, like many states, relies on local voluntary efforts to provide town services related to natural resource management and preservation. Here, members of conservation commissions, planning boards, and zoning boards of adjustment indicated that they needed additional training to adequately deal with the myriad of issues related to their offices.

In an era in which fewer people are willing or able to devote the time necessary to serve in such capacities, it is incumbent to provide whatever assistance is needed to facilitate their efforts. This is particularly true for meeting information needs, since errors, either through improper action or no action, by such boards likely will have long lasting effects. Identifying training needs and providing them in modes consistent with the members' desires may well be one way to most efficiently reduce the potential for such problems in the future.

Literature Cited

Baldwin, H. 1990. Forest area of New Hampshire 1660 - 1990. *Forest Notes*. 185: 14-15.

Befort, Wm., A. E. Luloff, and M. Morrone. 1987a. Land use change: ~~S~~trafford County New Hampshire 1953 - 1982. Report 111. Durham, NH: New Hampshire Agricultural Experiment Station. 31 p.

Befort, Wm., A. E. Luloff, and M. Morrone. 1987b. Land use change: Rockingham County New Hampshire 1953 - 1982. Report 112. Durham, NH: New Hampshire Agricultural Experiment Station. 54 p.

Bureau of the Census. 1990. 1990 Census population for the United States is 249,632,692; reapportionment will shift 19 seats in the U.S. House of Representatives. Washington, D.C.: Publication No. CB90-232. U.S. Department of Commerce Economics and Statistics Administration. 4 p.

Dillman, D. A. 1978. *Mail and Telephone Surveys: The Total Design Method*. New York: John Wiley and Sons, Inc. 325 p.

Dobbs, D. 1990. On the home front: spark plugs, front liners & old pros. *Forest Notes*. 185: 16-17.

Frieswyk, T. S. and A. M. Malley. 1985. Forest statistics for New Hampshire 1973 and 1983. *Resource Bulletin NE-88*. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 100 p.

Hulcher, W. E. 1973. Elected local leadership in municipal government. *The Annals of the American Academy of Political and Social Science* 405: 137-144.

Luloff, A. E., R. T. Eckert, and D. W. Moore. 1991. Project North Country Future. Durham, NH: University of New Hampshire Institute for Policy and Social Science Research. 80 p.

Luloff, A. E., G. W. Howe, and S. G. Hutchins. 1985. Population growth and change in New Hampshire. Report 107. Durham, NH: New Hampshire Agricultural Experiment Station. 50 p.

Luloff, A. E., W. H. Chittenden, E. Kriss, S. Weeks, and L. Brushett. 1984. Local voluntarism in New Hampshire: Who, why, and at what benefit. *Journal of the Community Development Society*. 15(2): 17-30.

Morris, D. E., J. D. Kline and E. F. Jansen, Jr. 1988. Planning for growth in New Hampshire communities: perceptions and efforts of local officials. Report 118. Durham, NH: New Hampshire Agricultural Experiment Station. 20 p.

University of New Hampshire. 1975. *Manual of town offices - selection, functions and duties, and references*. Extension Publication 22. Durham, NH: University of New Hampshire Cooperative Extension. 40 p.

Watkins, M. 15 June 1990. Personal communication.

ENVIRONMENTAL AWARENESS

AND VOLUNTARISM

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This study examines residents' level of environmental awareness about the Great Bay National Estuarine Research Reserve (GBNERR), and their willingness to volunteer to protect the resource. The data were obtained from a survey mailed to New Hampshire and Maine residents. Sensitivity to, and knowledge about the resource increased as environmental awareness increased. About half of the respondents expressed a willingness to volunteer to protect the Bay. The volunteers tended to be environmentally aware, knowledgeable about the GBNERR, environmental organization members, young, educated, and lived close to the Bay. The analysis suggested the type of individuals who should be targeted as volunteers, and emphasized the importance of increasing environmental awareness and knowledge about the GBNERR.

Introduction

Estuaries are coastal areas where freshwater mixes with seawater. National estuarine reserves, established through cooperative federal-state efforts, are areas set aside for long-term research, education, and interpretation. A primary aim of these research and education projects is to provide information to the state that is useful for decision-makers concerning the management and protection of estuarine resources.

The Great Bay National Estuarine Research Reserve (GBNERR) in New Hampshire was established in 1989, and is one of 19 such reserves in the United States. The GBNERR contains 4,471 acres of tidal waters and mud flats. The water area includes all of the Great Bay, the small channel from the Winnicut River, and the larger channels from the Squamscott and Lamprey Rivers. At low tide, approximately half of the Great Bay is exposed; most of the intertidal area is mud flat. The upland portion of the estuary includes 800 acres of salt marsh, tidal creeks, islands, woodlands and open fields.

Seven rivers enter the Great Bay estuary and are the major sources of freshwater inflow. The highest volumes of freshwater occur during the spring runoff. Because the ratio of freshwater to saltwater during the remainder of the year is less than 1%, the dominant hydrologic influence in the Bay is the twice daily tides. Researchers at the Jackson Estuarine Laboratory and the University of New Hampshire have gathered an extensive data

base on the hydrology of the Great Bay. A 1983 study, for example, examined the impacts of sewage treatment plants and other sources of nutrients on water quality. Time series analyses using eight years of data indicated that the estuarine water quality was good. Thus, although other estuaries have experienced major eutrophication [an overload of nutrients] problems during the last decade, this has not occurred in the Great Bay estuary because of the rapid assimilation of nutrients within the inflowing tidal rivers and vigorous tidal mixing. These features have combined to maintain an elevated nutrient carrying capacity within the system (Loder et al. 1983).

In addition to hydrologic influences, the character of the 48 mile shoreline around the Great Bay partially accounts for the good water quality. With the exception of seasonal homes such as those at Brackett and Weeks Points, the shoreline is predominantly a mixture of residential property, agricultural land, and woodlands. This pattern of development around the Bay has been driven by two considerations. First, local land use controls place restrictions on shoreline development. The towns adjacent to the Bay have classified shoreline uses for residential, agricultural and conservation purposes only. Second, many landowners continue to retain large parcels of land. Because the landowners are committed to preserving their own homestead and the open character of the area, some of these parcels are more than 100 acres in size.

Five boat launch points provide access to the Great Bay. Boating in the upper bay, however, is limited due to the extensive mud flats in the Great Bay and the shallow channels in the rivers at low tide. Most of the boaters are concentrated in the lower portions of the Little Bay, the Piscataqua River and Portsmouth Harbor; outside the boundaries of the Research Reserve. Commercial fishing in the estuary is limited. Other water dependent uses of the Great Bay include recreational fishing, clamming, oystering, bird hunting and bird watching.

Projections for future use and development of the estuary indicate a moderate rate of growth for the area. From 1970 to 1980, the eight town region grew from 38,721 to 44,475, an increase of 15%. From 1980 to 1990, census counts show a growth of 21% to 53,644. This growth translates into more construction activity, more housing and more recreational activity. With these changes come the potential for increased adverse impacts on the Reserve.

The transition of Pease Air Force Base to other uses may also disrupt the stability of the area's ecology. Among the proposed alternatives are an airport, air cargo and aircraft repair facilities, a light industry and warehousing center, a foreign-trade zone, a research park, hotel and conference space, a golf course, and a wildlife refuge. The extent of impact associated with these uses will likely be related to which combination of proposals are put into effect. As evident by the Jamaica Bay Wildlife Refuge near JFK airport in New York, for example, an airport may not harm the environment around the Great Bay, provided that the six miles of undeveloped shoreline at Pease are left as a wildlife refuge.

Other threats to the environmental quality of the Reserve come from both direct and indirect sources. Among the direct potential impacts are the toxic waste sites at Pease AFB, the filling of wetlands for new developments, and airborne pollutants from both automobile and aircraft traffic. Studies conducted in the Chesapeake Bay indicate airborne pollutants account for as much as two-thirds of organic water pollutants (Goldman 1990). Although not connected to the GBNERR, the expansion of the Portsmouth Port could indirectly effect water quality. Due to the dynamics of an estuary, pollutants that enter at any point will eventually impact the entire system. In recognition of these possible consequences, the Great Bay Reserve needs to be managed as a total system, rather than a single bay.

To mitigate the potential impacts associated with changing land use patterns, it is essential that members of the general public

understand the importance and value of the Reserve. The effective design and development of any educational effort requires baseline information on the current knowledge and awareness of the population of interest. Although a number of educational efforts for the Great Bay Estuarine Reserve have been initiated, there has not as yet been a systematic evaluation of individuals who use the area around the Reserve, local landowners, developers and conservation commissions to determine their understanding of how the GBNERR works and what the establishment of the Reserve means to them. Existing programs have tended to focus on audiences with some prior interest in the estuary (e.g. Audubon, Sea Grant). As general recognition of the existence of the Reserve increases, the number of visitors to the resource is also likely to increase. Reaching this broader audience requires a systematic assessment of the public's general and specific knowledge of and attitudes toward estuarine systems.

The study described in this paper contributes another component to the overall management program on the Great Bay by examining residents' level of environmental awareness about the GBNERR, and their willingness to volunteer to protect the Bay.

Methods

A random sample of New Hampshire and Maine residents was identified from telephone listings. The sample was stratified according to the distance the person lived from the Reserve [those living in communities adjacent to the Great Bay ($n = 350$), residents who lived in the two adjacent counties, but not in communities adjacent to the Bay ($n = 300$), and those who lived outside Rockingham and Stratford counties ($n = 200$)]. Finally, a sample of conservation organization members ($n = 100$) was chosen. The organizations included the Great Bay Estuarine System Conservation Trust, the Great Bay Watch, the Audubon Society, the Society for the Protection of New Hampshire Forests, Friends of Odiorne, and UNH Marine Docents.

Two separate mailings were used with a reminder postcard after the first mailing. Of the 950 surveys mailed, 432 were returned (51%). The highest response rates were noted for organizational members and New Hampshire residents living adjacent to the Bay (83% and 61%, respectively). New Hampshire residents living outside Rockingham and Strafford counties and Maine residents were the least likely to complete and return the survey (25% and 26%).

Results

Environmental Awareness

Nine items on the survey addressed residents' specific awareness of environmental issues affecting the Great Bay (Table 1). Responses to these beliefs reflected individuals' knowledge of the importance of estuaries, and their concerns over protecting the GBNERR from industrial and recreational activities. The percent of agreement with these statements ranged from 72% to 98%.

An environmental awareness scale was constructed from these 9 survey items. Reliability statistics calculated for the scale produced an overall Cronbach alpha of .78. The overall mean value for the scale was 3.33, suggesting that many individuals were sensitive to environmental issues affecting the Bay.

Individuals were classified as being either low, medium or high on the environmental awareness scale. People in the low environmental awareness group reported an average score of less than 3.00. These respondents less often agreed with the statements shown in Table 1. People in the medium category scored, on average, 3.00 to 3.49 on the environmental awareness scale, while those classified in the high group reported average scores greater than or equal to 3.50. Twelve percent ($n = 50$) were judged to have low environmental awareness, 37% ($n = 155$) fell into the medium category, and 51% ($n = 216$) reported high environmental awareness (Table 2).

Table 1. Item composition of environmental awareness scale

Items in Environmental Awareness Scale ^a	Percent Agree	Mean	s.d.
Estuaries play an important role in the life cycle of many marine animals	98%	3.82	.43
The Great Bay is a fragile environment	95	3.61	.62
I feel a strong personal obligation to protect the Great Bay Estuary	87	3.28	.74
People do not have the right to modify the Great Bay to suit their needs	84	3.41	.83
Industries that accidentally discharge toxic substances into the Great Bay should be held financially and legally responsible for any damages	97	3.85	.52
Increasing industrial development near the Great Bay will contribute to the decline in environmental quality	84	3.34	.84
Increasing recreational development near the Great Bay will contribute to the decline in environmental quality	72	2.90	.81
More education programs should be offered on the value of the Great Bay	96	3.57	.62
More research is needed to help public agencies manage the Great Bay	86	3.24	.77

a/ Variables coded on a four-point scale:
1 = Strongly Disagree, 2 = Somewhat Disagree,
3 = Somewhat Agree, 4 = Strongly Agree.
Overall scale alpha = .78

Although many respondents were sensitive to environmental issues affecting the Bay, there were significant differences among the three groups. Nearly two thirds of the high environmentally aware group had heard of the Great Bay Research Reserve, compared to only a third of the medium group and a quarter of the low group (Table 2).

The high environmental awareness group was more likely to belong to an environmental organization. Half of the people in this category belonged to at least one organization. Two thirds of those in the medium classification and 80% of the low group did *not* belong to any organization. The two most frequently mentioned organizations by the high group was the Audubon Society, and the Society for the Protection of New Hampshire Forests. Fourteen percent of this group belonged to the Conservation Trust and another 11% were members of the Friends of Odiorne.

Table 2. Environmental Awareness: Bivariate relationships

	Environmental Awareness			Chi-Square
	Low	Medium	High	
Entire Sample	12%	37%	51%	
Heard of GBNER				41.5**
No	74%	67%	37%	
Yes	26	33	63	
Organization Member				18.1**
No	80%	65%	50%	
Yes	20	35	50	
Property ownership along the Great Bay				17.3**
No	94%	97%	85%	
Yes	6	3	15	
Distance of residence from the Great Bay				13.9*
< 3 miles	22%	18%	24%	
3 to 5 miles	27	28	31	
5 to 10 miles	24	19	23	
11 to 25 miles	22	15	13	
> 25 miles	5	20	10	
Age				n.s.
18 to 24	2%	7%	4%	
25 to 34	15	24	17	
35 to 44	28	26	27	
45 to 54	11	15	14	
55 to 64	17	10	16	
65 +	28	18	22	
Gender				6.5*
Female	28%	30%	42%	
Male	72	70	58	
Education				15.8**
High School	36%	18%	14%	
Some College	17	19	20	
College	32	29	31	
Grad School	15	34	35	
Income				n.s.
<\$20,000	23%	20%	19%	
\$20,000-\$29,999	16	18	19	
\$30,000-\$49,999	37	35	38	
≥\$50,000	23	27	24	

* p < .05; ** p < .01

Over 84% of all respondents did *not* own property along the Bay. Respondents in the high environmental awareness group, however, were five times more likely to be landowners than the medium group (15% versus 3%, respectively), and two and a half times more likely to own property than the low group (15% versus 6%). Although most respondents did not actually own property on the Great Bay, many lived relatively close. About a quarter of those in the high and a fifth of the medium and low environmental awareness respondents lived less than 3 miles away. Extending this distance 10 miles, incorporates about three quarters of respondents in the high and low categories, and two thirds of the medium group.

Over two thirds of those in the low and medium groups were male, while the high group was divided more evenly between males and females. The high awareness group tended to be more educated than the other two groups. No significant difference among the environmental awareness groups were noted for age or income.

Perceived Problems Affecting the Bay

A number of inter-related environmental issues can influence the Great Bay. Reductions in water quality, pressures to increase development, declines in fisheries resources, and the impacts associated with recreational use all play a role in the overall quality of an estuary.

Beliefs about water quality were examined relative to specific types of impacts; for example, chemical and oil spills, direct discharge of sewerage, toxic waste, etc. For each of the water quality items shown in Table 3, evaluations of the condition as problematic consistently increased from the low to medium to high environmental awareness groups. Chemical and oil spills, direct discharge of sewerage, shoreland erosion and toxic wastes were perceived to be problems by a majority of those in the high environmental awareness group. A similar pattern emerged for the medium awareness group, although the percentage of individuals rating these water quality indicators as problematic was lower. None of these issues were rated as problems by more than 32 percent of the low environmental awareness group.

If the quality of water in the Bay declines, fisheries resources may also be impacted. Contamination of fish and shellfish, for example, was considered a problem by over three quarters of the high awareness group, about two thirds of the medium group, and half of the low environmental awareness respondents. Beliefs about declining fisheries resources showed a similar pattern of responses.

Table 3. Perceived problems affecting the Great Bay

	Environmental Awareness ^a			Chi-Square
	Low	Medium	High	
Water quality				
Chemical/oil spills	32%	50%	63%	19.5 [*]
Sewerage discharge	31	51	60	17.1 [*]
Toxic wastes	24	44	54	21.7 [*]
Agricultural run-off	16	37	48	24.0 [*]
Shoreland erosion	30	47	63	21.7 [*]
Sedimentation	18	32	46	31.6 [*]
Overall water quality	14	47	63	62.4 [*]
Fisheries				
Declining fisheries	36%	51%	70%	41.3 [*]
Contamination of fish	48	62	78	24.1 [*]
Development				
Shoreline	27%	55%	84%	90.3 [*]
Industrial	18	47	73	64.1 [*]
Marina	14	40	64	50.6 [*]
Loss of wetlands	29	61	79	63.6 [*]
Population growth	24	62	89	115.6 [*]
Human Impact				
Amount of boating	20%	44%	67%	44.7 [*]
Boat discharge	33	62	78	38.9 [*]
Jet ski usage	14	31	43	21.9 [*]
Discarded trash	48	68	83	30.4 [*]

^a Cell entries are the percentage of respondents who consider the issue to be a problem * p < .01

Table 3 also displays the respondents' perceptions of problems associated with development and human impact. In general, the pattern of findings observed for water quality and fisheries were also noted for concerns over development and recreational use of the Bay. People who were in the high environmental awareness group tended to perceive these issues to be more of a

problem than either the medium or low groups. Individuals in the medium group were also more likely to rate them as problems than the low awareness group. For example, perceptions of problems resulting from population growth around the Bay, shoreline development, industrial and marina development, and loss of wetlands were greatest for the high awareness group and least for the low category.

Voluntarism

Across all groups, just under half (47%) of the respondents expressed a willingness to volunteer to protect the Great Bay (Table 4). Self-guided nature walks, boat tours of the Bay and helping to clean up the Bay were the three most popular volunteer programs. Donating money ranked fourth in importance for individuals at all levels of environmental awareness. The three least popular volunteer activities involved the repair / construction of buildings, becoming a tour guide and writing articles.

Nearly two thirds of the high environmental awareness group indicated a willingness to volunteer, compared to only 10% of the low group. As expected, simple awareness of the GBNERR was also related to voluntarism. Fifty-nine percent of those who had heard of the Reserve expressed an interest in volunteering their services; 36% of those who had not heard of the GBNERR volunteered.

Half of the volunteers belonged to an environmental organization; less than a quarter of the non-volunteers belonged to an organization. The Audubon Society, the Society for the Protection of New Hampshire Forests, the Great Bay Estuarine Systems Conservation Trust, and the Friends of Odiome were the four most commonly mentioned organizations.

The volunteers were three times more likely to own property along the Bay, lived closer to the Bay in terms of distance, and were more likely to live in either Rockingham or Strafford counties than were the non-volunteers. Length of residence in the county was not statistically related to voluntarism.

Volunteers tended to younger than non-volunteers (Mean age = 45.6 versus 50.3, respectively). Volunteers had also completed more years of formal education than non-volunteers. Gender and reported income were not related to voluntarism.

To develop an understanding of which of these variables are most useful in distinguishing between volunteers and non-volunteers, a stepwise discriminant analysis was used. This analysis correctly classified 81% of the respondents into their respective groups (Table 5). Eighty-one percent of the volunteers were correctly classified, while non-volunteers were predicted with 77% accuracy. The best predictor of voluntarism was the environmental awareness scale. Individuals who were sensitive to the environmental issues affecting the Great Bay were more willing to volunteer than those who lacked this sensitivity. The respondents' age was the next variable to enter the equation. Younger individuals were more likely to volunteer than older individuals. Membership in an environmental organization, simple knowledge of the existence of the GBNERR, property ownership along the Bay, and education were positively related to willingness to volunteer, while distance of residence from the Bay and income were negatively related to voluntarism. Gender was not significant.

Table 4. Willingness to volunteer: Bivariate relationships

	Willing to Volunteer to Protect the Great Bay		Chi-Square
	No	Yes	
Entire Sample	53%	47%	
Environmental Awareness			53.1**
Low	90%	10%	
Medium	61	39	
High	36	64	
Heard of GBNERR			21.8**
No	64%	36%	
Yes	41	59	
Organization Member			20.7**
No	78%	22%	
Yes	50	50	
Property ownership along the Great Bay			12.4**
No	95%	85%	
Yes	5	15	
Distance of residence from the Great Bay			12.2*
< 3 miles	16%	26%	
3 to 5 miles	26	31	
5 to 10 miles	22	21	
11 to 25 miles	19	11	
> 25 miles	16	10	
Age			10.1*
18 to 24	4%	6%	
25 to 34	19	22	
35 to 44	22	29	
45 to 54	15	13	
55 to 64	13	15	
65 +	27	15	
Gender			n.s.
Female	32%	39%	
Male	68	61	
Education			13.6**
High School	25%	11%	
Some College	17	21	
College	30	30	
Grad School	28	38	
Income			n.s.
<\$20,000	21%	18%	
\$20,000-\$29,999	18	20	
\$30,000-\$49,999	38	35	
≥\$50,000	23	27	

* p < .05; ** p < .01

Table 5. Predictors of willingness to volunteer ^a

Classification Variable	Zero-Order Correlation	Standardized Discriminant Coefficient
Beliefs / Knowledge		
Environmental Awareness Scale ^b	.50 **	.65 **
Heard of the GBNERR ^c	.34 **	.43 **
Organization Member ^c	.31 **	.45 **
Proximity to the Great Bay		
Own property along Bay ^c	.20 *	.23 **
Distance of residence from Bay ^d	-.20 **	-.24 **
Demographics		
Age ^d	-.17 *	-.55 **
Gender ^e	.15	n.s.
Education ^f	.09	.17 **
Income ^g	.06	-.23 **

^{a/} The dependent variable refers to the respondent's willingness to volunteer: 1 = yes; 0 = no.

^{b/} Scale includes the variables listed in Table 1; Values range from 1.33 to 4.00.

^{c/} Dummy variable: 1 = yes; 0 = no.

^{d/} Variable coded from open-ended responses.

^{e/} Dummy variable: 1 = Female; 0 = Male.

^{f/} Variable coded on a 6 point scale ranging from 1 = "grade 1 to 8" to 6 = "graduate degree."

^{g/} Variable coded on an 11 point scale ranging from 1 = "under \$7,500" to 11 "over \$100,000."

* $p < .01$; ** $p < .001$

Discussion

Many of the respondents to this study were sensitive to environmental issues affecting the Great Bay. The classification scheme categorizing respondents according to their level of environmental awareness, however, showed marked differences among the three groups. Sensitivity to, and knowledge about the Bay increased as the level of overall environmental awareness increased. These findings suggest that programs designed to familiarize individuals about estuaries and the Great Bay National Estuarine Research Reserve may help to mitigate problem conditions before they arise.

Although perceptions of existing problem conditions occurred more frequently among the high and medium awareness groups, about half of these individuals indicated they were unsure of the actual extent of the impact. This suggests that increasing the knowledge base of all residents is important.

Across all groups, slightly less than half of the respondents expressed a willingness to volunteer to protect the Great Bay, suggesting interest exists in preserving the resource. The eight variable discriminant function analysis correctly classified 81% of these respondents. Similar to the bivariate findings, this analysis indicated that volunteers tended to be environmentally aware, knowledgeable about the GBNERR, and belonged to environmental organizations. The volunteers in this sample were young, lived close to the Bay, reported higher levels of education, and relatively low incomes. While some of these variables cannot be controlled by natural resource managers, the analysis suggests the type of individuals who should be targeted as volunteers. It also emphasizes the importance of increasing environmental awareness and knowledge about the Great Bay Natural Estuarine Research Reserve.

Given the fragility of estuaries, and the consequences associated with alternative uses both within and outside the boundaries of reserves, the GBNERR needs to be managed as a total system (including the surrounding area), rather than as a single resource. The findings reported here reinforce the need for a coordinated management effort. The New Hampshire Fish and Game Department needs to assume management control over the various volunteer programs, and continue to be involved in all decisions affecting the Bay.

Literature Cited

Goldman, E. 1990. Tug of war over the Great Bay. *New Hampshire Premier*. November: 22-24.

Loder, T. C.; Love, J. A.; Penniman, C. E.; Neefus, C. D. 1983. Longterm environmental trends in the nutrient and hydrographic data from the Great Bay Estuarine System, New Hampshire - Maine. UNH Marine Program Publication, UNH-MP-D/TR-SG-83-6. University of New Hampshire, Durham. 69 pp.

AN EXAMINATION OF ENVIRONMENTAL ATTITUDES AMONG COLLEGE STUDENTS

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This paper examines the relationship between two attitudinal components: the affective component, represented by environmental concern, and the conative component, represented by behavioral intention. Results suggests that environmental concern is a reasonable predictor of environmentally favorable behavioral tendencies and that socio-demographics have limited influence on environmental

Introduction

Earth Day 1970 is often considered by many to be the focal point of the environmental social movement of the 1960s and 1970s and the beginnings of the Environmental Era. While perhaps slowing during the 1980s, environmental concern may again be on the rise. According to Dunlap (1987, p.11) public opinion research clearly demonstrates "a significant upturn in public concern for environmental quality during the Reagan presidency." In a July 1988 poll conducted by the New York Times and CBS News, pollsters found that 65% of the public supported the idea of environmental care, an increase of approximately 20% from 1981, when the poll was first conducted (May, 1988).

It would seem logical that some of this increase could be attributed to the increased popularity of environmental education programs instituted in the school systems during the 1970s and 1980s. It would also appear reasonable to assume that a majority of those individuals presently enrolled at colleges and universities would have experienced some type of environmental education program during their elementary and/or secondary education. Finally, college students, previously exposed to some form of environmental education, should theoretically, hold environmentally conscientious attitudes.

The results of the research regarding attitudinal relationships, have varied and have been inconclusive. Attitudes have been diversely defined by social scientists, and most definitions include multiple components composing one's attitude (Bennet, 1974; Fishbein and Ajzen, 1975; Iso Ahola, 1980; McGuire, 1969). According to Fishbein and Ajzen (1975, p.6) an attitude is "a learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object." Thus one can see the connection between beliefs and the intention to respond in a particular manner. McGuire (1969) suggested that the attitude construct is composed of three entities: (a) a cognitive component, (b) an affective component, and (c) a conative component. In order to sufficiently investigate the relationship attitude has with behavior, knowledge, and demographic factors, the relationship between these components of one's attitude needs further examination. Predicting the influence environmental knowledge has on attitudes, and in turn, the influence attitudes have on behavior, should prove to be more reliable when the relationships between specific components of an attitude are

identified and understood. The study at hand focused on researching the latter two components of McGuire's attitudinal model, affective and conative, in order to measure the strength of the cognitive component. More specifically, this study was an investigation of the independent variable, environmental concern, and its influence on the dependent variable, environmental behavioral intention.

Purpose of Study

The purpose of this study was to determine the degree of environmental concern among college students and to investigate the influence attitude has on positive environmental action in the lifestyle of students through their willingness to give up items in major categories of adjustments to lifestyles, use of resources, and contamination of the environment. Variables such as political leaning, income, academic factors (class, major, college), age, gender, exposure to environmental education, and geographic background were also tested against the attitude of environmental concern, and against "willingness to change" attitudes.

Methodology and Research Design

The study was based on a sample of 250 college students enrolled in a Physical Education 129 course entitled "Fitness for Life," primarily comprised of undergraduate students. The first day of class during the fall semester of 1991 was chosen for data collection. The students were given a questionnaire to be completed in the first 10 minutes of class. A total of 226 questionnaires were collected at the end of class, 12 questionnaires were discarded due to incompleteness, resulting in 214 usable questionnaires, a response rate of 86 percent.

Instrumentation

The structure and format of the instrument employed was comprised of two instruments that had been tested in previous research (Dunlap and Van Liere, 1978; Thompson and Gasteiger, 1985). Dunlap and Van Liere's instrument, known as the "New Environmental Paradigm," was designed to measure a general dimension of environmental concern, and was used in this study to identify the affective component of one's attitude. In order to measure environmental behavior intentions, Thompson and Gasteiger's attitudinal survey was utilized, identifying the conative component of one's attitude.

Environmental attitude. A revised edition of Thompson and Gasteiger's attitudinal survey instrument was implemented in the first section of this questionnaire to assess the students' awareness of environmental problems by obtaining their responses to provocative statements on the subject. These revisions were determined to be necessary as a result of the changes in society that have occurred since the development of the instrument. In addition, these revisions were made in light of the relevance of the items within the context of current environmental concerns. Most of the revisions were made in the first section of Thompson and Gasteiger's instrument which measured the students' willingness to alter their behavior in order to be more environmentally sensitive. This section of the questionnaire was divided into the following five sub-sections: Food Consumption and Packaging, Personal Items, Household Items, Recreation, and Transportation. Each of these subsections consisted of a seven-item scale, and respondents were asked to rate themselves on their willingness to give up each of these items. These sub-scales were treated as separate dependent variables when the data was statistically analyzed. The remainder of the Thompson and Gasteiger instrument incorporated into this questionnaire focused on the respondent's reaction to various potential control measures dealing with environmental quality issues and was utilized statistically to aid in validating the relationship between environmental concern and environmental behavioral intention.

Environmental concern. The second part of the questionnaire for this study implemented Dunlap and Van Liere's "New Environmental Paradigm" instrument. The instrument was composed of a twelve item scale, in a Likert-type format, reflecting all of the crucial aspects of the "New Environmental

Paradigm." These aspects included; (a) the concept of a limit to growth, (b) a balance of nature, and (c) the need to reject the anthropocentric notion of natural resource use. The scale represented a global environmental disposition, in contrast to the previous scales which focused on specific problems, such as pollution, energy use, and overpopulation.

The final part of the survey instrument provided a profile of the respondent by obtaining socio-demographic background information, which was used as independent variables to examine their effect on attitudinal choice patterns. For the purpose of this study Dunlap and Van Liere's instrument represented the independent variable, and Thompson and Gasteiger's questionnaire served as the dependent variable. The combination of these two measurements aided in understanding the degree of environmental concern and its influence on behavioral intentions.

Treatment of Data

The statistics employed to analyze the data and test the research hypotheses included descriptive statistics, Cronbach Alpha Coefficient, Pearson Correlation Coefficient analysis, One-way Analysis of Variance, and finally, Scheffe's tests. The statistical results were considered significant at the .05 level. Descriptive statistics were employed to demonstrate the frequency distribution of responses, the means of each item, and the total computed scores for each scale. A Cronbach Alpha Coefficient was utilized to test reliability on each dimension of the scales and examine the item composition in each scale included in the questionnaire. A Pearson Correlation Coefficient analysis was utilized to analyze the relationship between environmental concern and environmental behavioral intention among college students. The relationships between socio-demographic variables and environmental attitudes, were tested using One-way Analysis of Variance. The socio-demographic variables acted as the independent variables, and the study investigated the influence these variables had on environmental attitudinal choice patterns. In examining the relationships between socio-demographic variables and the various scales of behavioral intention, the overall scale as well as the individual items of each scale, were included in the analysis. Scheffe's tests were used, when significant relationship were found within these two hypotheses, to determine the differences between group means.

Analysis and Findings

All scales and sub-scales were found to have adequate overall scale alphas based on Kuhn and Jackson's study (1989) involving the stability of factor structures in the measurement of public environmental attitudes. They suggested that a score of .40 or greater is generally considered to be an acceptable level of reliability. Table 1 shows that the behavioral intention scale, consisting of 35 items, yielded a reliability coefficient of .85. When this scale was divided into its five sub-scales, each having seven items, the reliability coefficients ranged from .57 to .71. The alternate behavioral intention scale, utilized to help validate the consistency of resulting relationships in this study, yielded an alpha coefficient of .72. It has been suggested by Geller and Lasley (1985) that Dunlap and Van Liere's (1978) scale is multidimensional and represents three attitudinal domains: "balance of nature", "limits of growth", and "man over nature". Therefore, the reliability of both the overall scale and the multi-dimensionality of the scale was examined. The reliability tests for each of three proposed domains resulted in the relatively strong coefficients of .66 for balance of nature, .53 for limits of growth, and .67 for man over nature. When the scale was tested for its overall reliability it resulted in a coefficient of .74 and all of the 12 items appeared to have a uniform correlation. Based on these findings, the alpha coefficients for testing the relative homogeneity of variables, within each scale and sub-scale, exhibit a strong degree of internal consistency among the instruments employed in the study.

Table 1. Reliability coefficients for the attitudinal scales.

Scale	Overall Scale Alpha
Behavioral Intention Scale	.85
Food Consumption & Packaging Sub-Scale	.61
Household Items Sub-Scale	.57
Transportation Sub-Scale	.60
Personal Items Sub-Scale	.71
Recreation Sub-Scale	.62
Control Measures Scale	.72
Environmental Concern Scale	.74

In examining the data, a significant relationship was found to exist between behavioral intention and the environmental concern of students when their intentions were analyzed on an overall scale and this relationship is positive in nature. The increased environmental concern of college students, thus, increases their willingness to modify behavior in favor of the environment in most of the relationships currently examined. The relationship between concern and the five sub-scales of behavioral intention resulted in significant relationships for four of the sub-scales (food consumption and packaging, household items, transportation, and recreation). The relationships were significant at the .01 level, indicating that as the level of concern for the environment increases among college students, their willingness to modify behavior in favor of the environment also increases in the four categories (see Table 2). When the relationships between concern and the individual items of behavioral intention were investigated, it was found that nearly 60% of the items were significantly related to concern. Therefore, it was determined that there is a relationship between concern and the behavioral intentions of 20 of the 35 items. For these items, the results convey that as the concern of students increases, there is a simultaneous increase in their willingness to alter behavior in favor of the environment.

Table 2. Pearson correlation coefficient analysis for behavioral intention scales with environmental concern scale.

Scale	Concern ^a	N
Over-all Behavioral Intention Scale	.377**	184
Food Consumption and Packaging Sub-Scale	.339**	193
Household Items Sub-Scale	.312**	192
Transportation Sub-Scale	.342**	191
Personal Items Sub-Scale	.131	194
Recreation Sub-Scale	.227**	197
Control Measures Scale	.350**	197

** Significant at 0.01 level

^a Indicates the R value for the correlation of the two variables.

The control measures scale was included in the analysis in order to further demonstrate the relationship between concern and behavioral intentions using an alternative behavioral intention measure. When this scale was tested against the concern scale, also using Pearson's r, a significant relationship was found at the .01 level (see Table 2). Thus, the increased environmental concern of students positively influences their willingness to adopt measures to control and limit energy use and consumption.

The outcome of the Oneway Analysis of Variance of socio-demographic variables and environmental concern yielded F-values for gender, age, student status, geographic background, parent yearly income, background in environmental education, and political leaning none of which significant at the .05 level.

Therefore, the seven independent socio-demographic variables identified in this study were found to have limited significant influence on the environmental concerns of college students (see Table 3).

Table 3. Significance of demographic variables on environmental attitudinal scales

Item in Scale	Gender ^a	Age ^b	Student ^c Status	Geographic ^d Background	Parent ^e Income	Background ^f In EE	Political ^g Leaning
Behavioral Intention Scale	NS	NS	NS	NS	NS	NS	(+)*
Food Consumption and Packaging Sub-scale	NS	NS	NS	NS	(-)*	(+)*	NS
Household Items Sub-scale	NS	(+)*	(+)*	NS	NS	NS	(+)*
Transportation Sub-scale	NS	NS	NS	(-)**	NS	NS	NS
Personal Items Sub-scale	(-)**	NS	NS	NS	NS	NS	NS
Recreation Sub-scale	(+)**	NS	NS	NS	NS	NS	NS
Control Measures Scale	NS	NS	NS	NS	NS	(+)*	(+)**
Concern Scale	NS	NS	NS	NS	NS	NS	NS

NS - Not significant * Significant at 0.05 level ** Significant at 0.01 level

^a A positive symbol indicates that females have more favorable environmental intentions than males.

^b A positive symbol indicates that older students have more favorable environmental intentions.

^c A positive symbol indicates that upper class students have more favorable environmental intentions.

^d A positive symbol indicates that students with urban backgrounds have more favorable environmental intentions.

^e A positive symbol indicates that students from lower income families have more favorable environmental intentions.

^f A positive symbol indicates that students with strong EE backgrounds have more favorable environmental intentions.

^g A positive symbol indicates that liberals have more favorable environmental intentions.

It was suggested that there would be a relationship between behavioral intentions and the seven socio-demographic variables identified in this study. Table 4 summarizes the findings of this study. It was predicted that the direction of the relationship between behavioral intention and gender would show females more willing to modify behavioral intentions, the results are inconclusive. The effect of age on the behavioral intentions of college students is minimal and the direction of the relationship tends to reveal older students having more favorable environmental intentions. The student status variable influences the behavioral intentions of college students in specific sections of the behavioral intention scale, and the direction of the relationship is generally such that upperclassmen are more willing than underclassmen to alter their behavior towards the environment as expected but with some exceptions. The geographic background of students had limited influence on their intended behavior with subjects from rural areas have more favorable behavioral intentions than subjects from both suburban and urban backgrounds. The relationship between annual family income of students and their behavioral intentions is limited, with those from higher incomes subscribing to more favorable intentions than those from families with lower income. The relationship between environmental education experience and the behavioral intentions of students resulted in limited significant findings; students with higher levels of experience with environmental education do not appear to have any more concern for the environment than students with little experience in this subject. In examining the relationship between political leaning and behavioral intention, the findings suggest that students with liberal political orientations tend to have more behavioral intentions in favor of the environment. In summary, the findings of this research reveal that socio-demographic variables have limited influence on the behavioral intentions of college students.

Discussion and Implementation

With regard to the influence the affective component of one's attitude has upon the conative component, as suggested by Fishbein and Ajzen (1975), these research findings appears to support the relationship. The subjects' environmental concern, representing the affective component, is positively related to their behavioral tendencies, or the conative component of one's attitude. Both of the scales representing behavioral intentions employed in the current study resulted in significance when this relationship was tested. This would imply that the environmental concern of college students is a reasonable predictor of environmentally favorable behavioral tendencies of those students. Thus, as the environmental concern of college students increases, it is likely that they will have more intentions to behave in manners which reflect that concern and favor the environment.

The subjects' response to items in categories reflecting adjustments to lifestyle, use of resources, and contamination of the environment reveals their limited tendencies of behavioral adjustments. The category they appear to be the most willing to modify behavior in is their recreational pursuits. This would imply that the items which are associated with their leisure are the most expendable. The items which students appear to be the least willing to give up pertain to household items and items of personal concern. Those items which students are acquainted with in a normal daily routine would, therefore, be the items they would be least likely to relinquish. Additionally, the data does appear to indicate that students have some degree of inclination to modify their behavior regarding items pertaining to food consumption and packaging. It would appear from the results that college students would comply with restrictions or alterations favoring the environment in areas associated with food and recreational pursuits. However, the restriction of commodities associated with the home, as well as items of personal concern, would not currently be acceptable among the college students included in this study, regardless of the benefit of such restriction towards the environment.

Table 4. Significance of demographic variables on behavioral intention scale items.

Item in Scale	Gender ^a	Age ^b	Student ^c Status	Geographic ^d Background	Parent ^e Income	Background ^f In EE	Political ^g Leaning
Food Consumption and Packaging							
Instant foods	NS	(+)*	(+)**	NS	NS	NS	NS
Paper towels and napkins	NS	NS	NS	NS	NS	(+)*	NS
Purchased items in plastic containers	NS	NS	NS	NS	NS	(+)*	NS
Red meat	(+)**	NS	NS	NS	NS	NS	NS
Fast-food restaurants	(+)*	NS	NS	NS	(-)*	NS	NS
Canned soft drinks	NS	NS	NS	NS	NS	NS	NS
Frozen foods	NS	NS	(-)*	NS	NS	(+)**	NS
Household Items							
Clothes dryer	NS	NS	NS	NS	NS	NS	(+)*
Home air conditioning	NS	NS	NS	NS	NS	NS	(+)*
Dishwasher	NS	(+)*	(+)*	(-)**	NS	NS	(+)*
Daily newspaper	NS	NS	NS	NS	NS	NS	NS
Hi-fi (stereo)	(+)**	NS	NS	NS	NS	NS	NS
Electric and gas heat	NS	NS	NS	NS	NS	NS	NS
Home garbage disposal	NS	(+)*	(+)**	NS	NS	NS	NS
Transportation							
Air travel (conventional)	NS	NS	NS	NS	NS	NS	NS
Automobile with more than 4 cylinders	NS	NS	NS	(-)*	NS	NS	NS
City transit system	NS	NS	NS	NS	NS	NS	NS
Supersonic jet travel	NS	NS	NS	(-)*	NS	NS	NS
Vehicles that achieve less than 25 mpg	NS	NS	(-)*	NS	NS	NS	(+)**
Ability to buy a new car within 8 years	NS	NS	NS	NS	NS	NS	NS
Long distance buses	NS	NS	NS	NS	NS	NS	NS
Personal Items							
Showers longer than 5 minutes	(-)**	NS	NS	NS	NS	NS	NS
Ability to bathe every day	NS	NS	NS	NS	NS	NS	NS
Perfume and aftershave	(-)**	NS	(+)*	NS	NS	NS	NS
Current fashion	(-)**	NS	NS	NS	NS	NS	(+)*
Hair dryer	(-)**	NS	NS	NS	NS	(+)*	NS
Credit cards	NS	NS	NS	NS	NS	NS	NS
Smoking	NS	NS	NS	NS	NS	NS	NS
Recreation							
Television	(+)**	(+)**	NS	NS	NS	NS	NS
Movies	NS	NS	NS	NS	NS	(+)**	NS
Downhill skiing	NS	(+)*	(+)**	NS	NS	NS	NS
Hunting	(+)**	(-)**	NS	(+)*	(-)**	NS	NS
Recreational vehicles	(+)*	NS	NS	NS	NS	NS	NS
Live musical performance	NS	NS	NS	NS	NS	NS	(-)*
Country club	NS	NS	NS	NS	(+)*	NS	NS

NS - Not significant * Significant at 0.05 level ** Significant at 0.01 level

^a A positive symbol indicates that females have more favorable environmental intentions than males.^b A positive symbol indicates that older students have more favorable environmental intentions.^c A positive symbol indicates that upper class students have more favorable environmental intentions.^d A positive symbol indicates that students with urban backgrounds have more favorable environmental intentions.^e A positive symbol indicates that students from lower income families have more favorable environmental intentions.^f A positive symbol indicates that students with strong EE backgrounds have more favorable environmental intentions.^g A positive symbol indicates that liberals have more favorable environmental intentions.

The theory of the attitudinal framework suggests that behavioral intentions are a more accurate predictor of behavior than other components of an individual's attitude. The attitudinal framework tested in the research also implies that the behavioral intentions of individuals predispose their behavior. Although the current research did not directly examine this relationship between these two attitudinal components, the results provide a basis to assume that students have a substantial level of cognitive awareness of the need for environmental protection and quality due to their high level of concern for the environment. Therefore, in the case where subjects indicate a high level of willingness to change their behavior regarding an item, it is likely that they will give these items up in comparison to other items. Based on the current study, the findings of limited numbers of students who are strongly willing to modify their behavior suggest that students are not likely to change their behavior in favor of the environment. This implication would, of course, be in reference to those items specified in the study and would be in regard to the immediate future. It is disappointing that students with higher levels of experience with environmental education do not appear to have any more concern for the environment than students with little experience in this subject. In fact, the results of the study indicate that previous experience with environmental education has limited influence on the attitudinal components, both affective and conative, of individuals. Therefore, based on this research alone, the factors which influence the affective component, leading then to one's behavioral intentions, could not be attributed to experiences with environmental education.

The theories proposed by Arcury, Scollay, and Johnson (1987), that females tend to be more favorable towards the environment, were not supported in the results of the research. In the limited cases where environmental behavioral tendencies were sensitive to the gender variable, the results were inconsistent. Females were found to have more environmentally favorable intentions regarding their willingness to modify behavior in items related to recreation; however, males tend to be more favorable regarding items of personal concern. The difference in gender was the strongest for personal items, where women consistently rated showers longer than five minutes, current fashion, and the hair dryer as more essential than did men. Among the recreation items, men rated television, recreational vehicles, and hunting as more essential than did women. Thompson and Gasteiger (1985), finding similar results, suggest the reasoning for these results is that personal items express the individuality and uniqueness of women, and the recreation items, conversely, are consistent with men maintaining a traditional masculine image.

In consideration of the objectives and goals of environmental education discussed by Hungerford et al. (1983), which imply that environmental education will enhance environmental responsibility, it is disappointing that this factor was not found to be of more importance in this study. The limited findings regarding the influence of this variable reveal that students with more experience in environmental education view the food consumption and packaging items as more expendable than those students with little experience. This finding is perhaps due to the concentration of teaching environmental responsible actions in this category, whereas the other areas are not as well addressed among environmental educators. Further findings reveal that environmental education influences the willingness of subjects to adopt measures to control and limit energy use. The findings here could possibly be due to the popularity within environmental education of teaching about alternative energy sources; less experience in this field of education would limit individuals from seeing potential options to energy and resources. The influence of environmental education still remains a limiting factor regarding its value of predicting environmental attitudes based on the results of the research.

In conclusion, the importance of investigating the environmental attitudes of college students may be a valuable indicator of the future health of the environment itself. If, in fact, the solution to environmental problems and the responsibility of environmental protection and quality is the

alteration of human behavior, as proposed by Maloney and Ward (1973), the influencing factors of environmental attitudes will remain a topic of continual study. Research in this area among college students provides researchers with some indication of the importance and needs of the educational system. It might well provide assistance in the speculation concerning the future attitudes of the public and the use of natural resources, as students move into management, the marketplace, teaching fields, politics, and other positions of influence in our society. The current research appears to imply that college students have a relatively strong degree of concern for the environment and that their behavioral intentions are more favorable as their concern increases. However, there is some indication (based on the limited degree of willingness to alter behavior in favor of the environment) that students either favor current lifestyles, regardless of the negative impacts on the environment, or may lack the skills and understanding of options regarding environmentally favorable alternatives in the item categories examined. The need for future research in this field of study among college students appears to be for a more thorough investigation of the influencing factors on both environmental concern and behavioral intentions.

Recommendations for Further Study

The following recommendations are made for further study. A more thorough framework testing the factors which influence behavior should be considered in order to determine valid predictors. One possibility would be the testing of Hines, Hungerford and Tomera's proposed model of responsible environmental behavior (1986/1987). A multi-item scale measuring the environmental education experience of respondents should be included in future studies in order to overcome the reliability problems associated with single item scales, like the one used in the current research. In order to more clearly validate the attitudinal framework considered in the current research, a study should be conducted testing the entire model suggested by the researchers (Bennet, 1974; Fishbein and Ajzen, 1975; McGuire, 1969). This investigation should include measuring the cognitive, affective, and conative components, as well as measuring their influence on overt behavior. The instrument developed for this investigation should be developed to measure these aspects on the same level. This initial research of the environmental attitudes of college students covers only a small portion of the population of all college students. To generalize the research findings, further study should be conducted on university campuses in diverse areas of the United States. Furthermore, a larger sample size, representing the population, should be considered at each study site. A test/retest sampling method should be considered in future research of this topic to help validate the consistency of respondents' choice patterns. Employing the research methods of the current research during both the beginning of the semester and at the end of the semester among the same respondents would serve this purpose. In addition, future study should compare the environmental attitudinal choice patterns of college students over time periods. This could be done by testing the research instrument included in the current study in ten years among the same population in order to compare potential differences. When measuring the self-reported behavioral intentions of individuals, future research should include a measurement to determine whether individuals currently utilize an item they are asked to respond to. Finally, it is suggested that if replication of the research on environmental concern and behavioral intentions is to occur, a more appropriate behavioral intentions scale should be developed which would measure intentions more accurately at the same level as the concern scale. This would involve designing an intention scale based on the crucial aspects of the New Environmental Paradigm. These aspects include a limit to growth, a balance of nature, and the need to reject the anthropocentric notion that nature exists solely for human use, which would then be considered as sub-scales of the overall intention scale.

Literature Cited

Anthony, R. 1982. Trends in public opinion on the environment. *Environment*. 24:14-20, 33-34.

Arcury, T. A., Scollay, S. J., & Johnson, T. P. 1987. Sex differences in environmental concern and knowledge: The case of acid rain. *Sex Roles*. 16(9/10):463-472.

Bennet, D. B. 1974. Evaluating environmental education programs. In: J. A. Swan & W. B. Stapp (Eds.). *Environmental Education* (pp. 113-164). New York, NY: John Wiley.

Dunlap, R. 1987. Public opinion on the environment in the Reagan era. *Environment*. 29(6):6-11.

Dunlap, R. E., & Van Liere, K. D. 1978. The "new environmental paradigm." *J. of Environmental Education*. 9(4):10-19.

Fishbein, M., & Ajzen, I. 1975. *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*. Reading, MA: Addison-Wesley.

Geller, J. M., & Lasley, P. 1985. The new environmental paradigm: A reexamination. *Journal of Environmental Education*: 17(1):9-12.

Hines, J. M., Hungerford, H. R., & Tomera, A. N. 1986/1987. Analysis and synthesis of research on responsible environmental behavior: A meta-analysis. *Journal of Environmental Education*. 18(2):1-8.

Hungerford, H. R., Peyton, R. B., & Wilke, R. J. 1983. Yes, EE does have definition and structure. *Journal of Environmental Education*. 14(3):1-2.

Iso Ahola, S. E. 1980. *The Social Psychology of Leisure and Recreation*. Dubuque, IA: Brown Company Publishers.

Kuhn, R. G., & Jackson, E. J. 1989. Stability of factor structures in the measurement of public environmental attitudes. *Journal of Environmental Education*. 20(3):27-32.

Maloney, M. P., & Ward, M. P. 1973. Ecology: Let's hear from the people. *American Psychologist*. 28:583-586.

May, C. August 1988. Pollution ills stir support for environmental groups. *New York Times Magazine*, p. 20.

McGuire, W. J. 1969. The nature of attitudes and attitude change. In G. Lindzey & E. Aronson (eds.). *Handbook of Social Psychology* (III: 136-314). Reading, MA: Addison-Wesley.

Samdahl, D. M., & Robertson, R. 1989. Social determinants of environmental concern. *Environment & Behavior*. 21(1):57-81.

Thompson, J. C., & Gasteiger, E. L. 1985. Environmental attitude survey of university students: 1971 vs. 1981. *Journal of Environmental Education*. 17(1):13-22.

Van Liere, K. D., & Dunlap, R. E. 1981. Environmental Concern: Does it make a difference in how it's measured? *Environment and Behavior*. 13(6): 651-676.

OUTDOOR RECREATION
Outdoor Recreation I

ACTIVITY PACKAGES IN MASSACHUSETTS:

AN EXPLORATORY ANALYSIS

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Traditional activity package research has sought to identify recreation groups as a function of participation rates and socio-economic classifications. A major problem in projecting recreation demand has been the failure to recognize that the chosen activity is undertaken at a specific resource. Therefore, recreation demand is hypothesized to be a function of travel diversification and that travel patterns may represent activity compatibility.

Introduction

Travel behavior may result from a series of possible scenarios including a desire to avoid conflict. As visitation of local park resources continues to increase, planners and managers must recognize the intertemporal travel patterns and resource dependency of many outdoor recreation activities. Traditional activity package research has sought to identify recreation groups as a function of participation rates or socio-economic classifications. A major problem in projecting recreation demand has been the failure to recognize that the chosen activity is undertaken at a specific resource. Without inherently linking the resource to the activity, one cannot define activity packages that are useful for park planners and managers. In other words, why do people go to an area and what group of activities do they engage in while there.

The purpose of this study is to explore the linkage between activity participation and destination choice in Massachusetts. It is hypothesized that the level of destination diversification is influenced by the type of activity in which one participates. Furthermore, the greater the diversification one undertakes, the more likely it will be that conflict may have driven the recreator to visit another site.

Literature

Recreation travel can be viewed in one of two ways; either people visit the same park repeatedly or they tend to exhibit diversified travel behavior. It has long been thought that much of travel was exemplified by repetitious travel choice. For instance, Marble and Bowlby (1968) investigated repetitious travel for households. They found people would repeat visits 75% of the time, thus indicating a high degree of travel concentration.

Recently, some geographers have questioned this belief. Hanson and Huff (1988) for example, explain repeat travel findings as a function of poor research design. The authors found that repeat travel was characteristic of short sampling schemes; and when travel patterns were considered for longer periods of time, considerable variation in behavior was found to exist.

Fesenmaier (1985) examined multideestination and diversified travel behavior for recreationists. He recognized that individuals may visit several parks and the failure to study these travel patterns may lead to an underestimation of participation levels.

To understand the reasons for travel diversification, Hanson (1980) reviewed the literature and found several possible explanations for diversified travel behavior. First, for example, travel diversification may result from an interest to spread risk by developing a portfolio of regularly visited destinations. Displacement by recreationists has caused alternative destinations to be selected in order to escape the conflict at the original site (Nielson and Endo 1977).

A second possibility for travel diversification may come about because of temporal, spatial and modal constraints. In a recreation context, this difference could be explained by comparing the experience for a family who takes a weekend picnic at the local park and a family who visits Yellowstone for the family vacation.

A third reason Hanson (1980) found was the need to reduce boredom by adding variety. This strategy may be classified as risk taking, collecting or trophy hunting (McAllister and Pessemier 1982). Further, this collecting process serves to stimulate interest in the National Park Services' (NPS) "Passport" program where visitors collect the Passport stamp for each of the NPS properties.

Activity and Resource Dependency

A major problem in projecting recreation demand has been the failure to recognize that the chosen activity is undertaken at a specific park resource and is therefore intrinsically linked to the physical resource base. Activities are not independent of the resource base. This relationship is important since it is the resource that is managed for the provision of the recreation experience (Driver et al. 1987).

Proctor (1962) was the first to hypothesize this relationship. In his study for the Outdoor Recreation Resources Review Commission (ORRRC), Proctor investigated participation rates in 15 different outdoor recreation activities and found several were uniquely tied to a particular resource base. This grouping yielded activities tied to water resources and the backwoods, implying the need for a particular resource type for certain outdoor recreation activities.

While important in recognizing activity/resource dependency, Proctor's study has one primary failing; the activities found to be resource based were derived only on participation rates and not actual travel to sites. This meant, for example, activities which were unlikely to be found at the same park resource, were grouped together.

A second wave of research considered these relationships. For example, Ditton et al. (1975) first considered water-based recreation by investigating the four unique environments. They found the environmental factors were major determinants of travel behavior even within the same activity category. For example, "Fishing in a stream is quite unlike trolling in Lake Michigan, and the activity at a beach is quite unlike that of a pool" (Ditton et al. 1975:292). Therefore, specific activities are found at specific resources which in turn, directs recreators to seek alternative destinations for alternative activity experiences.

Recognizing that recreation behavior takes place on specific resources, a study by Fesenmaier and Lieber (1988) investigated the travel patterns of recreationists in terms of number of different types of activities pursued and the number of park destinations visited. They hypothesized that recreator would have either of two travel tendencies: (1) concentrated travel behavior (traveling consistently to one or a very few parks for

the same activity), or (2) diversified travel behavior (where an individual tends to visit many parks for the same activity).

For example, water skiing and sailing were generally found to be undertaken at a single resource and thereby travel behavior was concentrated. This is logical since sailboats will be moored at a lake as well as the high horsepower boats needed for water-skiing. On the other hand, diversified travel behavior is found for canoeing. This activity may fuel destination diversification by directing families to seek alternatives to add to their portfolio.

More recently Bristow (1989) found Illinois' recreationists displaying different levels of travel diversification. Here, those who engaged in river canoe trips also sought new rivers to paddle. This was in contrast with lake canoeists who would congregate at the same resource on several trips. Further, this research established the significance of activity participation to explain travel diversification over the more traditional determinants of recreation demand (e.g., socio-economics and spatial distributions).

Activity Packages

Solitary activities are rarely found on a park resource base. Recreators engage in many outdoor recreation activities when at a park. McCool (1978) considered the attractiveness of water-based recreation sites. He reasoned that several outdoor recreation activities attracted people to water resources. For example, a household may wish to boat at a reservoir and also fish, swim and picnic. All activities are intrinsically tied to the particular resource and may require varying facilities to accommodate each. McCool recommended that management of water-based recreation resources and supporting infrastructure should be made to reflect the appropriateness of alternative activities. This further supports resource dependency needs for particular outdoor recreation activities.

There is a need to identify groups of activities that could maximize the use of public lands in order to maximize benefits to society. This area of investigation pertains to the identification of activity packages. However, unlike previous studies that used the term to find what group of activities could satisfy satisfaction and similar needs (e.g., Proctor, 1962; Hendee and Burdge 1974; Romsa 1973; Vaske, Donnelly and Tweed 1982), activity packages take on a different approach in the present study. Activity packages are defined as groups of compatible outdoor recreation activities that can be undertaken by recreators at the same resource base; all activities in the "package" may or may not be undertaken at the same time but all activities are resource dependent.

Methods

In terms of travel behavior, a continuum of activity packages may be derived. At one end, totally compatible activities are found. No conflict exists between the individuals undertaking these pursuits. At the other end, totally incompatible activities are present. Cross-country skiing and snowmobiling are classic examples of two incompatible activities found on the same resource base (Knopp and Tyger 1973). In between the two poles, are activities that are more or less sensitive to each other.

Conceptually, one can illustrate the possible relationships between the number of park destinations visited and the number of activities selected by a household (see Figure 1). It is hypothesized that multiple compatible activities at the same site should lead to a decrease in the number of alternative destinations chosen relative to the number of activities that are undertaken by recreators. A slope of less than one illustrates this relationship ($b < 1$); more than one activity may be undertaken at a park resource. Alternatively, when more destinations are visited than the number of activities undertaken (i.e. $b > 1$), one could speculate that the individual is diversifying travel behavior because of conflicts at the initially chosen site.

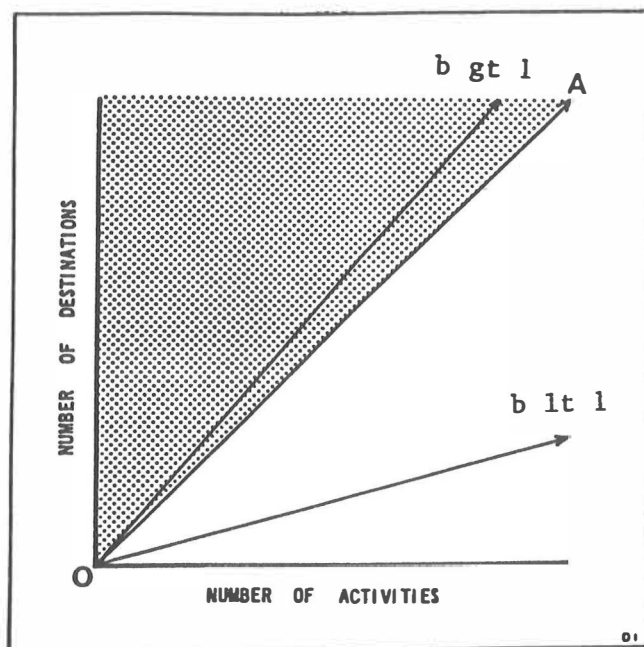


Figure 1. Hypothetical relationships between number of park destinations and number of outdoor recreation activities.

The Sample

The analyses identified in this research is based on the Massachusetts Department of Environmental Management data gathered for the 1988 State Comprehensive Outdoor Recreation Plan (SCORP). A description of the SCORP study is found in Smith et al. (1988). The project utilized a statewide stratified random digit-dialing telephone survey. Completed interviews yielded a sample size of 3,500. The household survey directed the interviewer to seek a head of household respondent over 16 years of age. The questionnaire included personal, socio-economic, and demographic information about the household, levels of participation in cold weather and warm weather recreation activities and the places where each activity took place most frequently. Additional insights sought included travel time and resource satisfaction.

The total number of activities undertaken over the course of the year was calculated. All unique destinations were counted to obtain the total number of resources the household visited during the previous year. These destinations were found both in the Commonwealth as well as outside the state. This is the dependent variable used in this research and is a measure of travel diversification.

Results

The model suggests that a causal relationship will exist between the number of outdoor recreation activities one selects and the resulting travel behavior as defined as the number of unique destinations visited. The results of the regression indicate that there is a correlation ($r^2 = 0.2115$). This information is found in Table 1 and supports the idea that the number of outdoor recreation activities one undertakes influences the number of different destinations choices. The positive parameter estimate (0.56) indicates that Massachusetts recreators tend to diversify travel behavior for one reason or another. The positive intercept (1.96) indicates a tendency to diversify travel since as soon as one decides to participate in an outdoor recreation activity, at least one park destination must be visited.

Table 1. Bivariate regression analysis

VARIABLE	ESTIMATE	STD. ERROR	T-TEST	PROB>(T)
INTERCEPT	1.9566	0.0326	29.388	0.0001
TOTAL # ACTS	0.5566	0.0189	59.955	0.0001

$R^2=0.2115$; $ADJ R^2=0.2113$; $F \text{ VALUE}=863.68$,
 $PROB>F=0.0001$

Resource Dependency

To test the main hypothesis, a multiple regression model was calibrated with independent variables to determine whether or not the individual participated in each of fourteen different outdoor recreation activities. In this test, individual differences between recreators and their activity choice can be investigated. All activities were significant in explaining the travel behavior. The model results are given in Table 2. The degree to which travel behavior varies for the activities, indicates the relative variation of travel strategies within the context of specific activities. For example, high "b" coefficients indicate a trend to diversify choice among alternative destinations. Since at least one facility must be visited when one participates in one activity, the "b's" close to one represent diversified behavior.

Backpacking (parameter estimate = 0.68) is a typical example of an activity driving diversified travel. In contrast, low "b" values describe a situation where travel concentration is expected. For those households who go hiking or walking, travel concentration is evident.

Activity Compatibility

In order to consider activity packages, the possible interaction of all pairs of outdoor recreation activities was evaluated. Fourteen different activities taken two at a time yields 86 possible arrangements. The results of this step are summarized in Table 3.

TABLE 2. Multiple regression Analysis for participation in recreation activities.

VARIABLE	ESTIMATE	STD. ERROR	T-TEST	PROB>(T)
INTERCEPT	1.9622	0.0341	57.39	0.0001
COURT SPORTS	0.5728	0.0443	12.92	0.0001
BIKING	0.5467	0.0456	11.97	0.0001
HIKING/ WALKING	0.4352	0.0306	14.18	0.0001
FIELD SPORTS	0.5670	0.0592	9.57	0.0001
SWIMMING	0.6209	0.0301	20.61	0.0001
BOATING	0.5313	0.0683	7.77	0.0001
FRESH FISHING	0.6497	0.0716	9.07	0.0001
SALT FISHING	0.5880	0.0774	7.59	0.0001
CAMPING	0.6760	0.0644	10.49	0.0001
PICNIC	0.5075	0.0638	7.94	0.0001
VISIT PARKS	0.4696	0.0910	5.16	0.0001
BACKPACKING	0.6817	0.1371	4.97	0.0001
HORSE RIDING	0.5101	0.1238	4.12	0.0001
GOLF	0.6190	0.0567	10.92	0.0001

$R^2=0.2215$; $ADJ R^2=0.2181$; $F \text{ VALUE}=65.18$,
 $PROB>F=0.0001$

Table 3. Multiple regression analysis for participation in pairs of activities.

Compatible Activity Packages	b Parameter
Boating & Visiting Parks	-0.649
Camping & Visiting Parks	-0.504
Incompatible Activities	b Parameter
Horseback vs. Golf	0.6191
Field Sports vs. Visiting Parks	0.5671
Court Sports vs. Picnics	0.4887
Salt Water Fishing vs. Backpacking	0.6893
Biking vs. Fresh Water Fishing	0.5467
Boating vs. Camping	1.1804
Swimming vs. Visiting Parks	0.6209
Backpacking vs. Visiting Parks	0.4352

$R^2 = 0.2215$, Adjusted $R^2 = 0.2181$, $F \text{ VALUE} = 65.18$,
 $Prob. > F = 0.0001$, parameters significant at 0.0001 level.

Several pairs of activities were found to influence the number of destinations visited. Those that tended to decrease the number of destinations traveled to are shown by a negative coefficient and can be termed compatible. Compatible pairs of outdoor recreation activities will tend to decrease the number of different park resources visited by households participating in both activities. Conversely, positive coefficients represent those pairs of activities that increase the likelihood of visiting more parks and these pairs of activities could be classified as incompatible.

Examples of incompatible outdoor recreation activities include boating and camping. This indicates that the Massachusetts recreators will visit a greater number of sites if they participate in both activities. While both activities are found at many of the Commonwealth's public parks, individuals must be undertaking these activities on separate trips. Other activities make sense; obviously horse back riding and golf are examples of incompatible packages.

Both field sports (i.e., soccer, softball) and court sports (basketball, tennis) appear to be incompatible with visiting parks and picnicking, respectively. One could conclude that school yards adequately serve these users and that the park system need not include these sports in the activity offerings. The other incompatible activities are clearly evidence of resource dependency. Saltwater fishing and backpacking are examples.

Compatible activities, (those with significant negative coefficients) are best exemplified by boating and visiting parks ($b = -0.65$). Other activities that appear to be compatible are camping and visiting parks. These situations support the establishment of boating and camping at state parks. It is interesting to note the high diversification of camping and boating. People must be visiting parks to camp or boat, but not both.

Implications

In summary, one can see that destination diversification depends on the activity selection. The best predictor of this travel behavior is the choice of one's activity. Several activities were shown to be correlated with diversified travel. Others, were shown to explain travel concentration. The implications of this are important when one considers the limited funding available in the state park system.

For instance, diversification may represent an over supply or abundance of resources for that particular activity. Needless offerings can be withdrawn based on the travel patterns of individuals. Alternatively, concentrated travel may lead planners to provide activity packages that can be uniformly offered throughout the state park system.

Future investigations should include a measure of recreation intensity. This measure may represent activity specialization, and those intensely participating in certain activities may not be willing to give up a favorite fishing spot or secret camp. Travel time might help to explain travel diversification since longer travel may represent activity specialization as well. Additionally, the spatial structure of Massachusetts park sites should be identified, since the aggregation of visitors by market supply may provide a better explanation.

Literature Cited

Bristow, R. S. 1989. The effects of spatial structure and activity compatibility on destination diversification. Doctoral Dissertation at Southern Illinois University at Carbondale.

Ditton, R. B.; T. L. Goodale; P. K. Johnsen. 1975. A Cluster analysis of activity, frequency, and environmental variables to identify water-based recreation types. *Journal of Leisure Research*. 7:282-295.

Driver, B. L.; P. J. Brown; G. H. Stankey; T. O. Gregoire. 1987. The ROS system: evolution, basic concepts, and research needed. *Leisure Sciences*. 9:201-212.

Fesenmaier, D. 1985. Modeling variation in destination patronage for outdoor recreation activity. *Journal of Travel Research*. 23:17-23.

Fesenmaier, D.; S. Lieber. 1988. Destination diversification as an indicator of activity compatibility: An exploratory analysis. *Leisure Sciences*. 10:167-178.

Hanson, S. 1980. Spatial diversification and multipurpose travel: Implications of choice theory. *Geographical Analysis*. 12:245-257.

Hanson, S.; J. O. Huff. 1988. Systematic Variability in Repetitious Travel. *Transportation*. 15:111-135.

Hendee, J. C.; R. P. Gale; W. R. Catton. 1971. A typology of outdoor recreation activity preferences. *Journal of Environmental Education*. 3(1):28-34.

Hendee, J. C.; R. V. Burdge. 1974. The substitutability concept: Implications for recreation research and management. *Journal of Leisure Research*. 6:157-162.

Huff, J. O.; S. Hanson. 1986. Repetition and variability in urban travel. *Geographical Analysis*. 18(2):97-114.

Knopp, T. B.; J. D. Tyger. 1973. A study of conflict in recreational land use: snowmobiling vs. ski-touring. *Journal of Leisure Research*. 6:101-112.

McCool, S. F. 1978. Recreation activity packages at water-based resources. *Leisure Sciences*. 1:163-173.

McAllister, L.; E. Pessemier. 1982. Variety seeking behavior: An interdisciplinary review. *Journal of Consumer Research*. 9:311-322.

Marble, D. F.; S. R. Bowlby. 1968. Shopping alternatives and recent travel patterns. In: *Geographic Studies of Urban Transportation and Network Analysis*. F. E. Horton, ed. Evanston, IL: Northwestern University.

Nielson, J. M.; R. Endo. 1977. Where have all the purists gone? An empirical examination of the displacement hypothesis in wilderness recreation. *Western Sociological Review*. 8(1):61-75.

Proctor, C. 1962. Dependency of recreation participation on background characteristics of sample persons. In: *The 1960 National Recreation Survey ORRRC Study No. 19*. Washington, DC: USGPO.

Romsa, G. H. 1973. A method of deriving outdoor recreation activity packages. *Journal of Leisure Research*. 5:34-46

Smith, K.; L. Klar; R. Warnick. 1988. *Massachusetts Outdoors: For Our Common Good, Vols. I & II*. Boston, MA: Dept. of Environmental Management.

Vaske, J. J.; M. P. Donnelly; D. L. Tweed. 1982. Recreationist-defined versus researcher-defined similarity judgments in substitutability research. *Journal of Leisure Research*. 15:251-262.

THE ADIRONDACK PARK: CHANGING PERCEPTIONS OF RESIDENTS TOWARDS PARK LAND USE ISSUES

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During the summer of 1989, 330 Adirondack Park residents were interviewed using a mail questionnaire regarding their perceptions of land use change due to tourism and commercial recreation growth in the Adirondack Park. In the summer of 1991, the respondents to the 1989 mail questionnaire were contacted by telephone to determine if their perceptions of the impact from increasing tourism and commercial recreation development had changed. The results of the 1991 survey suggest that the study group perceptions had moderated in their negative view of the impact of tourism and commercial recreation development on the Adirondack Park since 1989.

Introduction

"What was left ... was a vastly altered environment. Without stands of timber or a forest floor, ...water evaporates more quickly or runs off steep hills. It is no longer released quickly, diminishing the possibilities for fast second growth trees. The habits, food supplies, and distribution of many animals are disrupted (Keller, 1980: 97)."

The above quotation does not describe conditions in the rain forests of South America, Asia, and Africa today, but the Adirondack region of New York State in the late 1800's. New York reversed the environmental decline of the region by creating a state forest preserve in the Adirondacks in 1885, declaring the region a park in 1892, and protecting the forest preserve lands with the historic "forever wild" amendment to the state constitution in 1894. Since then, the Adirondack Park has grown to six million acres (1/5 of the total area of New York State), which is one million acres larger than Olympic, Yellowstone, Grand Canyon, and Yosemite National Parks combined. Its size, location (60 million people live within a days drive of the park), recreational resources (2,300 lakes and ponds, 1,200 miles of river, 30,000 miles of brooks and streams, 42 peaks over 4,000 feet in elevation, 2,000 miles of hiking trails, and 43 state camp grounds), "forever wild" constitutional protection, and combination of public and private lands make the Adirondack Park the world's foremost experiment in environmental protection through land use planning.

Despite its significance to the environmental movement, the Park's centennial year has been marked as much by controversy as it has by celebration. Environmental groups are backing a bill proposed in the Democratic controlled state Assembly that would significantly decrease the number of new homes that could be built in the park, and require that waterfront homes within the park be set well back from the shoreline. This legislation has been rejected by the deputy majority leader who has held unofficial veto power over Adirondack legislation in the Republican dominated state Senate. With strong support from park residents, legislation has been proposed that would

eliminate the Adirondack Park Agency (APA) which regulates development on private lands within the park, and limit the designation "Adirondack Park" to the land owned by the state. Whatever the result of these legislative initiatives, it is clear that the policy debate surrounding the park is becoming increasingly polarized and counter-productive.

The roots of this polarization can be found in events that took place in the Adirondack Park in the mid-to-late 1980's. The sale of large Adirondack tracts to land speculators prompted the media and environmental groups to proclaim that the park was facing a "development crisis" (Knustler, 1989, Barth, 1988, and Bauer, 1988). Responding to these concerns, Governor Mario Cuomo appointed a Commission on the Adirondack Park in the 21st Century to develop a set of policy recommendations for the park. When the Governor's Commission released its final report in June of 1990, many park residents responded with (sometimes violent) protests and acts of civil disobedience. In 1991, park residents led a successful fight to defeat the Environmental Quality Bond Act that included \$950 million to purchase additional state-owned land, much of which was speculated to be in the Adirondack Park.

The attitudes and perceptions of the Adirondack Park's 130,000 permanent and almost 200,000 seasonal residents are crucial to understanding this polarization. In 1989 a majority of a random sample of 330 permanent and seasonal park residents reported that they perceived the rate of development in the park to be "too fast," almost 2/3's reported that environmental conditions in the park were declining, and only a little over 1/4 reported that the jobs created by development were worth the changes they caused in the park (Buerger and Pasquarello, 1990). In light of these results, the increasing conflict between environmental groups and residents over Adirondack Park land use issues suggested that resident's perceptions of the impact of tourism and commercial recreation growth had changed dramatically.

The purpose of this study was to re-survey the original sample of Adirondack residents on key questions from the 1989 study concerning the effects of development on the park and collect new data on residents' perceptions of the Governor's Commission and the Environmental Quality Bond Act. This paper compares the results of the two surveys, examines the impact of intervening events on perceptual changes in residents' perceptions of the impact of tourism and commercial recreational growth, and explores the implications of the changes on the future of the Adirondack Park.

Procedures

With guidance from various state agencies and environmental groups, and drawing on a survey of Adirondack landowners conducted by Cornell University's School of Rural Sociology (Geisler et. al., 1985), a survey instrument was designed to measure residents' perceptions of land use change due to tourism and commercial recreation growth in the Adirondack Park. Specific questions were cast in five dimensions: demographics, recreation, development and environment, park management, and the forest products industry.

A random sample of households residing within park boundaries was drawn by Survey Sample, Inc. of Norwalk, Connecticut, from its sampling frame of 78 million homes and addresses representing over 88 percent of all U.S. households. After two mailings, 330 responses (40 percent of deliverable questionnaires) were gathered and analyzed during 1989.¹ In the summer of 1991 the respondents to the 1989 mail survey were contacted by telephone, and 150 agreed to participate in the follow-up study.

Results

Results from the 1991 re-survey indicate that Adirondack Park residents' perceptions of the impact of commercial recreation and tourism development had changed significantly since 1989. For all of the development related questions, respondents moved from negative perceptions about development and its associated

environmental impacts to a general belief that the park was not being threatened by new development. Specifically, nearly 60% of the sample group perceived the rate of development as being too fast in 1989. By 1991, only 40% responded in this fashion, while an additional 13% responded that the rate of development was "about right." Complete results for this question can be seen in Table 1.

Table 1. Adirondack Park residents' perceptions of the rate of development within the Adirondack Park.

Perception of Development	1989 Study n=324	1991 Study n=150
	PERCENT	PERCENT
Too Fast	59	33
About Right	27	40
Too Slow	8	17
Don't Know	7	9
Total	101*	99*

*due to rounding

Similarly, when questioned as to whether the growth of commercial recreation and tourism development was changing the character of the park, in 1989 79% of respondents agreed that it was. In the 1991 survey only 50% of the respondents perceived changes in the park resulting from development. In 1989, change had a negative connotation, with 64% of respondents reporting that environmental conditions in the Adirondacks were declining, while in 1991 only 33% responded in this manner. The complete results for these questions can be seen in Tables 2 and 3.

Table 2. Adirondack park residents' perceptions toward whether or not increased development is changing the character of the Adirondack Park.

Development is Changing the Character	1989 Study n=330	1991 Study n=150
	PERCENT	PERCENT
Agree	73	50
Neutral	11	16
Disagree	13	34
Don't Know	4	0
Total	101*	100

*due to rounding

1/ To determine the extent of bias resulting from self-selection in the mail survey, a follow-up phone survey of 79 randomly selected non-respondents was conducted in the summer of 1990. The demographic characteristics (age, income, education, years of residence in the park) of non-respondents and respondents were virtually identical, suggesting that self-selection bias did not seriously skew the results of the mail survey.

Table 3. Adirondack Park residents' perceptions of environmental conditions within the Adirondack Park.

Perception of Conditions	1989 Study n=327	1991 Study n=148
	PERCENT	PERCENT
Improving	7	16
About Same	29	51
Declining	64	33
Total	100	100

In 1989, the economic benefits of increasing commercial recreation and tourism development did not appear to offset concerns about the negative impacts that may result from such growth. Sixty five percent of those surveyed reported that they did not believe the jobs created by development were worth the changes they would cause to the park. By 1991, only 24% of the sample had a similar response. Complete results for this question can be found in Table 4.

Table 4. Adirondack Park residents' perceptions of whether or not jobs created by development are worth the changes they cause to the Adirondack Park.

Perception Towards Jobs	1989 Study N=322	1991 Study N=149
	PERCENT	PERCENT
Jobs Worth Changes	26	39
Jobs Not Worth Changes	65	24
Don't Know	9	38
Total	100	101*

*due to rounding

The results of the 1989 survey indicated that most Adirondack residents did not seem to be knowledgeable about the "forever wild" amendment to New York's constitution that protects state owned lands in the park. Despite the intense public debate and media attention focused on park management and planning that resulted from the controversy surrounding the report of the Governor's Commission on the Adirondack Park in the 21st Century, the percentage of 1991 study respondents who correctly identified state lands in the park as constitutionally protected actually declined from 47% to 43%. Complete results for the question pertaining to residents' knowledge of the constitutional protections afforded state lands in the Adirondack park can be found in Table 5.

Table 5. Adirondack Park residents' knowledge of the protection of the forest preserve by the New York State Constitution.

Forest Preserve is Protected by the Constitution	1989 Study n=329	1991 Study n=150
	PERCENT	PERCENT
Yes	47	43
No	5	7
Don't Know	48	51
Total	100	101*

*due to rounding

It was not possible to conduct T-tests for the difference between the means for responses from all 150 subjects who agreed to participate in both surveys due to the use of a different questionnaire coding system on the second mailing of the 1989 survey. Of the 150 subjects who participated in both studies, 92 could be positively matched with both their 1989 and 1991 questionnaires. Even with the smaller sample size, the T-test showed significant differences between the means (.05 level) for the response to the questions: rate of development (Table 1), changing character of the park (Table 2), environmental conditions (Table 3), and value of new jobs (Table 4). Response to the constitutional protection question (Table 5) did not result in a statistically significant difference in means between the two studies.

The surprising number of residents who appeared to be unaware of the unique constitutional protection afforded state lands in the Adirondack Park, and the hostile reaction of Adirondackers to the report of the Governor's Commission on the Adirondack Park in the 21st Century and the 1991 Environmental Quality Bond Act prompted the addition of four new questions about park management and political issues in the 1991 survey.

The results of the 1991 survey underscored the depth of residents' misunderstanding of the salient characteristics that distinguish the Adirondack Park. Only 43% of the 1991 sample knew that New York's Department of Environmental Conservation was responsible for managing the Public Forest Preserve park lands and only 59% knew that the Adirondack Park Agency was responsible for planning and regulating private land use in the park. Complete results for these questions appear in Tables 6 and 7.

Table 6. Adirondack Park residents' belief about the New York State agency responsible for managing the public forest preserve lands in the Adirondack Park. n = 150

	FREQUENCY	PERCENT
NYDEC	65	43
APA	38	25
Other	15	10
Don't Know	32	21
Total	150	99*

*due to rounding

Table 7. Adirondack Park residents' belief about the New York State agency responsible for planning and regulating private land use in the Adirondack Park. n = 150

	FREQUENCY	PERCENT
APA	89	59
NYDEC	6	4
Other	17	11
Don't Know	38	25
Total	150	99*

*due to rounding

The debate within the park about the recommendations of the Governor's Commission on the Adirondack Park in the 21st Century (issued April 1990) was generally characterized by the media as being overwhelmingly negative in terms of park resident support for the commission report. An additional question on the 1991 survey asked the sample group whether or not they agreed with the recommendations of the Governor's Commission on the Adirondack Park in the 21st Century. Only 13% of the subjects reported that they agreed with the commission recommendations. Similarly, subjects were not supportive of the 1990 New York State Environmental Quality

Bond Act. Of those who responded, only 14% of the subjects acknowledged having voted during the preceding fall election in favor of the Environmental Quality Bond Act (complete results to these questions can be seen in Tables 8 and 9).

Table 8. Adirondack Park residents' who agreed with the recommendations of the governor's commission on the Adirondacks in the twenty-first century. n = 150

	FREQUENCY	PERCENT
Agree	19	13
Neither Agree Nor Disagree	54	36
Disagree	77	51
Total	150	100

Table 9. Adirondack Park residents who voted in favor of the 1990 New York State Environmental Quality Bond Act. n = 150

	FREQUENCY	PERCENT
Yes	21	14
No	86	57
Did Not Vote	21	14
Don't Remember	22	14
Total	150	99*

*due to rounding

Conclusions

The results of the 1989 and 1991 surveys show significant changes in residents' perceptions of the impact of commercial recreation and tourism development in the Adirondack Park. Since it is highly unlikely that development patterns in the park have changed significantly in such a short period of time, it is reasonable to assume that the changes may reflect residents' dissatisfaction with the Governor's Commission on the Adirondack Park in the 21st Century. Even though the Commission was appointed in January 1989, it did not issue its first interim report or hold public hearings in the park until October 1989. As a result, most residents were unfamiliar with the Commission and its charge during the June-September data collection period for the 1989 survey.

This changed rapidly as the residents began to hear of Commission recommendations, such as a one year moratorium on new development in the park, additional shoreline restrictions, and the acquisition of 654,850 additional acres for the Forest Preserve. The recommendations seemed to emphasize preservation of natural resources at the expense of greater regulation of private land. By the time data collection for the 1991 survey had begun, the release of the Commission's final report had triggered vocal, sometimes violent protests, acts of civil disobedience, and the formation of at least 20 different citizens groups in the park to protest the recommendations. The leader of one of the citizen groups summed up the feeling of many Adirondack residents, "I think that the commission report is the most outrageous assault on constitutional rights that I've seen in my adult life" (Staff, 1990). The Environmental Quality Bond Act, a part of which would be used to finance the acquisition of additional state land in the Adirondack Park, had also become a focal point for park residents' protests. In fact, much of the statewide opposition to the Environmental Quality Bond Act can be traced to negative information about the Bond Act put out by Adirondack interest groups (Staff, 1992).

The shifting perceptions of park residents has dramatic implications for the future of the Adirondack Park. It is significant that the Governor's Commission on the Adirondack Park in the 21st Century did not include a single member from

Adirondack local government. Furthermore, the commission held only two public hearings within park boundaries during its deliberations, and even those were held at a such a late date as to seem almost perfunctory. Unless steps are taken to include park residents in planning and decision making, further polarization of policy positions seems inevitable. The lack of knowledge displayed by residents about the salient features that distinguish the Adirondack Park is also cause for concern. Park managers and environmental groups must take steps to educate residents about the history, structure, and environmental significance of the Adirondack Park. Failure to take these measures may result in a future Adirondack Park characterized by conflict, environmental degradation, and a lost sense of park identity.

Literature Cited

Barth, Janis. 1988. Wilderness for Sale. Syracuse Herald American. December 18: clp.

Bauer, Peter. 1988. Land Wars. Adirondack Life. November-December: 37-43, 85-88 pp.

Buerger, Robert; Pasquarello, Thomas. 1990. Residents' perceptions of recreation development and land use within the Adirondack Park. In: Proceedings of the 1990 Northeastern Recreation Research Symposium; 1990 February 25-28; Saratoga Springs, NY. Gen. Tech. Rep. NE-145. Radnor, PA: US Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 79-86.

Geisler, Charles; Jussaume, Raymond; Kenny, Susan; Vlieger, Ronald; Kay, David; Mitsuda, Hisayoshi. 1985. Adirondack Landowner Survey, Rural Sociology Bulletin 145, Ithaca, NY: Cornell University. 1-39.

Keller, Jane. 1980. Adirondack Wilderness: A Story of Man and Nature. Syracuse, NY: Syracuse University Press. 97 p.

Kuntsler, James. 1989. For Sale: Thousands of Pristine Adirondack Acres. The New York Times Magazine, June 18: 22-25, 30-33.

Staff. 1992. Judge Moves APA's Earth Day Service Away from Visitors Interpretive Center. Hamilton County News. April 29: 3 p.

Staff, 1990. Solidarity Alliance Called Outspoken, Charismatic. Press-Republican Supplement. August 19: 8 p.

IMPORTANCE-PERFORMANCE ANALYSIS: CONGRUITY/DISPARITY BETWEEN CHARTER BOAT CAPTAINS AND CUSTOMERS

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Lake Ontario charter fishing captains and customer were surveyed during the 1991 season to measure customer motivations, relative importance of charter operation characteristics to customers, and customers' evaluation of the captains' performance. The importance of various items was measured using both 5-point Likert scales and a weighted attribute approach and was evaluated using the importance/performance technique.

Introduction

The development of the Lake Ontario charter fishing industry has been successful because of the fishery management program of the New York State Department of Environmental Conservation, the entrepreneurial ability of the charter captains, and the demand for lake fishing access by the charter fishing customers. While the success of the fishery and charter business industry has been documented in previous research, knowledge about charter fishing customers has been anecdotal and subject to considerable speculation. The charter industry has made important economic contributions in the coastal region and the future of the industry rests on both fishery supply and customer demand (Dawson and Voiland, 1990).

The charter fishing industry along New York's Lake Ontario waters reportedly grew from 33 vessels in 1975 to 450 in 1985 and to 560 in 1990 (Murray et al., 1976; Voiland, 1987; Dawson 1991). These charter operations represent both capital investments and economic contributions to the local economy. The estimated current market value of the boat and equipment of the 563 charter operations located in the 1990 survey of New York's Great Lakes waters was \$29 million (Dawson, 1991). The estimated revenues received by these operations in 1990 from customers taking the 29,840 paid charters was \$9.9 million (Dawson, 1991). Beyond these direct revenues, the charter fishing industry has a much greater positive economic impact on New York's Great Lakes coastal region as the charter revenues are respent by captains to pay operating and other expenses, and as customers generate additional trip-related expenditures within the coastal region (Dawson et al., 1989).

While locating fish and having a reasonable probability of catching fish is an important ingredient for most anglers, many other social and recreational factors affect a customer's decision to fish. The three most important characteristics customers reported they sought in a charter were the captain's ability to locate fish, boat safety features, and the hospitality shown customers (Mahoney et al., 1985; Gunderson, 1988; Hushak and Mohammad, 1988; Kinnunen and Mahoney, 1989). Other contributing characteristics which were less important included: catch rate and species of fish in the area, size and appearance of the boat, and availability of comfort features and fishing

equipment on the boat. Selection of a charter operation was influenced by the customer's reasons for going charter fishing. The most often stated reasons were: challenge and excitement, relaxation, to enjoy nature and the Great Lakes, and to get away from daily routines (Mahoney et al., 1985; Gunderson, 1988; Kinnunen and Mahoney, 1989).

Overall, angler motivation studies in the past 20 years have indicated that the motives for fishing are multiple, and that experiencing the natural environment, relaxation, and companionship were often rated by anglers as more important than were factors of catch; catch was rated more highly for tournament anglers and some highly involved anglers (e.g., Moeller and Engelken, 1972; Knopf et al., 1973; Fedler and Ditton, 1986; Absher and Collins, 1987; Loomis and Ditton, 1987; Siemer et al., 1989; Steele et al., 1990). Many angler studies were descriptive and generally relied on the Fishbein attribute-focused model (Ajzen and Fishbein, 1975) and measurements were based on Likert-type scales to rate the relative importance of various attributes or motives. In some studies, the attribute or motive scores were used with factor analysis or cluster analysis to construct scales (e.g., common motivational dimensions) using various subgroups of attributes or motives (e.g., consumptive). The scale scores were used to test for differences between various angler sub-groups or those with some distinguishing characteristics (e.g., tournament vs. non-tournament anglers) or to develop a linear regression equation to explain the variance of the component scales or attributes. However, implicit assumptions about the equal weight of each attribute or motives were common but generally these assumptions were not explicitly discussed and evaluated.

Both policy analysis and decision analysis tend to use more sophisticated models such as multiple attribute theory to explicitly surface the value or utility of each attribute and correspondingly develop weight factors between the attributes (Carroll and Johnson, 1990). The steps in conducting a multiple attribute analysis forces the researcher (and angler in the survey process) to compare the value (or weight) between the attributes, this process is generally not part of the Fishbein model. The importance of developing a multiple attribute model for angling motivations is that it begins to surface the process involved in angler choices and behavior. While multiple attribute models do not give a detailed explanation of how decisions are made, they construct a more comprehensive and structured model than the Fishbein approach. Carroll and Johnson (1990) report that multiple attribute and weighted-additive models are the most useful analysis approaches for predicting choices. Given the need for predicting angler behavioral reactions to various fishery situations, the multiple attribute models may provide greater understanding and prediction about angler behavior.

The multiple attribute model approach to analyze angler decision-making is combined in this study with the importance/performance technique to show the value of the multiple attribute approach. The technique for importance/performance analysis is adopted from Martilla and James (1977) and Mengak et al. (1986). The basic technique is to graphically present the importance and performance measures as a means to evaluate the effectiveness of the captains in meeting customer expectations and motivations. The graph of importance/performance results in four quadrants that are described in a business management context as: (1) the lower left quadrant where importance and performance measures are low is characterized as "low priority"; (2) the upper left quadrant where importance is high and performance is low is characterized as "need to concentrate business resources here"; (3) the lower right quadrant where importance is low and performance is high is characterized as "possible overkill"; and (4) the upper right quadrant where both importance and performance are high is characterized as "keep up the good work".

The objectives of this study are to: (1) identify Lake Ontario charter fishing customer motivations during the 1991 season; (2) determine the relative importance of charter operation

characteristics to customers; (3) measure the customers' evaluation of the performance of those charter characteristics; and (4) compare customer responses to the captain's predictions of their responses.

Methods

This study of charter customers included two related surveys: (1) charter captains were surveyed to obtain customer mailing lists and to measure the ability of the captain to prediction customer motivations and performance ratings; and (2) customers were surveyed to measure their self-reported motivations and performance ratings of the overall charter experience. The survey questions were adapted from previous research of the charter fishing captains and customers in the Great Lakes states (Dawson et al., 1989).

The charter captains were randomly selected from the list of 563 charter businesses identified in a 1990 study of New York's Great Lakes charter industry. Surveys were mailed to the sample of 62 captains in September, 1991. Reminder letters were sent out and telephone calls were made up to November, 1991 in an attempt to increase the number of respondents (Dillman, 1978). Of the 62 captains selected, 2 were undeliverable, and 10 reported that they were out of business either for the year or permanently. Of the 50 still in business, 24 (48%) returned completed surveys.

All of the captains were asked to randomly select up to 15 of their 1991 customer names and addresses. The 24 participating captains provided 184 customer names and addresses for use in the customer survey. The customer surveys were sent out during September through November, 1991 and up to two reminder letters were mailed to non-respondents. Of the 184 customers sent a survey, 4 were undeliverable, and 111 were completed and returned for analysis (62% response rate).

Survey Results

Customers were asked to rate their motivations or reasons for going on their 1991 charter fishing trip using a five-point scale: (1) not important; (2) somewhat important; (3) important; (4) very important; and (5) extremely important. The average score ratings for 11 motivations are shown in Table 1 along with captains' predictions of the customers' responses and the difference between the responses (i.e., the captains' average score minus the customers' average score). Six of the 11 motivations had statistically significant differences between the mean responses of the customers and captains (i.e., T-test of means using separate variance estimates and a 2-tail probability with $P < 0.05$ or 0.10).

Table 1. Motives or reasons why customers went on charter fishing trips on Lake Ontario in 1991, the captains' predictions of customers' responses, and the difference between responses.

Motives for Charter Trip	Customer	Captain	Difference
For relaxation	4.2	4.2	0.0
To enjoy nature and lake	4.0	2.8	-1.2 **
For challenge and excitement	3.9	3.5	-0.4 *
To get away	3.6	4.0	0.4 *
For companionship	3.5	3.4	-0.1
To catch trophy fish	3.0	3.3	0.3
Family togetherness	2.9	2.6	-0.3
To catch many fish	2.4	3.0	0.6 *
To catch fish to eat	2.3	2.8	0.5 *
To improve fishing skill	2.3	2.2	-0.1
To do business	1.3	1.7	0.4 *

T-test of means

** $P < 0.05$

* $P < 0.10$

The three most important customer motivations were relaxation, enjoy nature/lake, and challenge/excitement (Table 1). Customers reported that motives related to catching fish were not as important, on the average, compared to social and relaxation motives. Captains accurately predicted that relaxation was the most important customer motive. Captains tended to underestimate some of the customer motivations to enjoy nature and Lake Ontario, for challenge and excitement, and family togetherness; whereas, the captains tended to overestimate customer motivations related to catching many fish, catching fish to eat, and catching trophy fish.

Customers were asked to rate the characteristics or attributes important to their deciding to charter with a particular captain and boat on their 1991 charter fishing trip using a five-point scale: (1) not important; (2) somewhat important; (3) important; (4) very important; and (5) extremely important. The average score ratings for the 12 characteristics or attributes are shown in Table 2 along with the captains' predictions of the customers' responses and the difference between the responses (i.e., the captains' average score minus the customers' average score). Three of the 12 characteristics or attributes had statistically significant differences between the mean responses of the customers and captains (i.e., T-test of means using separate variance estimates and a 2-tail probability with $P < 0.05$).

Table 2. Factors Characteristics or attributes important in the customer's decision to charter on a particular boat on Lake Ontario in 1991, the captains' predictions of the customers' responses, and the difference between the responses.

Attributes Used to Choose Charter	Customer	Captain	Difference
Hospitality of captain/crew	4.4	4.4	0.0
Captain's ability to locate and catch fish	4.3	3.8	-0.5 **
Safety aspects of boat	4.0	3.9	-0.1
On-board fishing equipment	4.0	3.4	-0.6 **
Fish species in area	3.7	3.5	-0.2
Appearance and cleanliness of boat	3.6	3.8	0.2
Catch rate in area	3.5	3.3	-0.2
Comfort facilities on boat	3.3	3.5	0.2
Size of the boat	3.1	3.3	0.2
Price of the charter	3.1	3.1	0.0
Recommendations from others	2.8	3.8	1.0 **
Nearness to residence or summer home	1.8	1.7	-0.1

T-test of means

** $P < 0.05$

The four most important customer decision items (e.g., characteristics or attributes) were the hospitality of the captain and crew, the captain's ability to locate and catch fish, the safety aspects of the boat, and the fishing equipment on-board the boat (Table 2). Captains accurately predicted that hospitality was the number one customer reason for choosing a particular charter and that the price of the charter was, on the average, one of the least highly ranked items by customers. Captains tended to underestimate some of the customer decision items such as the captain's ability to locate and catch fish and the equipment on-board the charter boat; whereas, the captains tended to overestimate customer reliance on the recommendations of other customers as a decision item.

Customers were asked to compare the relative importance of 11 characteristics or attributes in their decision to charter with a particular captain and boat on their 1991 charter fishing trip.

The instructions were to distribute 100 points between these characteristics or attributes to reflect how they value each of these items (i.e., weight each attribute). The average score ratings for the 11 characteristics or attributes are shown in Table 3 along with the captains' predictions of the customers' responses and the difference between the responses (i.e., the captains' average score minus the customers' average score). One of the 11 characteristics or attributes had statistically significant differences between the mean responses of the customers and captains (i.e., T-test of means using separate variance estimates and a 2-tail probability with $P < 0.10$).

Table 3. The weighted importance of various characteristics or attributes in the customer's decision to charter on a particular boat on Lake Ontario in 1991, the captains' predictions of the customers' responses, and the difference between the responses.

Attributes Used to Choose Charter	Customer	Captain	Difference
Captain's ability to locate and catch fish	18.9	18.4	-0.5
Hospitality of captain/crew	14.7	15.3	0.6
Safety aspects of boat	10.8	8.6	-2.2
Appearance and cleanliness of boat	10.1	9.0	-1.1
On-board fishing equipment	8.4	7.2	-1.2
Size of the boat	8.1	9.0	0.9
Catch rate in area	8.1	7.6	-0.5
Price of the charter	6.8	10.3	3.5 *
Fish species in area	6.5	5.6	-0.9
Comfort facilities on boat	5.7	6.8	1.1
Nearness to residence or summer home	1.9	2.2	0.3
TOTAL	100.0	100.0	

T-test of means

* $p < 0.10$

Customers were asked to rate the performance of the captain, crew, and equipment during the charter trip in 1991 on Lake Ontario using a five-point scale: (1) poor; (2) fair; (3) good; (4) very good; and (5) extremely good. The average score ratings for the 9 items are shown in Table 4 along with captains' predictions of the customers' responses and the difference between the responses (i.e., the captains' average score minus the customers' average score). Two of the 9 items had statistically significant differences between the mean responses of the customers and captains (i.e., T-test of means using separate variance estimates and a 2-tail probability with $P < 0.05$ or 0.10).

The three most highly rated items were the performance of the captain and crew related to hospitality, the performance of the on-board fishing equipment, and the fishing assistance provided by the captain and crew (Table 4). Customers reported very high performance ratings for 6 of the items and above average ratings for the other 3 items. Captains tended to correctly predict the high customer performance ratings. The largest underestimation by the captains was of the customers high rating for the fishing assistance provided to the customer by the captain and crew.

Ninety-seven percent of the customers reported catching one or more fish on their charter trip on Lake Ontario in 1991. Overall, most (59%) of the customers were very satisfied with their 1991 charter trip on Lake Ontario. The remainder were either satisfied (27%), uncertain (8%), or dissatisfied to very dissatisfied (5%) with their trip.

Table 4. The customer rating of the performance of the captain, crew, and equipment during a 1991 charter trip on Lake Ontario, the captains' prediction of the customers' responses, and the difference between the responses.

Performance Factors to Rate Charter Experience	Customer	Captain	Difference
Hospitality of the captain/crew	4.6	4.5	-0.1
On-board fishing equipment	4.6	4.3	-0.3*
Fishing assistance provided by captain and crew	4.5	4.1	-0.4**
Appearance and cleanliness of boat	4.4	4.2	-0.2
Safety aspects of boat	4.4	4.5	0.1
Captain's ability to locate and catch fish	4.1	4.0	-0.1
Comfort facilities on boat	3.7	3.5	-0.2
Price of the charter	3.5	3.5	0.0
Catch rate	3.4	3.4	0.0

T-test of means

** $P < 0.05$

* $p < 0.10$

Based on their experience, 97% of the customers reported that they will go charter fishing on Lake Ontario in the future and 91% of those who will return reported that they would charter with the same captain again. Seventy-three percent of the customers had chartered with the same captain during one to four different years over the previous four-year period (1987 through 1990): one year (18%); two years (19%); three years (11%); and four years (26%). Only 25% of the customers chartered with another captain on Lake Ontario during the five-year period of 1987-1991.

Importance/Performance Analysis

Customer satisfaction is a function of both the importance customers place on various attributes and their perception of the captain's performance. The evaluation of eight items important in the customer's decision to charter on a particular boat (Table 2) is graphed in Figure 1 with the customer's ratings of the captain's performance (Table 4). The importance items used in Figure 1 were based on the 5-point Likert type scales. All eight items are clustered in the upper right quadrant with high importance and high performance ratings. The evaluation of the ratings in the upper right quadrant is often characterized in the literature as "keep up the good work" and can be interpreted by the charter captains as an indication that no changes in management are necessary.

A second evaluation of the eight items important in the customer's decision to charter on a particular boat (Table 3) is graphed in Figure 2 with the customer's ratings of the captain's performance (Table 4). The importance items used in Figure 2 were based on the weighted total of 100 points distributed between the eleven items in Table 3. The eight items used are those that correspond with the eight items in the performance evaluation (Table 4). In this figure, only 4 of the items are clustered in the upper right quadrant with high importance and high performance ratings. The evaluation of the ratings in the upper right quadrant is characterized as "keep up the good work" and can be interpreted by the charter captains as an indication that no changes in management are necessary for these 4 items. Another 4 items are clustered in the lower right quadrant and this quadrant is characterized as being "overkill" because the importance levels are low and the performance levels are high. The additional separation of these later four items using the weighted attribute approach suggests that the charter captains could reduce their effort and expenses, to some degree, in these areas and maintain satisfied customers.

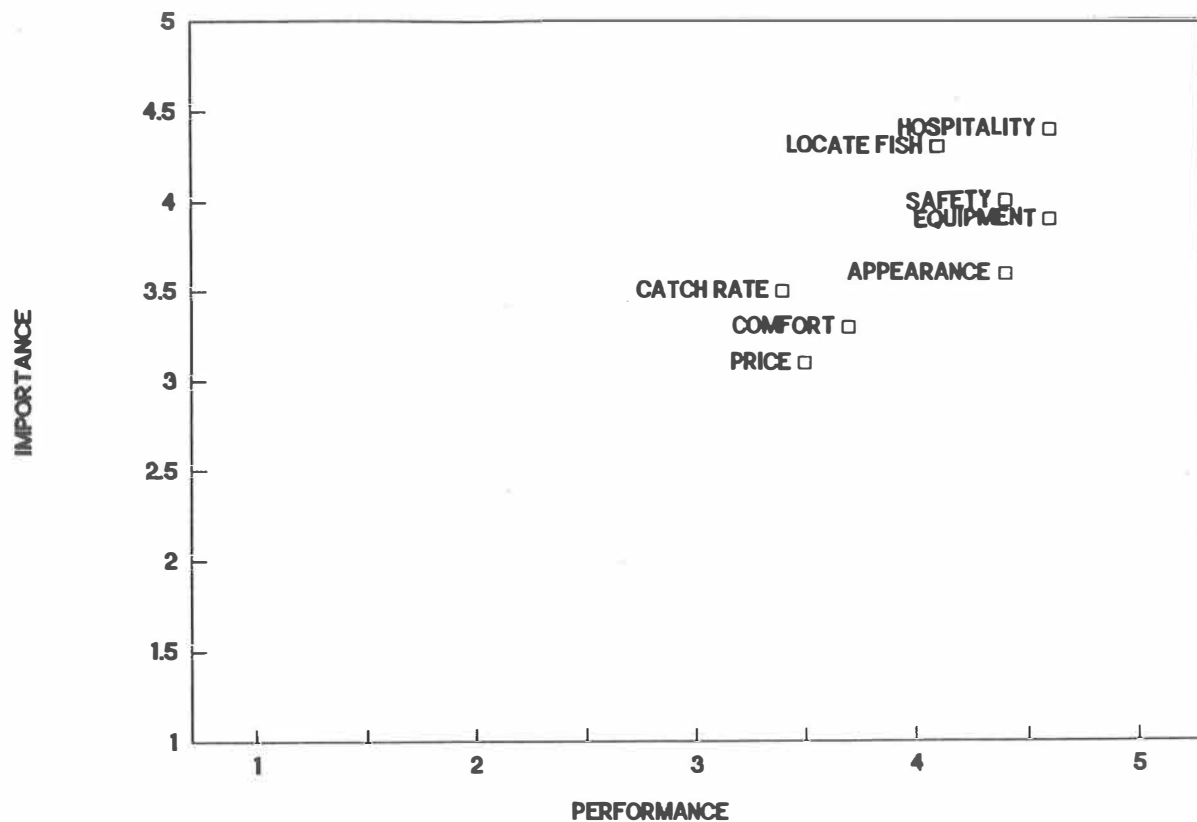


Figure 1. Importance and performance ratings of eight decision-making factors by charter customers; importance responses were 5-point Likert scales.

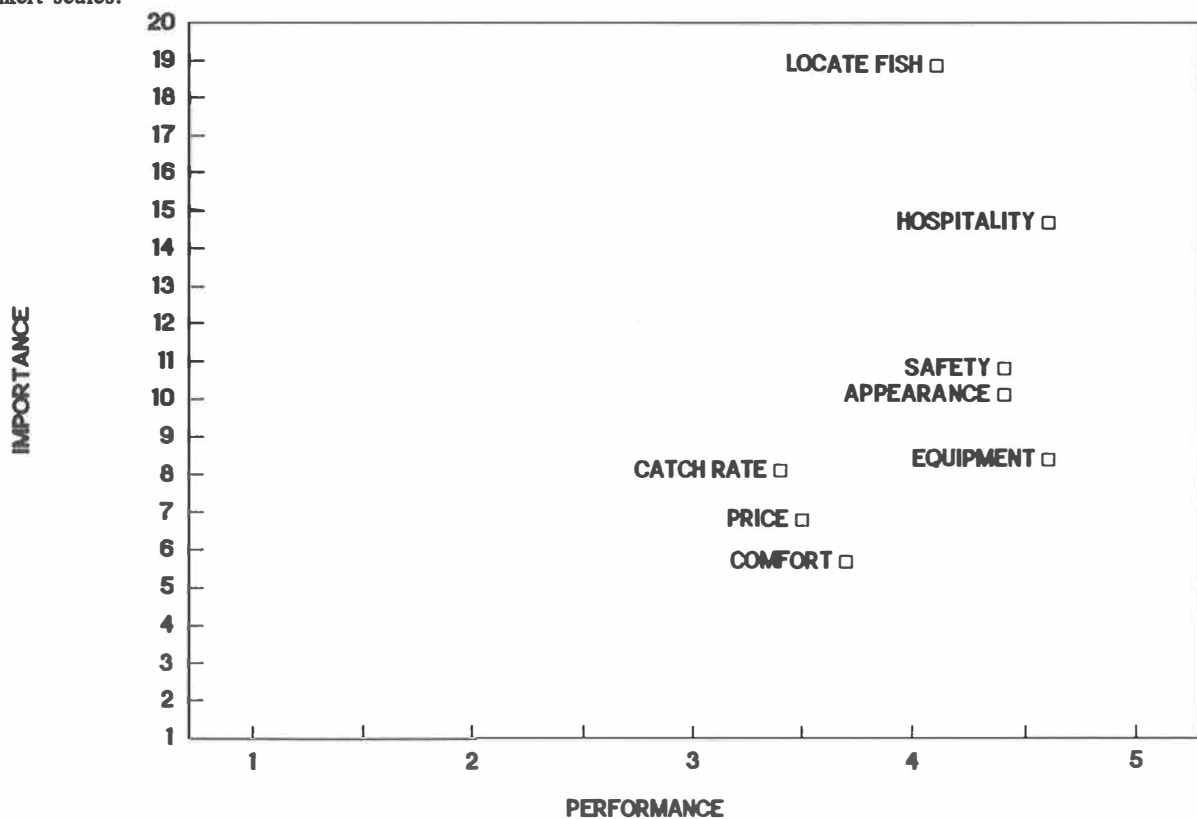


Figure 2. Importance and performance ratings of eight decision-making factors by charter customers; importance responses were weighted scales.

A discriminant analysis was performed to attempt to classify the customer's overall satisfaction according to their reported importance and performance ratings. This approach was used in an attempt to understand the relationship between the

importance/performance measures and overall satisfaction and the difference in classification accuracy between the 5-point Likert scale importance measures and the weighted importance measures. The importance/performance items in both models

were standardized into Z-scores to account for the differences in variance evident between the 5-point Likert scale and the weighted scales. The four satisfaction categories were very satisfied, satisfied, uncertain, and dissatisfied to very dissatisfied.

The discriminant analysis model using the 8 items of importance and performance shown in Figure 1 (i.e., 5-point Likert scale) resulted in an 85% correct prediction or classification of the overall charter satisfaction rating. The discriminant analysis model using the 8 items of importance and performance shown in Figure 2 (i.e., weighted scale) resulted in an 82% correct prediction or classification of the overall charter satisfaction rating. The percent correctly predicted or classified and the standardized canonical discriminant coefficients suggest that both models provide a similar level of discriminatory power when attempting to predict the overall trip satisfaction level.

Discussion

The Lake Ontario charter customer motivations and the decision-making characteristics or attributes used to select a charter reported in this study are similar to those reported elsewhere in Great Lakes research studies. Similarly, the strong loyalty to a captain (i.e., the number of years a customer returns to charter with the captain) has been reported in several other Great Lakes studies. This high percentage of repeat business is one indication that customers are satisfied with the performance of the captains and their overall experience on a charter trip.

The captain's ability to accurately predict many of the angler responses is especially noteworthy and was not anticipated based on the research conducted to date on related recreational activities. The accuracy of the captains' predictions is partially related to the fact that these respondents are the captains who have survived a downturn in the industry and were willing to cooperate in this study. Thus, these captains may be more open to communication both with the researchers and their customers and more successful than average.

The importance/performance analysis suggests that the weighted attribute approach is better able than the 5-point Likert type scale to separate the relative importance of the various items and provide the charter captains with a critical evaluation of where they should use limited time and resources to satisfy customers. Both the 5-point Likert and weighted discriminant models were equally able to correctly predict or classify the overall trip satisfaction of the customers.

Acknowledgment

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Literature Cited

Absber, J.D. and J.R. Collins. 1987. Southern Lake Michigan Sportfishery: Angler Profiles and Specialization Index for Illinois and Indiana. Illinois-Indiana Sea Grant Program Report IL-IN-SG-R-87-2. 125pp.

Ajzen, I. and M. Fishbein. 1975. Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research. Addison-Wesley Inc., Reading, MA.

Carroll, J.S. and E.J. Johnson. 1990. Decision Research: A Field Guide. Applied Social Research Methods Series, Volume 22. Sage Publications, Newbury Park. 138pp.

Dawson, C.P. 1991. A Summary of the 1990 Charter Fishing Industry Along New York's Great Lakes Coast. New York Sea Grant Extension Program, Oswego, NY. 4pp.

Dawson, C.P. and M.P. Voiland. 1990. The Great Lakes Charter Fishing Industry in the 1990's. In J.T. O'Leary et al., (editors). Proceedings of 1990 Outdoor Recreation Trends Symposium III, Volume II, pp. 694-706. Indiana University, Indianapolis, IN.

Dawson, C.P., F. Lichtkoppler and C. Pistis. 1989. The Charter Fishing Industry in the Great Lakes. North American Journal of Fisheries Management, 9:493-499.

Dillman, D.A. 1978. Mail and Telephone Surveys: The Total Design Process. John Wiley and Sons, New York. 325pp.

Fedler, A.J. and R.B. Ditton. 1986. A Framework for Understanding the Consumptive Orientation of Recreational Fishermen. Environmental Management 10(2): 221-227.

Gunderson, J. 1988. The 1987-88 Charter Fishing Study: Minnesota Waters of Lake Superior. Minnesota Sea Grant Extension Program, Research Report 27, Duluth.

Hushak, L.J. and G. Mohammad. 1988. A Profile of Lake Erie Charterboat Clients. Dept. of Agricultural Economics and Rural Sociology, Ohio Cooperative Extension Service, The Ohio State University, Columbus, OH. 15pp.

Kinnunen, R.E. and E.M. Mahoney. 1989. 1987 Upper Michigan Charter Fishing Study. University of Michigan Sea Grant College Program, MICHU-SG89-501, Ann Arbor.

Knopf, R.C., B.L. Driver and J.R. Bassett. 1973. Motivations for Fishing. In J.C. Hendee and C. Schoenfeld (editors), Human Dimensions in Wildlife Programs: Reports on Recent Investigations, p. 28-41. Wildlife Mgt. Institute, Washington, DC.

Loomis, D.K. and R.B. Ditton. 1987. Analysis of Motive and Participation Differences Between Saltwater Sport and Tournament Fishermen. North American Journal of Fisheries Management 7:482-487.

Mahoney, E.M., M. Brunke, and C. Pistis. 1985. 1985 Michigan Charter Fishing Study. Pages 27-45 In Dawson (1985). The Great Lakes Charterboat Fishing Industry: Selected Papers Presented at the Great Lakes Sea Grant Network Charterboat Fishing Workshop, November, 1985. New York Sea Grant Extension Program, Oswego.

Martilla, J. and J. James. 1977. Importance-Performance Analysis. Journal of Marketing 4(1):77-79.

Mengak, K.K., F.D. Dottavio and J.T. O'Leary. 1986. Use of Importance-Performance Analysis to Evaluate a Visitor Center. Journal of Interpretation 11 (2):1-13.

Moeller, G.H. and J.H. Engelken. 1972. What Fishermen Look for in a Fishing Experience. Journal of Wildlife Management 36: 1253-1257.

Murray, J.D., J.E. Sutherland and M.A.J. Gratzner. 1976. The Charter Boat Industry of New York State: A Problem Analysis. State University of New York, College of Environmental Science and Forestry, Syracuse, NY.

Siemer, W.F., T.L. Brown and D.J. Decker. 1989. Fishing Motivations and Involvement of Boating Salmonid Anglers on Lake Ontario. Human Dimensions Research Unit Report No. 89-6, Cornell University, Ithaca, New York. 88pp.

Steele, R.J., S. Burr and D. Iacone. 1990. Pennsylvania Trout Fishing: a Consideration of Specialization and Social Interaction. In T.A. More et al. (editors), Proceedings of the 1990 Northeastern Recreation Research Symposium, p. 139-145. USDA Forest Service Gen. Tech. Report NE-145.

Voiland, M.P. 1987. The 1985 Lake Ontario Charterboat Industry Survey. New York Sea Grant Extension Program, Brockport.

USERS' PREFERENCES FOR SELECTED CAMPGROUND ATTRIBUTES¹

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This paper examines campers' preferences for selected campground attributes, including campground fees, using conjoint analysis. The results indicate that campground fees or price is the most important attribute included in the study, followed by hot showers, flush toilets, bike paths and self-guided nature programs. However, moderate fee increases, accompanied by the addition of hot showers or flush toilets, are preferred over lower-priced campgrounds without hot showers or flush toilets.

Introduction

Because of the budget problems facing many of the states in the Northeast, state recreation agencies have fewer dollars to provide recreational opportunities. The Maine Bureau of Parks and Recreation is a case in point. It has experienced several budget cuts and two bond issues for upgrading and maintaining existing facilities have been defeated in referenda in recent years. On the other hand, several critical needs have been identified through the SCORP process. Given the current fiscal problems and the projection that the problems may continue for several more years, the Bureau is in need of information to prioritize camping needs so that it can undertake those programs that contribute most to the satisfaction of state park campground users.

One option that the Bureau could implement to obtain the revenue needed to provide additional services is to increase campsite fees at state parks. Previous research suggests that recreationists are willing to pay higher fees if they receive the services they desire (Economic Research Associates 1976). However, very little research has been done to determine how important user fees are, relative to other campground attributes, in terms of campers' level of satisfaction with a given camping experience. Consequently, the study also investigated campers' preferences toward user fees, in addition to selected other campground attributes or amenities.

Overall, the objective of the study is to determine the importance of selected campground attributes in campers' camping decisions. More specifically, we were interested in determining the campground attributes that are most important to campers and the utility values or "part-worth" utilities associated with the selected campground attributes using conjoint analysis.

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Conjoint Analysis

The theoretical foundation for conjoint analysis is based on the consumer preference approach developed by Lancaster (1966), who argued that consumers do not derive satisfaction from goods themselves, but rather from the attributes or characteristics the goods possess. In applying conjoint analysis to campgrounds, it is assumed that campgrounds possess attributes (distance from place of residence, for example) and that the level of these attributes vary among campgrounds (one-hour drive, two-hour drive, etc.). Respondents are presented with descriptions of different campgrounds with alternative combinations of attribute levels and they are asked to rank or rate the different campgrounds. Conjoint analysis then uses a decompositional rule to determine the relative importance of each attribute from respondents' overall rankings or ratings of the campground attribute bundles evaluated.

For the purpose of this study, four attributes were chosen. The attributes and attribute levels are:

<u>Campsite fee:</u>	\$8, \$12, \$16 and \$20;
<u>One-way travel time:</u>	1 hour, 2 hours, 3 hours and 5 hours;
<u>Facilities:</u>	Neither flush toilets nor hot showers, flush toilets only, hot showers only, and both flush toilets and hot showers;
<u>Services:</u>	Neither self-guided nature program nor bike path, nature program only, bike path only, and both nature program and bike path;

These attributes coincide with the services and facilities that have been identified as important campground needs in previous studies by the Bureau. For example, the one-way travel time attribute serves as a proxy for the need to develop another campground and thereby reduce travel time for residents in some areas of the state. Including price or campsite fee as an attribute allows one to determine the importance of campsite fees, relative to other attributes, to campers.

Each of the four attributes has four levels. Therefore, there are 4⁴ or 256 possible combinations of attribute levels in a full-profile complete design. This is too many for campers to evaluate, so we constructed an orthogonal main-effect design, which reduces the number of combinations to be rated to sixteen (Addelman 1962). The orthogonal main-effect design assumes that the effects of each attribute on campers' utility are independent of the remaining attributes. Previous research suggests that this assumption may not be valid (Louviere and Timmermans 1990). To correct for this problem, a fractional factorial design was used that contains the orthogonal main-effect design and sixteen additional combinations of attribute bundles or "campgrounds". Consequently, the total number of combinations of attributes bundles included in the conjoint analysis is thirty-two. It is still, however, impractical to have respondents rate 32 attribute bundles in a mail survey. Therefore, a pseudo-attribute with eight levels was introduced, which established eight blocks with four campground bundles in each block. Respondents then were asked to rate the four campground attribute bundles in a block.

Data Collection Procedures

The information required for the conjoint analysis was obtained by presenting hypothetical state park campgrounds with different attribute levels to campground users. The 32 different campground attribute bundles were divided into eight sets of four campgrounds each, and respondents were asked to assign a rating between one and ten to each of the four campgrounds in the set.

The data were obtained through a mail survey of 400 campers who used the Maine state park campgrounds during 1990. The sample was selected randomly from the registration cards completed by campers when they arrive at the campgrounds.

Dillman's (1978) Total Design Method was used to conduct the mail survey, and a response rate of 91 percent was obtained.

Results

The data were used to estimate a part-worth preference model for state park campers. This model assumes that the utility of campers is affected by the attributes included in the analysis, and that the overall preference rating for a campground is the sum of the effects of each attribute on campers' utility. Based on these assumptions, the part-worth preference model estimated is:

Campground Rating =

$$B_0 + B_1P12 + B_2P16 + B_3P20 + B_4Trav2 + B_5Trav3 + B_6Trav5 + B_7Show + B_8Toil + B_9Nat + B_{10}Bike + e$$

All of the attributes are categorical rather than continuous, and "effects coding" (Cohen and Cohen 1983) was used for the attribute levels; consequently, the intercept term in the estimated equation represents the mean preference rating for the 32 campgrounds and the coefficients on each independent variable is a measure of the deviation from the mean rating associated with the attribute level.

Table 1. Estimated conjoint preference model parameters.

Variable	Parameter Estimate	T-statistic
Intercept	5.2012*	76.127
P12	0.4241*	3.368
P16	-0.2582*	-2.051
P20	-1.3961*	-11.087
TRAV2	0.1959	1.602
TRAV3	0.4559*	3.727
TRAV5	-0.7835*	-6.405
SHOW	0.5517*	7.803
TOIL	0.5400*	7.085
NAT	0.0499	0.697
BIKE	0.2272*	3.181

Calculated Parameters

P8	1.2302	- ($B_1 + B_2 + B_3$)
TRAV1	.1317	- ($B_4 + B_5 + B_6$)
NOSHOW	-.5517	- B_7
NOTOIL	-.5400	- B_8
NONAT	-.0499	- B_9
NOBIKE	-.2272	- B_{10}

$R^2 = .22$ F ratio = 37.31* n = 1312

*significant at the .01 level

The equation was estimated using Ordinary Least Squares (OLS) and the results are reported in Table 1. Nine of the eleven variables are statistically significant at the .05 level. The mean rating for the 32 campground attribute bundles is 5.2. Prices of \$8 and \$12 increase the mean rating because the coefficients on those variables are positive. In contrast, prices of \$16 and \$20 lower the mean rating since their coefficients are negative. Likewise, Trav3 increases the mean rating of campgrounds, while Trav5 decreases the mean value. The presence of showers, flush toilets and bike paths all increase the mean rating. Although the R^2 for the equation is only .21, the F-ratio for the equation is statistically significant.

Part-worth utility values for each attribute level are calculated from the coefficients in the estimated equation (Green and Srinivasan, 1978). These are shown in Table 2. The estimated part-worths represent the mean rating for all campground attribute bundles that contain that specific level of an attribute. The part-worths are calculated using the formulas shown in the Table.

Table 2. Estimated part-worth utility values for campground attributes.

Attributes & Levels	Calculation of part-worths	Estimated part-worths
<u>Overnight campsite fee</u>		
\$8.00	$B_0 - B_1 - B_2 - B_3$	6.43
\$12.00	$B_0 + B_1$	5.62
\$16.00	$B_0 + B_2$	4.94
\$20.00	$B_0 + B_3$	3.80
<u>Travel time</u>		
1 hour	$B_0 - B_4 - B_5 - B_6$	5.33
2 hours	$B_0 + B_4$	5.39
3 hours	$B_0 + B_5$	5.65
5 hours	$B_0 + B_6$	4.41
<u>Hot showers</u>		
showers	$B_0 + B_7$	5.75
no showers	$B_0 - B_7$	4.64
<u>Flush toilets</u>		
toilets	$B_0 + B_8$	5.74
no toilets	$B_0 - B_8$	4.66
<u>Bike Path</u>		
bike path	$B_0 + B_{10}$	5.42
no bike path	$B_0 - B_{10}$	4.97
<u>Nature Program</u>		
program	$B_0 + B_9$	5.25
no program	$B_0 - B_9$	5.15

The estimated part-worths are useful for two reasons. First, the magnitude of the part-worths indicate how respondents' utility ratings are affected by changes in the level of the attribute. For example, the part-worths for campsite fees decrease as the fees increase. This clearly indicates that campers prefer the lower-priced campgrounds to the higher priced alternatives, other things being equal. The part-worths for the travel time attribute suggest campers are relatively indifferent between one and two-hour travel times, and that a three-hour travel time better than the shorter travel times. However, the utility value for the five-hour travel time is lower than those associated with the shorter travel times. Hence, campers prefer to camp at campgrounds located about three hours from home. Finally, note that campgrounds containing the facilities and services have higher part-worths than the campgrounds that do not have those attributes.

Table 3. Relative importance of each campground attribute.

Attribute	Attribute Level Range	Relative Importance
Campsite fee	2.63	39.73
Travel time	1.24	18.73
Hot showers	1.11	16.77
Flush toilets	1.09	16.47
Bike path	.45	6.79
Nature program	.10	1.51
Total Range	6.62	100.00

Second, the range in the utility values for a given attribute provides an indication of the importance of one attribute relative to the other attributes. Specifically, the greater the

range in the part-worths across attribute levels, the greater the importance of that attribute to campers. The ranges for the four attributes, shown in Table 3, vary from 2.62 for campsite fees to only 0.10 for the nature program. This indicates that price is a much more important attribute to campers than are the other attributes studied. This result is reflected in the last column of the Table. The campsite fee accounts for about 40 percent of the total range over all attributes and is, therefore, the most important attribute in the analysis. Note that travel time, hot showers and flush toilets each account for 16-19 percent of the total range and are of approximately equal importance to campers. Finally, although the presence of a bike path is more important to campers than the nature program, neither of these attributes is as important as the other attributes.

Summary and Policy Implications

The overall objective of this study is to provide information that would assist the Bureau of Parks and Recreation in prioritizing the needs of state park campground users. The results from the conjoint analysis performed clearly suggest that the campsite fee is the most important campground attribute affecting campers decisions of where to camp in Maine. However, this does not necessarily mean that fees should not be increased to cover the costs of providing some of the other attributes considered in the study.

For example, assume that the current campsite fee is \$8, average travel time is 5 hours, and none of the other attributes are offered in the campground. The average rating associated with this campground is 4.28. Now assume that the campsite fee is raised to \$12 and hot showers are added at the campground. Other attributes remaining constant, the mean rating for this campground is 4.58, which is higher than the mean rating for the original campground. Clearly, the loss in utility associated with the fee increase is less than the utility gained by adding the hot showers. Increasing fees from \$8 to \$12 to cover the cost of adding flush toilets would also increase the average users' total utility for the campground.

Similarly, assume that a new campground is constructed that reduces travel time for users from five to three hours, and a fee of \$12 is instituted at the campground. This campground would be preferred by the average camper over a campground that has an \$8 fee and a five-hour travel time. The average rating for the new campground is 4.71 compared to the average rating of 4.28 for the same campground with a one-way travel time of 5 hours and an \$8 fee.

Finally, different conclusions pertain to self-guided nature programs and bike paths. The loss in utility associated with increasing the fee from \$8 to \$12 is greater than the increase in utility associated with adding these services. Hence, the results indicate that fees should not be increased to pay for the provision of these services.

Literature Cited

- Addelman, Sidney. 1962. Symmetrical and asymmetrical fractional factorial plans. *Technometrics* 4(1): 47-58.
- Cohen, Jacob; Cohen, Patricia. 1983. Nominal or qualitative scales. In: *Applied multiple regression/correlation analysis for the behavioral sciences*. Hillsdale, NJ: Lawrence Erlbaum Associates: 181-222.
- Dillman, Don A. 1978. *Mail and telephone surveys - the total design method*. New York, NY: Wiley Press.
- Economic Research Associates; 1976. Evaluation of public willingness to pay for use of outdoor recreational areas and facilities. Prepared for the Bureau of Outdoor Recreation, U.S. Department of Interior, Washington, D.C.: U.S.G.P.O. 44p.
- Green, Paul E.; Srinivasan, V. 1978. Conjoint analysis in consumer research: issues and outlook. *Journal of Consumer Research* 5: 103-123.
- Lancaster, K.J. 1966. A new approach to consumer theory. *Journal of Political Economy*. 74: 132-157.
- Louviere, Jordan; Timmermans, Harry. 1990. Stated preferences and choice model applied to recreation research: a review. *Leisure Sciences* 12: 9-32.

OUTDOOR RECREATION
Outdoor Recreation II

HIKER CHARACTERISTICS AS AN INDICATOR OF PERCEIVED CONGESTION LEVELS IN THE SANDWICH RANGE WILDERNESS AREA

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Stewards of the Sandwich Range Wilderness Area have observed biological degradation due to overuse. Wilderness area users may be willing to modify their behavior in order to preserve the wilderness area. A survey of hikers defines characteristics which influence perceived congestion and identifies viable management schemes for the area.

Introduction

The Wilderness Act of 1964, Eastern Wilderness Act of 1975, and other resulting legislation, have been responsible for the establishment of the national wilderness preservation system within the United States. This legislation also attempts to outline specific policy guidelines for wilderness areas. As often is the case with federal policy, these policy guidelines are defined in general terms. The resulting ambiguity forces individual federal agencies charged with the management of wilderness areas to independently interpret objectives, and develop and implement plans for meeting their interpretation of objectives.

In 1984, 25,000 acres of the White Mountain National Forest were designated by Congress as the Sandwich Range Wilderness Area. New Hampshire's USFS managers were charged with developing a management plan for the Sandwich Range Wilderness Area that not only met their interpretation of policy objectives but also followed federal guidelines outlined for National Wilderness Areas. The past seven years have shown significant accomplishments regarding management within the Sandwich Range Wilderness, but there are still management concerns to be addressed.

The Sandwich Range Conservation Association (SRCA) has identified one of these concerns as significant adverse human impacts at Black Mountain Pond. Black Mountain Pond is one of only two large ponds located within the Sandwich Range Wilderness boundary of the Pemigewasset Ranger District. In June 1991, Forest Service and SRCA personnel inspected the site and deemed its deterioration to be at an unacceptable level. The reason attributed to the deterioration was overuse by hikers and campers in the area.

This inspection led to a consensus that Black Mountain Pond needs a committed management plan. Options discussed included establishment of a restricted use area, restoration of heavily trampled sites, removal or relocation of shelters, and establishment of latrine facilities, trail systems, and a

wilderness education program. In addition, it was noted that information was lacking regarding public perceptions related to crowding and use. If wilderness area users have observed overuse symptoms, they may be willing to modify their behavior in order to preserve the ecology and enhance their own future wilderness experiences.

In this paper we attempt to analyze individual preferences for use levels of the Sandwich Wilderness Area. We also discuss willingness to participate in several defined management schemes. Utilizing data provided by the Sandwich Wilderness Area we will determine if present use of the area exceeds individual preference levels for number of users. By providing public impressions of crowding and potential management systems, our work may assist stewards of the wilderness area develop a practical user limitation scheme.

Literature Review

Hikers go to wilderness areas to get away from more crowded hiking trails in other areas (Manning, 1986). Yet an increase in the number of outdoor enthusiasts in general, and hikers in particular, has led to certain wilderness areas receiving the pressure they were designed to alleviate.

Researchers in certain national parks, like Yosemite and Sequoia, have found a saturation point beyond which people destroy the very solitude they seek (Van Wagtenonk, 1986). As a result, wilderness managers face the conflict of protecting the natural resource while preserving the recreational experience (Brown, 1990). If managers don't act, hikers surely will. A common coping method among hikers is "displacement" (Anderson and Brown, 1984). Displacement refers to changes in trip patterns and areas visited due to increasing use levels.

One result of research on wilderness crowding has been the use of terms such as "carrying capacity" in recreational literature when referring to hikers. In wildlife management, carrying capacity refers to the number of wildlife an area will support before vegetation is degraded or the population's health declines. In sociological terms, carrying capacity has been defined in terms of the number of acres in a wilderness travel zone, the trail miles in that zone and its ecological fragility (Van Wagtenonk, 1986).

Symptoms of overuse are easy to spot, especially at campsites: no vegetation, compacted soil, and fire rings (Kania, 1987). But sometimes, overcrowding is a matter of perception. Hikers feel crowded if they see more hikers than they expected (Shelby et al., 1983). That is, hikers who expect to encounter few others felt more crowded if their expectations are exceeded, even if the numbers of other hikers are relatively low. A traditional crowding model suggests that perceptions of crowding are influenced not only by the number of contacts one experiences, but also by how the number of individuals encountered compares to one's expectations and preferences for contacts (Graefe et al., 1986).

Certainly managers should act when the physical characteristics of wilderness areas are degraded. Permit systems and entrance fees are two methods (Stankey and Baden, 1977). Evidence suggests that wilderness users are more careful when they pay to use an area, especially if the public agency charging the fees also improves maintenance of the area (Clawson and Knetsch, 1966). But overcrowding based on visitor perceptions is harder for managers to solve. An important ingredient in wilderness management requires a forecast of future recreational demand; in a word, planning (Clawson and Knetsch, 1966). Managers, who actively seek out what users perceive as overcrowded conditions, can use education to provide a diversity of recreational opportunities (Shelby et al., 1983).

Experience of each hiker plays an important role in finding preferences and expectations. The more experienced a hiker, the more sensitive he, or she, is to crowding (Manning, 1986). Also, the size of groups allowed into a wilderness area can have an influence on what other hikers perceive as too crowded.

Visitors generally prefer meeting many small groups as opposed to one large group (Manning, 1986).

Manning (1986) found that several variables need to be accounted for when managers try to find visitor preference: type of area, preferred location of camping sites within an area, and preferred size of camping parties and environmental factors. The greater the environmental impact left by previous visitors, the higher the perceived crowding.

For New England, the problems are more acute because of fewer wilderness areas and a greater percentage of the population within a day's drive than in many of the western wilderness areas. Virtually all the wild country left in northern New England is in private hands, timber and paper companies (Wilderness Society, 1989). Until recently, local tradition in Maine and elsewhere allowed public access for recreation, but in the 1980's, companies began to sell to developers.

The U.S. Forest Service has divided the Sandwich area into four zones and developed a separate management objective for each zone. Each management objective suggests various methods for dispersing users and providing opportunities for solitude. Before Forest Service officials can disperse wilderness users, however, they first have to find out how many people are using the area, and what their points of entry are (USFS, 1989).

For the past three seasons, U.S. Forest Service personnel have been trying to count visitors in the White Mountain National Forest through the use of electronic counters. For two years, counters have been set up at designated trail heads leading into the Sandwich Range Wilderness (Smith, 1991). The counters are an "electric eye" type device that shoots a beam of infra-red light across a trail. Anytime the beam is broken, an attached counter makes note.

Elsewhere, wilderness managers have tried a variety of methods to measure actual contacts between hiking parties (Manning, 1986). Observer-reported contacts, reported contacts by visitors and diary contacts recorded during an outing have all been used.

Methods

The purpose of this study was to determine perceived congestion levels in the Sandwich Range Wilderness Area in central New Hampshire. The components of this involved determining general characteristics of hikers using the area, the level of use, and possible support for various policies to control crowding.

Hikers were contacted by personal interviews as they entered trail-heads to the Sandwich Range Wilderness Area. The interviews were conducted on two consecutive Saturday mornings in October of 1991. The site of the interviews were the Bennett St. trail-head to Flat Mountain Pond and the Livermore Rd. trail-head to Trip Pyramid Mountain and Greeley Pond. These trail-heads were recommended to the researchers as popular hiking locations within the wilderness area by personnel at the Sandwich Range Conservation Association in Plymouth, New Hampshire. The Sandwich Range Wilderness Management plan developed by the U.S. Forest Service identified four zones within the area. The trails from which primary data were collected are included in zones B and C, described as the more heavily used areas. This gave consideration to the season and enabled the researchers to obtain a better response rate for the survey. Regression analysis of the variables was performed to determine how various hiker characteristics affect perceived congestion levels and support for mitigation of overuse.

Data was collected by three methods in this study. The first was by the use of a survey. The survey was designed to determine general characteristics of hikers such as age, level of hiking experience, size of hiking party, and percentage of hiking done within the Sandwich wilderness, as well as level of support for different proposed policies to control use of the area. Several questions mirrored those developed by Brown (1990) regarding

information provision in wilderness management at the Pemigewasset Wilderness Area.

The surveys were administered by the interviewers in an attempt to eliminate non-response bias and facilitate completion. Hikers were interviewed upon entry to trail-heads as hiker concentrations are less dispersed over time at starting points. The time of year (autumn) coupled with hunting season necessitated this condition for data collection. The U.S. Forest Service data regarding trail use in the Sandwich Wilderness Area was compared with data collected from the surveys regarding perceived congestion levels of hikers to determine if congestion is in fact a problem in terms of raw numbers of people.

Perceived congestion levels were also analyzed after personal and telephone interviews with several Forest Service personnel. Their perceptions of use and degree of hiker impact that presently affects the wilderness area were compared with hiker perceptions and counter levels.

The sample size consisted of 61 individuals ranging in age from twelve to fifty-five. A majority of the hikers were in their thirties. Brown's survey of 250 hikers in the Pemigewasset Wilderness Area produced similar results (Brown, 1990). The age distribution of both surveys are presented in Figure 1.

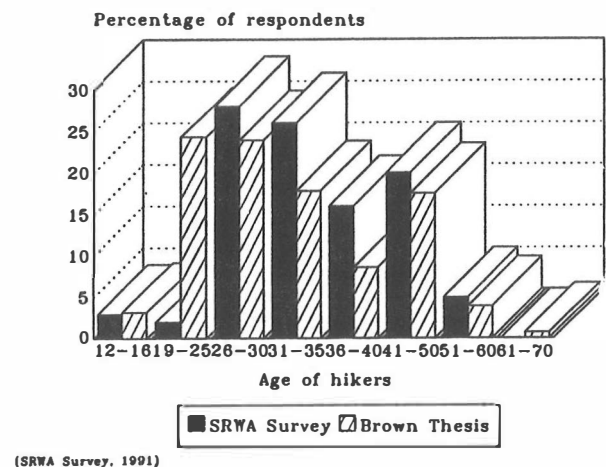


Figure 1. Age distribution.

Male/Female respondents were not differentiated between as most hiking parties included both, and parties tended to discuss survey questions before answering. Hiking party size varied from two individuals to nine which was also consistent with the Brown study (Brown, 1990). Most individuals interviewed were casual hikers, hiking approximately several time a year. Several were very experienced, hiking an average of three times per month. A majority of respondents hiked in the Sandwich Wilderness Area less than 10% of their hiking trips. About 15% of the respondents hiked there more than 50% of the time. All data was collected and analyzed to determine if congestion is a problem or if it has the potential to be a problem. In addition, potential policy recommendations to ensure that overuse does not negatively impact the wilderness area were developed and discussed.

Results and Discussion

It was determined that hiking experience had a significant coefficient at the 95 percent level in influencing individual's crowding level. Also, that hiker's experience influenced willingness to support a user management scheme at the 95 percent level. These results support Manning's work which concluded that the more experienced a hiker, the more sensitive he, or she, is to crowding (Manning, 1986) and therefore, the experienced hiker seeks more solitude in a hiking trip. Finally,

the results show that individual's hiking in larger parties do not have a higher threshold level for other visitor contacts.

The survey was administered at the trail-head on weekend mornings. This limited interviewing to hikers who were beginning their hike, so expected number of contacts versus actual number of contacts during a day did not bias preference levels. A possible bias in the results stems from interviewing an entire hiking party at once. Often one member of the party would answer first, and others would simply confirm the first answer.

The October climate hastened our questions and hikers replies. In addition, October is not peak season for recreational use. This may have influenced hiker's perceived needs for recreational management, or their willingness to participate in such management.

Daily use data was provided by the Forest Service within the Sandwich Wilderness Area. The number of hikers was measured by an electric eye which was tripped by motion. Weekend use in the summertime had the greatest number of hikers, an average daily count of 25 hikers. During the fall period, September 15-November 15, weekend use had average daily counts of 4 hikers. The most frequent response in the survey for maximum number of other visitors encountered before feeling crowded was ten. Figure 2 represents the responses concerning perceived congestion level. Crowding levels of 25 or below were preferred by 68 percent of the hikers interviewed.

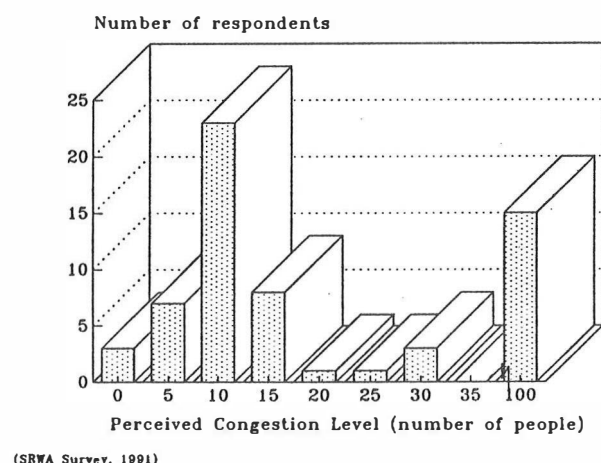


Figure 2. Perceived congestion levels.

Of the 61 respondents, 29 did not think a user control system was needed. Several qualified this answer by saying that the Sandwich Range Wilderness Area remains remote and pristine and so a management system seems superfluous. Symptoms of overuse -- fire-rings, litter, trampled vegetation -- may be uncommon, or may not be interpreted as evidence of overuse by all visitors. Many respondents, however, did support implementing a system. Respondents could support more than one policy if they so chose. There was a significant correlation at the 99 percent level with a coefficient of -4.255 between crowding threshold and support for regulation indicating that those with a lower threshold for congestion were more supportive of a management scheme to control use.

The most favored management scheme was voluntary dispersion based upon making available information of current use at each trail-head. This scheme reinforces "displacement" behavior by providing accurate information for hikers choosing unpopulated destinations. This method could also be implemented by simply posting sign-in sheets. It is effectively used by rock climbers to ensure free routes and safety without supervision by rangers.

A policy which requires hikers to obtain a permit before entering the wilderness was the second favored solution. The permits would be free and distributed on a first come, first serve basis. There would be a finite number of available permits. This solution would require regulation by the rangers. It would also provide an opportunity to disperse educational material concerning low impact use of wilderness areas.

Advanced registration and entrance fees were unpopular methods to manage use of the wilderness area. Both of these policies may be interpreted as antithetical to the wilderness experience. Wilderness land is owned by the general public and so accessibility should not be contingent upon an entrance fee. Advanced registration is a practice used for several national parks and other recreation areas, but the proximity of the Sandwich Range Wilderness Area to residential areas makes it available for day use which is often unplanned. Figure 3 presents the various levels of support for proposed management schemes.

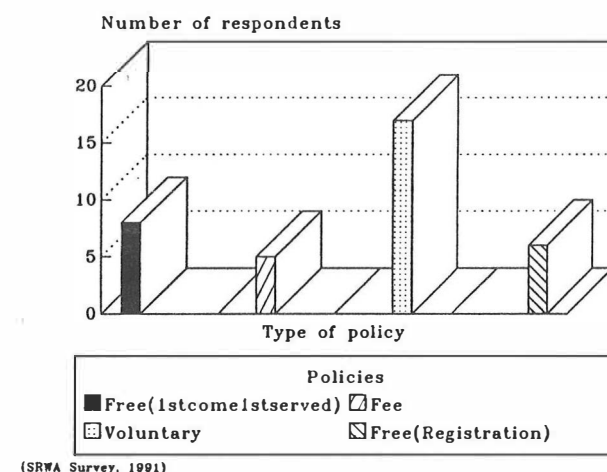


Figure 3. Support for management schemes.

Over half of the respondents perceiving no need for user management answered the crowding question with an infinite threshold for crowding. These responses correlated with hiking experience. Thirteen of the fifteen with unlimited use responses were cast by infrequent users. Possible explanatory hypotheses for protest responses are 1) that infrequent users are less aware of the impacts of overuse and 2) that infrequent users have different motivations and expectations for their wilderness experience.

The Forest Service emphasizes the ecological impact of overuse. They do not perceive a problem with diminished hiker's experience due to crowding. A management scheme which provides an educational opportunity to discuss low impact camping would therefore be most helpful. However, the results of our study illustrate three points clearly. First, that the number of users in the Sandwich Range Wilderness Area during peak use exceeds the number of visitors that most hikers prefer to see. Second, that the frequent users of the wilderness are more affected by crowding than infrequent visitors. And finally, that the frequent visitors are more willing to participate in a management scheme. These results illustrate that there is perceived congestion. The management schemes discussed would assist the Forest Service in mitigating ecological impacts of overuse in the Sandwich Range Wilderness Area.

Literature Cited

Anderson, D.H.; Brown, P.J.. 1984. The displacement process in recreation. *Journal of Leisure Research*. 16(1): 61-73.

Brown, C. 1990. Information Provision In Wilderness Management: An Evaluation of The Pemigewasset Wilderness Management Plan. M.S. Thesis, University of New Hampshire.

Clawson, M.; Knetsch, J.L. 1966. Economics of Outdoor Recreation. Baltimore: John Hopkins Press.

Graefe, A.R.; Donnelly, M.P.; Vaske, J.J. 1986. Crowding and specialization: A reexamination of the crowding model. In: Proceedings of National Wilderness Research Conference. U.S. Forest Service, Technical Report. 212: 333-338.

Kania, M.R. 1987. U.S. A site analysis approach for determining wilderness carrying capacity. In: Proceedings of National Wilderness Research Conference. U.S. Forest Service, Technical Report. 220:369.

Manning, R.E. 1986. Density and crowding in wilderness: Search and research for satisfaction. In: Proceedings of National Wilderness Research Conference. U.S. Forest Service, Technical Report. 212: 440-448.

Shelby, B.; Heberlein, Vaske, J.; Alfano, G. 1983. Expectations, preferences, and feeling crowded in recreation activities. *Leisure Sciences*. 6(1): 1-14.

Smith, R. October 1991. White Mountain National Forest, New Hampshire. Personal Interview.

The Wilderness Society. Spring 1989. Wilderness America: A vision for the future of the nation's wildlands. *Wilderness*. 52(184): 3-53.

U.S. Forest Service. January 1989. Sandwich Range Wilderness Management Plan.

U.S. Department of Agriculture. 1977. Rationing wilderness use. Research Paper 192.

Van Wagtendonk, J.W. 1986. The determination of carrying capacities for the Yosemite wilderness. In: Proceedings of National Wilderness Research Conference. U.S. Forest Service, Technical Report 212: 456.

1990 STATEWIDE PUBLIC BOATING

ACCESS STUDY

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The New York State Office of Parks, Recreation and Historic Preservation (OPRHP) and the Department of Environmental Conservation (DEC) conducted a study of 107 public boat launching sites from April-October, 1990. The study was designed to calculate total boating use of public facilities in New York and to determine use patterns, user characteristics, and perceived problems and needs of boaters at these sites. A total of 10,685 questionnaires were returned. Public access facilities support an estimated 435,000 boating trips or 1.3 million activity days. Fishing was the primary activity. New York residents accounted for 88% of the boating trips. The average size motorized boat was 16.8 feet long powered by an 83.1 HP motor. Public launch sites contributed an average of only 28% of the boats in use during the busy summer weekend and holiday period. Boaters identified 459 waters to which they desired new or expanded public access. The survey results will be used to guide future activities of OPRHP and DEC in providing recreational waterway access.

Introduction

New York State is blessed with an abundant waterway resource, including 4,000 inland lakes and ponds covering 750,000 acres, 439 miles of shoreline on Lake Erie and Lake Ontario, 190 miles of shoreline on Lake Champlain, and 1,667 miles of marine and coastal shoreline. In addition, there are 63,000 miles of permanent rivers and streams. These waterways have served as an important transportation network and contributed to the development of the state and are presently enjoyed by many for fishing, swimming, recreational boating, water supply, and aesthetic values.

DEC maintains 200 boating access facilities and OPRHP 75 sites. Public access is also available through 417 sites provided by municipalities. Commercial operators account for another 93 cartop and 1,021 ramp launch sites. (SCORP, 1988).

Funding assistance for the study was provided through the Land and Water Conservation Fund of the National Park Service, the Federal Sport Fish Restoration Fund of the U.S. Fish and Wildlife Service and the Recreational Boating Safety Financial Assistance of the U.S. Coast Guard.

Goals and Objectives

A statewide boating use survey at public access sites was jointly undertaken by DEC and OPRHP during the 1990 boating season (April 14 - October 14, 1990) to:

- provide data necessary to evaluate the amount, pattern, and types of use received by existing facilities;
 - access boaters perceptions of problems and needs; and
 - investigate the relative contribution of boating use attributed to state boating access sites compared with all other sources.
- This information is needed to guide and support development, renovation, and maintenance of public access facilities

Methodology

The study included 107 boat launch sites across the state. This included 74 DEC sites and 33 OPRHP sites that served a range of water body sizes, from 25 acre Laurel Lake in the Adirondacks, to 2,270,000 acre Lake Ontario (New York portion), and facility capacities, from cartop sites with parking for four or five cars to large multi-launch lane facilities able to accommodate more than 150 cars and trailers. The aerial survey covered a subset of 21 lakes and the Mohawk River.

The 1990 boating season was subdivided into 6 strata for analysis of boating use and user characteristics based on season and weekday versus weekend/holiday periods. Seasons were defined as: Spring (April 14, - June 30), Summer (July 1 - September 3 (Labor Day)), and Autumn (September 4 - October 14).

Data were obtained from three sources. Roving census agents counted vehicles and recorded data on lake and weather conditions at 48 sites. Boaters completed self-administered postage paid questionnaires left on vehicles (with trailers or cartop racks or other evidence of boat hauling capability) by census agents or distributed at 33 OPRHP park/access sites and 26 DEC campgrounds by entry gate personnel. DEC Division of Aviation conducted the aerial survey during each sampling frame to count all boats in use and all others docked or ashore.

Results

A total of 10,685 questionnaires were returned, including 8,009 from the 48 sites covered by DEC roving census agents, 796 from DEC Campgrounds, and 1,775 from 32 OPRHP facilities. A total of 104,854 trips were estimated from data at 48 sites covered by roving census agents. An additional 15,174 boated trips were calculated from 26 DEC campgrounds. These sites contained slightly more than 27% of the total installed public access capacity of all waterway access sites operated by DEC, OPRHP, and cooperative municipal launches. If the sites included in the survey are representative of the entire network of state waterway access sites, then the network of state sites supported approximately 435,000 boating trips in 1990. This represents 1.3 million days of boating recreation annually, based on an average of 3.0 persons per boat.

Seasonal Patterns

Statewide, summer weekends and holidays were the most popular days for boating (Figure 1) accounting for 31% of the estimated annual trips. The least popular period was autumn that experienced only 6% of the trips.

Site occupancy patterns were examined for 48 sites covered by DEC census agents. Seventy-nine (79%) of these sites filled to capacity at least once during the study, with most of these occasions occurring during the summer weekend/holiday stratum. The pattern of site occupancy relative to capacity is illustrated in Figure 2 which shows that nearly one-fourth of all census site-days in the summer weekend/holiday stratum were at or above capacity, twice that of the spring weekend/holiday stratum which was the next busiest period observed.

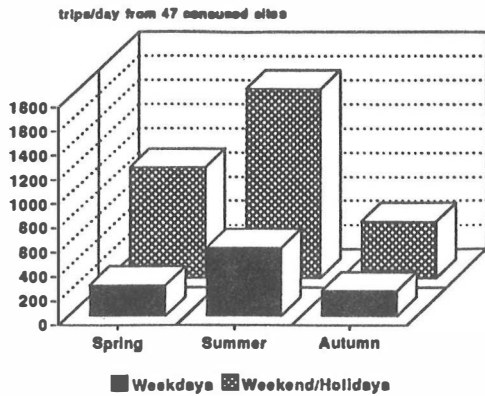


Figure 1. Number of boating trips by season and type of weekday.

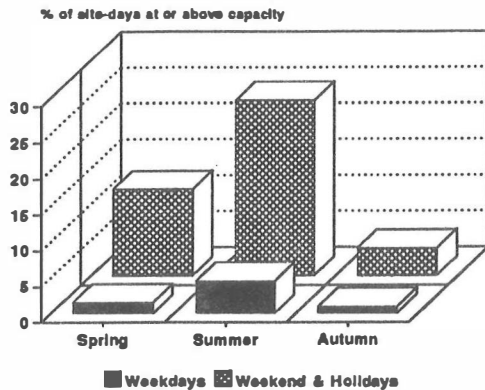
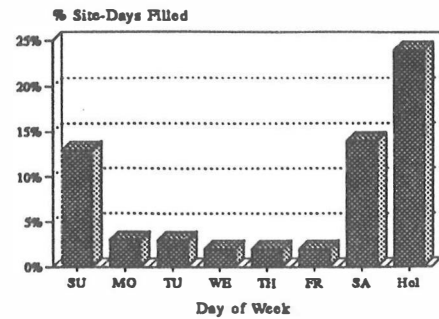


Figure 2. Number of vehicles to site capacity by season and type of weekday.

Daily Use Patterns

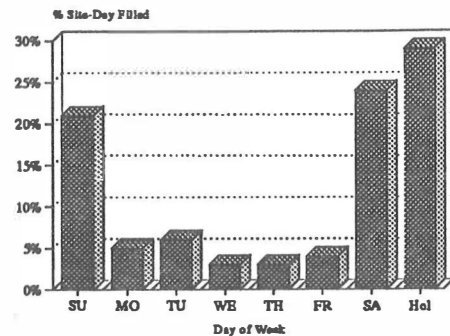
In general, weekends and holidays during the all three seasons experienced significantly higher use levels than weekdays. Figure 3 shows a clear and consistent relationship between day of week and use relative to capacity, with non-holiday weekdays (Monday - Friday) filling to capacity only about 2 or 3% of the time, compared with non-holiday weekend days (Saturday and Sunday) and holidays (any official holiday, regardless of day of the week), which filled between 12% and 24% of the time. Figure 4 shows a very similar pattern for the summer months, with the major difference being an across the board increase in the percentage of site-days observed at or above capacity.

A composite daily boating pattern was derived from all questionnaires reporting day trip starting and ending times. Figures 5 and 6 identify the effect of staggered starting and ending times of boating trips which likely reflects the patterns of fishing and non-fishing trips. Launch ramp activity is extremely busy between 10 a.m. and 6 p.m., both in terms of total launches and retrievals, and potential competition for launch lanes between those wishing to launch or retrieve. The peak number of boats in use occurred at 1:00 p.m. and represented approximately 53% of the total boating activity during the course of this composite day. By 2 p.m., more boaters are attempting to leave the water than launch, and retrievals continue to dominate increasingly throughout the rest of the day. For waterway access sites used near capacity, earlier-departing boaters vacate parking spaces that may then be used by late-arriving boaters, allowing greater use of the limited capacity of public sites by turning over parking spaces so that more than 1 boating trip per parking space can be accommodated each day.



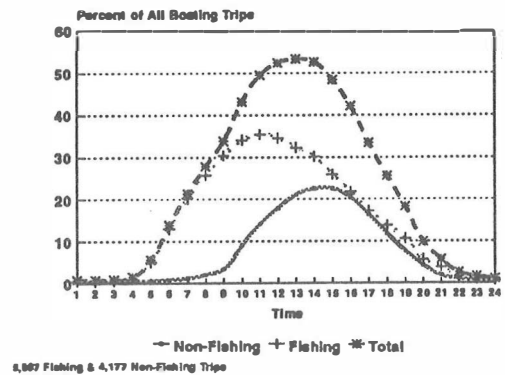
All Seasons (Apr 15 - Oct 15)

Figure 3. Relationship of day of the week to sites filling to capacity.



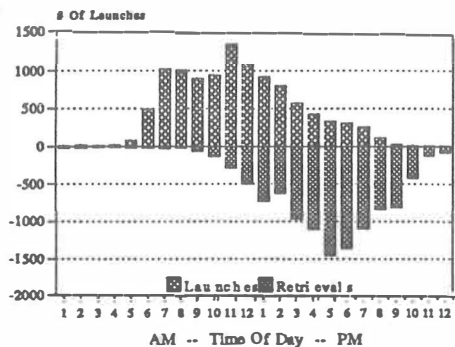
Summer (July 1 - Sept 3)

Figure 4. Relationship of day of the week to sites filling to capacity.



Legend: — Non-Fishing — Fishing — Total
8,887 Fishing & 4,177 Non-Fishing Trips

Figure 5. Distribution of boating activity by hour and purpose of trip.



Reported from 18,065 Trips

Figure 6. Boat launchings and retrievals by hour.

Purpose of Trip

Fishing was the activity identified by the most respondents in all seasons and types of weekdays, ranging from 47% during the summer weekends and holidays to 64% during the spring weekdays (Figure 7). Overall, 58% of boating trips were primary for the purpose of fishing. Of the non-fishing activities, pleasure boating was the activity named by the most respondents in all seasons and types of weekdays. Boaters identified swimming or water skiing on 12% and 11% of their boating trips, respectively, during the summer weekend/holiday stratum. There was considerable variation among sites, from 9% whose primary purpose was fishing at Rollins Pond Campground in the Adirondacks to 97% at the Mexico Point OPRHP access facility on Lake Ontario.

Type of Boat

Boats powered by outboard motors were the most frequently used type of craft statewide (58% of all boating trips) and on each of the size classes of water bodies. Inboard/outboards were the next most commonly used type of boat accounting for 22% of the trips. This type was used by 31% of boaters on lakes greater than 25,000 acres, but only 4% on lakes less than 1,000 acres and small rivers. Canoes were the third most frequently used type of boat, accounting for nearly 11% of all boating trips at the sites covered by this study. This type was used by 32% of boaters on lakes less than 1,000 acres and smaller rivers, and by 10% of boaters on lakes between 1,000 and 25,000 acres. Slightly more than 5% of canoeists reported using a motor on their canoe, with an average rating of 3 HP. Rowboats were used by approximately 2% of boaters statewide, but nearly 10% of boating trips on lakes less than 1,000 acres and small rivers were in rowboats. All other types of watercraft were used less than 3% of the trips.

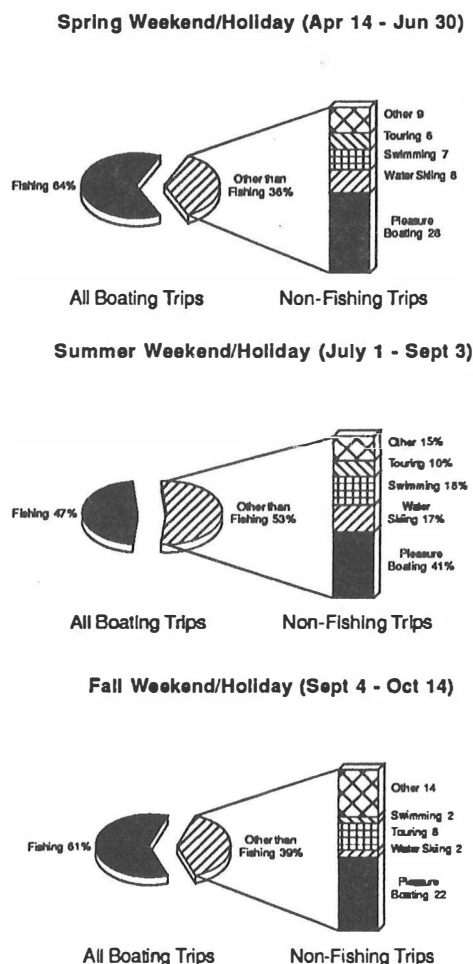


Figure 7. Primary purpose of boating trips.

The average motorized boat was 16.8 feet long and was powered with an 83.1 HP motor. As would be expected the size and horse power of the boat increased as the size of the water body increased.

Use of waterway access sites by non-boaters varied at the 48 sites covered by the census agents. Non-boater vehicle use ranged from 8% of all vehicles at Black Lake to 80% at Lake Superior. Overall this use accounted for 30% at all the sites. This was primarily caused by the multiple use of the site for other activities such as picnicking, temporary mooring, and shoreline fishing.

Site Amenities

Boaters were provided a list of 11 items and given the opportunity to indicate those items which needed to be provided (if not available) or improved. Parking capacity was most often selected (26%) by the respondents, followed closely by restrooms (25%). Docks (19%) and launch ramps (16%) were also frequently mentioned. Fish cleaning stations were noted as a desirable improvement by 14% of respondents. Since the responses logically reflected the boaters assessments of conditions at each individual site, which varied greatly in the range and condition of improvements provided, these statewide summaries are not as valuable or meaningful as individual site data. Another indication of the need for improvements is the number of sites at which more than 25% of the respondents selected a particular item (25% was selected as a threshold response rate above which an item was considered seriously deficient). From this perspective, of the 60 sites for which 40 or more completed questionnaires were returned, restrooms were the most frequently cited amenity (30 sites), followed by parking capacity (22 sites), docks (18 sites), and launch ramps (17 sites). Fish cleaning stations were mentioned rarely at inland sites, but were noted more than 25% of the time at 6 of 8 sites along the Great Lakes and St. Lawrence River.

Boater Use of Public and Private Boat Launching Sites

Boaters reported visiting the site at which they received the questionnaire an average of 13.4 to 14.4 days per year. Other public sites were visited 12.9 to 14.0 days per year, and private and commercial launch sites 5.6 to 6.0 days per year.

New York residents accounted for 88% of the boating trips, and the majority of trips (78%) originated from home. Overall, 61% of water access site users lived in the same or adjoining county as the location of the site. This indicates a preference of the boater to use a single site which is likely located within a reasonable distance from their home.

Public Site Contribution to Whole-Lake Boating Activity

Public sites contribute a relatively small proportion (28%) of all boats in use on lake during peak periods (summer weekends and holidays), and a smaller number but relatively greater proportion of boats in use during spring and fall seasons (Table 1). The aerial count data showed that the larger number of boats observed in use during the summer weekend and holiday period are attributable to the greater proportion of boats from non-public sources (riparian owners, clubs, marinas) that are being used during these times.

The Springtime frame was generally characterized by very light levels of use. Number of boats present and boat densities were low on all waters studied, probably a reflection of spring weather conditions and the absence of many seasonal camp-owners and marina-based boats. There was considerably greater use of public access sites on weekend and holiday days than weekdays (occupancy 37% vs. 12%, respectively), greater densities of boats in use 129 acres/boat vs. 467 acres/boat, respectively), and greater proportional use of all boats present (9% vs. 2%, respectively). Public boat access facilities contributed 40% of the boats observed in actual use on the water surface on weekends and holidays during the season.

The summertime frame was characterized by the highest levels of use. Numbers of boats present and boat densities reached peak observed levels on all waters. Weekends and holidays saw more than double the use of public access sites than weekdays (occupancy 89% vs. 39%, respectively), greater densities of boats in use (48 acres/boat vs. 78 acres/boat, respectively) and greater proportionate use of all boats present (11% vs. 6%, respectively). Public boat access facilities contributed 28% of the boats observed in actual use on the water surface on weekends and holidays and 21% on weekdays during the summer period. Boats originating from public access facilities contributed a smaller proportion of whole-lake use in the summer than in spring or fall because seasonal camp owner and marina-based boats fluctuated in numbers, reaching a peak in the summer, while the fixed capacity of public access facilities limit the maximum number of boats originating from this source.

Table 1. Public access site contribution to whole-lake boating activity.

	SITE OCCUPANCY	DENSITY (AC/BOAT)	ALLBOATS PRESENT	BOATS INUSE
SPRING	37% (12%)	129(467)	9%(2%)	40%
SUMMER	89%(39%)	48(78)	11%(6%)	28%
FALL	54%(8%)	110(499)	6%(6%)	52%

N = Weekend/Holiday, (N) = Weekday
Based on Aerial Survey of 21 Lakes
1990 Boat Access Survey

The fall time frame was characterized by very light levels of use, similar to spring levels. Numbers of boats present and boat densities decreased dramatically from summer numbers, as camp owners and marinas closed up for the season. Weekend and holiday days again saw considerably greater use of public access sites than weekdays (occupancy 54% vs. 8%, respectively), greater densities of boats (110 acres/boat vs. 499 acres/boat), and greater proportional use of all boats present (6% vs. 2%, respectively). Public boat access facilities contributed 52% of the boats observed in actual use on the water surface on weekends and holidays, and 30% on weekdays during this period.

Boaters Perception of Need to Expand Public Access

Survey respondents provided a great deal of information on waters that they felt needed new or improved public access. More than 48% of the completed questionnaires nominated one or more waters needing additional public access, resulting in a total of nearly 9500 nominations for 459 water bodies. The top 50 water bodies (Table 2) tended to be the largest waters with the most existing public access development.

Conclusion

Results of the 1990 statewide boating facilities use survey provide the first overall assessment of the public boating access program. The goals and objectives of the study were fully met. Given the type and scope of facilities surveyed, and the fact that all the sites studied combined represented 37% of the total installed public boating capacity in the state, the results constitute an excellent representation of the overall picture statewide.

The existing network of waterway access sites maintained by DEC and OPRHP is popular with boaters for fishing and general recreational access. Overall, fishing is the single most important boating activity supported by these sites, but a great deal of seasonal and site-by-site variation was observed in the relative importance of various boating activities. Local residents were the predominant users of sites, but many sites attracted visitors from elsewhere in the state as well as 27 other

states and 2 foreign countries. Boaters contacted at these public launch sites reported using public launch facilities an average of 26-28 days per year and using private or commercial launch sites approximately 6 days per year. While the sites are intended to support day-use boating, many riparian owners reported using the public site to launch and retrieve their boats for the season.

Table 2. Top 50 waters needing new or expanded access as identified by boater.

1 Lake Ontario	26 Honeoye Lake
2 Lake George	27 Caroga Lake
3 Lake Erie	28 Round Lake
4 Otsego Lake	29 Erie Barge Canal
5 Hudson River	30 Raquette Lake
6 Oneida Lake	31 Chazy Lake
7 Great Sacandaga	32 Conesus Lake
8 Marine District	33 Chautauqua Lake
9 Delaware River	34 Genesee River
10 Mohawk River	35 Sacandaga Lake
11 St. Lawrence River	36 Lake Clear
12 Lake Champlain	37 Red Lake
13 Skaneateles Lake	38 Black River
14 Seneca Lake	39 Raquette River
15 Keuka Lake	40 Brant Lake
16 Saratoga Lake	41 Eagle Lake
17 Cayuga Lake	42 Peconic River
18 Otisco Lake	43 Silver Lake (Wyoming Co.)
19 Blue Mountain Lake	44 Lake Pleasant
20 Owasco Lake	45 White Lake
21 Ballston Lake	46 Black Lake
22 Cazenovia Lake	47 Swinging Bridge Reservoir
23 Niagara River	48 Muskellunge Lake
24 Canandaigua Lake	49 Lake Bonaparte
25 Moon Lake	50 Salmon River

The results of the survey will provide valuable information to help guide the rehabilitation, improvement and expansion of public waterway access sites in New York State. The information will be utilized in the development and updating of statewide, regional and site specific plans such as the Statewide Comprehensive Outdoor Recreation Plan, the Great Lakes 25-Year Plan and the Strategic Plan for Moderation of the Department of Environmental Conservation Waterway Access Facilities in New York State.

Literature Cited

Department of Environmental Conservation. 1992. Draft Great Lakes 25-Year Plan. NYSDEC, Albany, NY.

Gann, Michael C. 1987. (Draft) Strategic Plan for Modernization of Department of Environmental Conservation Waterway Access Facilities in New York State. NYSDEC Division of Fish and Wildlife and Division of Operations. Albany, NY: NYSDEC. 26p.

Major, John T.; Gann, Michael C.; Reinhardt, Robert W.; Bartlett, Wesley; Solomon, Greg. 1992. 1990 Statewide survey of boating use at public waterway access sites in New York State. Albany, NY: NYS Department of Environmental Conservation, and the Office of Parks, Recreation and Historic Preservation. 49 p.

Office of Parks, Recreation and Historic Preservation. 1989. Statewide Comprehensive Outdoor Recreation Plan and Generic Environmental Impact Statement. Albany, NY: OPRHP. 288 p.

MULTIPLE VERSUS SINGULAR PATTERNS OF OUTDOOR RECREATION USE

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The purpose of this study was to determine whether there were differences among various groups in the number of activities pursued during their visit to parks. Data were drawn from three in-park surveys of users of Cleveland Metroparks, a regional park district in Northeast Ohio. It was found that some groups of users pursued a multiple style of use, while others pursued a more singular style of use.

Introduction

In the last 15 years, a great deal of research has focused on the kinds of experiences recreationists seek while visiting outdoor recreation areas. Numerous studies have documented that people seek different combinations of experiences (Driver, 1976; Knopf, 1983). The kinds of outcome sought are related to prior experience with the resource, the type of activity pursued, prior involvement in the activity, the social group accompanying the recreationist, and the extent to which specific activities and experiences are dependent on environmental conditions present (Bryan, 1977; Schreyer and Knopf, 1984).

Most studies tend to assume that the experiences people pursue occur within the context of a single activity (e.g., camping, hiking, boating, etc.). In actuality, people may pursue many activities when they visit recreation areas (Field, 1976). Yet current research generally ignores the range of activities that people pursue while visiting such places. Consequently, little is known about the number of activities people participate in while visiting outdoor recreation areas. The purpose of this study was to determine whether distinct groups differ in the number of activities they participate in while visiting parks administered by Cleveland Metroparks, a regional park district in Northeast Ohio.

Study Area Characteristics

Cleveland Metroparks consists of over 19,000 acres of land in 12 different reservations (parks). Facilities and features operated by the Park District include hiking, bridge, and all purpose trails, golf courses, swimming beaches, nature centers, interpretive programs, picnic areas, play fields, wildlife sanctuaries, and boating and fishing areas. Overnight camping is provided on a very limited basis. Therefore, day-use is the primary mode by which people use Cleveland Metroparks.

The Study

Trained interviewers conducted on-site interviews during three-week intervals in the spring (N=1231), summer (N=2558), and fall (N=1084) of 1991. Interviews were conducted in parks in approximate proportion to the rate of attendance. Interviews were conducted on random days on both weekdays and weekends. Groups and visitors were interviewed using a random selection process.

Respondents were shown a card with 24 activities and asked simply to name those activities they planned to participate in while visiting. The dependent variable for this study was the total number of activities respondents said they planned to pursue. While three of the activities are actually experiences (relaxation, solitude, and to be alone with someone special), they were treated here as activities. Two activities (picnicking and group picnicking) were merged and treated as one activity.

Independent variables for this study included season of the year, park visited, patterns of use (frequency of visit, length of visit, travel time to park, number of others in party, number of children in party), demographic characteristics of visitors (gender, age, race, and level of income), and the type of activities pursued during one's visit.

Results

On the average, visitors participated in 2.29 activities during their visit. The range was 20. More than a third said they would participate in only one activity. One-quarter said they planned to participate in two activities. Less than 20 percent said they would participate in three activities. Less than one in ten said they planned to participate in four activities. Provided below are results of one-way analysis of variance for the relationships of different use and demographic variables to the number of activities people said they would participate in during their visit.

Season of the Year

Table 1 shows that the number of activities people engage in while visiting a park was significantly related to season of the year. Summer visitors pursued the most activities (Mean = 2.48), followed by spring visitors, (Mean = 2.27), with fall visitors engaging in the fewest activities (Mean = 2.06).

Table 1. Relationship of season of the year to number of activities pursued during visit.

Season	N	Mean Number of Activities
Spring	1232	2.27 _b
Summer	2558	2.48 _c
Fall	1084	2.06 _a

F = 29.19, df = 2, 4871, p ≤ .0001

Means with different subscripts are significantly different at .05.

Park Visited

The number of activities people participate was also related to the park visited (Table 2). Visitors to Mill Stream Run reported participating in significantly fewer activities (Mean = 1.80) than visitors to most other parks. In contrast, visitors to Hinckley participated in significantly more activities (Mean = 2.66) than visitors to four other parks. Facilities and opportunities available at these parks differ markedly. Primary opportunities available at Mill Stream Run include hiking, bicycling, running, and picnicking. While Hinckley offers each of these opportunities, swimming and boating are also available.

Table 2. Relationship of park visited to number of activities pursued during visit.

Park	N	Mean Number of Activities
Bedford	404	2.20 _{ab}
Big Creek	332	2.61 _{ac}
Bradley Woods	392	2.26 _{abc}
Brecksville	370	2.41 _{ac}
Euclid Creek	437	2.32 _{ac}
Garfield Park	338	2.12 _{ab}
Hinckley	458	2.66 _c
Huntington	414	2.43 _{ac}
Mill Stream Run	369	1.80 _b
North Chagrin	406	2.59 _{ac}
Rocky River	554	2.32 _{ac}
South Chagrin	400	2.19 _{ab}

F = 9.68, df = 11, 4862, p ≤ .0001

Means with different subscripts are significantly different at .05.

Gender

The number of activities pursued was significantly related to gender (Table 3), with females participating in more activities (Mean = 2.54) than males (Mean = 2.16).

Table 3. Relationship of gender to number of activities pursued during visit.

Gender	N	Mean Number of Activities
Females	2222	2.54 ^b
Males	2652	2.16 ^a

$F = 77.16$, $df = 1$, 4872, $p \leq .0001$

Means with different subscripts are significantly different at .05.

Age

Age was found to be negatively related to the number of activities pursued (Table 4). In general, younger visitors reported participating in more activities than their older counterparts.

Table 4. Relationship of age to number of activities pursued during visit.

Age	N	Mean Number of Activities
16-24	554	2.39 ^{ed}
25-44	2309	2.53 ^e
45-54	646	2.26 ^{bcd}
55-64	592	2.05 ^{ab}
65-74	508	1.94 ^a
75 +	103	1.82 ^{ac}

$F = 21.71$, $df = 5$, 4706, $p \leq .0001$

Means with different subscripts are significantly different at .05.

Race

There was no significant relationship between race/ethnicity and number of activities pursued (Table 5).

Table 5. Relationship of race to number of activities pursued during visit.

Race	N	Mean Number of Activities
Black	447	2.38 ^a
White	4324	2.32 ^a
Other	73	2.55 ^a

$F = 1.05$, $df = 2$, 4871, $p \leq .3502$

Means with different subscripts are significantly different at .05.

Income

As evident from Table 6, there was no significant differences among income groups in the number of activities pursued.

Table 6. Relationship of family income to number of activities pursued during visit.

Family Income	N	Mean Number of Activities
Less than \$15,000	565	2.36 ^a
\$15,000-\$24,999	826	2.30 ^a
\$25,000-\$34,999	852	2.40 ^a
\$35,000 +	1910	2.37 ^a

$F = .65$, $df = 3$, 4169, $p \leq .5842$

Means with different subscripts are significantly different at .05.

Frequency of Visitation

As evident from Table 7, those who visit more than once a month participated in significantly fewer activities (Mean = 2.15) than those who visit about once a month (Mean = 2.46) or those who visit less than once a month (Mean = 2.52).

Table 7. Relationship of frequency of visitation to number of activities pursued during visit.

Frequency of Visitation	N	Mean Number of Activities
More than once a month	1350	2.52 ^b
Once a month	649	2.46 ^b
Less than once a month	2311	2.15 ^a

$F = 29.84$, $df = 2$, 4307, $p \leq .0001$

Means with different subscripts are significantly different at .05.

Travel Time

Number of activities pursued was positively related to the amount of time it takes to get to the park (Table 8). Visitors who said they live within 15 minutes of the park participated in the fewest activities (Mean = 2.19), followed by those who live within 15-30 minutes (Mean = 2.48), with those who live more than 30 minutes from the park participating in the most activities (Mean = 2.72).

Table 8. Relationship of travel time to reservation to number of activities pursued during visit.

Travel Time	N	Mean Number of Activities
Less than 15 minutes	2799	2.19 ^a
15-30 minutes	1486	2.48 ^b
More than 30 minutes	430	2.72 ^c

$F = 33.29$, $df = 2$, 4712, $p \leq .0001$

Means with different subscripts are significantly different at .05.

Duration of Stay

A strong, positive relationship was evident between duration of stay and number of activities pursued during one's visit (Table 9). People who stayed for a short duration (less than 1 hour) participated in relatively few activities (Mean = 1.88). As duration of stay increased, so does the number of activities pursued.

Table 9. Relationship of length of stay to number of activities pursued during visit.

Length of Stay	N	Mean Number of Activities
Less than 1 hour	1622	1.88 a
1-2 hours	1797	2.39 b
2-3 hours	619	2.54 b
4 hours or more	704	3.11 c

$F = 121.20$, $df = 3$, 4778, $p \leq .0001$

Means with different subscripts are significantly different at .05.

Number of Others in Group

While number of activities pursued was positively related to the number of others in group, this relationship was not significant at .05 (Table 10).

Table 10. Relationship of number of others in group to number of activities pursued during visit.

Others in Group	N	Mean Number of Activities
None	520	2.27 a
1-3	3388	2.32 a
4 or more	957	2.43 a

$F = 2.46$, $df = 2$, 4862, $p \leq .0858$

Means with different subscripts are significantly different at .05.

Number of Children in Group

The number of activities people participate in at the park was strongly and positively related to the number of children they bring along to the park (Table 11). Those who visited with four or more children participated, on the average, of over three activities. The mean score for those who visited with one to three children was 2.79. The mean score for those visiting without children was 2.06.

Table 11. Relationship of number of children in group to number of activities pursued during visit.

Children in Group	N	Mean Number of Activities
None	3529	2.06 a
1-3	1112	2.79 b
4 or more	315	3.09 c

$F = 145.98$, $df = 2.4953$, $p \leq .0001$

Means with different subscripts are significantly different at .05.

Type of Activities Pursued

As evident from Figure 1 (see next page), the total number of activities pursued differed for participants and non-participants of different activities. For almost all activities, participants were significantly more likely than non-participants to engage in a greater number of other activities. This pattern was strongest for two activities: photography (Mean = 3.82) and league sports (Mean = 3.69). The same pattern was evident for a number of activities, including being alone with someone special (intimacy), visiting a nature center, and pleasure

driving, informal sports, horseback riding, and waxing cars, fitness (par) course, playing with children, and solitude, observing nature, swimming, picnicking, and relaxation.

However, pursuit of four activities - golfing, fishing, bicycling, jogging - meant a lower level of participation in other activities. Golfers reported participating in fewer activities than participants in all other activities (Mean = .89).

People who came to walk/hike or walk their dog did not differ significantly from non-participants in the number of other activities pursued.

Discussion

These data suggest that park visitors pursue either a singular style of use or a multiple style of use. In its truest form, a singular style of use is characterized by the pursuit of a single activity during one's visit. As its name suggests, a multiple style of use is characterized by the pursuit of multiple activities during one's visit.

In this study, a singular style of use was most characteristic of fall visitors; parks lacking distinguishing facilities or opportunities; males; older visitors; frequent visitors; visitors who live within close proximity of the park; visitors who stay for a short period of time; visitors who are not accompanied by small children; and golfers, runners/joggers, bicyclists, and, to a lesser extent, walkers/hikers.

In contrast, a multiple style of use was evident among summer visitors; parks offering distinguishing facilities or opportunities (e.g., swimming facilities); females; younger visitors; infrequent visitors; visitors who live relatively far away from the park; visitors who stay for a long period of time; visitors who are accompanied by small children; and picnickers, swimmers, visitors of nature centers, visitors seeking relaxation, solitude and intimacy, and visitors engaging in photography, league and informal sports, and children's games.

An understanding of multiple and singular styles of outdoor recreation use has implications for the marketing and planning of outdoor recreation services. In terms of marketing, it is helpful to know what groups are most likely to be attracted to one style of another. Information may be targeted to these groups that explain what kinds of opportunities are available and where. From a planning point of view, potential conflict may be managed by locating trails and other facilities that take into consideration different styles of use. For example, it makes no sense to provide opportunities for a singular style of use near existing facilities where a multiple style of use is dominant.

Literature Cited

- Bryan, H. 1977. Leisure value systems and recreational specialization: The case of trout fishermen. *Journal of Leisure Research*. 9: 174-187.
- Driver, B. L. 1976. Toward a better understanding of the social benefits of outdoor recreation participation. In: *Proceedings of the Southern States Recreation Research Applications Workshop*; 1975 September 15-18, Asheville, NC. Asheville, NC: General Technical Report SE-9, United States Department of Agriculture, Forest Service, Southeastern Forest Experiment Station: 163-189.
- Field, D. R. 1976. The social organization of recreation places. In Cheek, D. R., et al. (eds.), *Leisure and Recreation Places*. Ann Arbor: Ann Arbor Science Publishers.
- Knopf, R. C. 1983. Recreational needs and behavior in natural settings. In Altman, I.; and Wohlwill, J. (eds.), *Behavior in the Natural Environment*. New York: Penum: 205-240.
- Schreyer, R.I.; Knopf, R. 1984. The dynamics of change in outdoor recreation environments - some equity issues. *Journal of Park and Recreation Administration*. 2: 9-19.

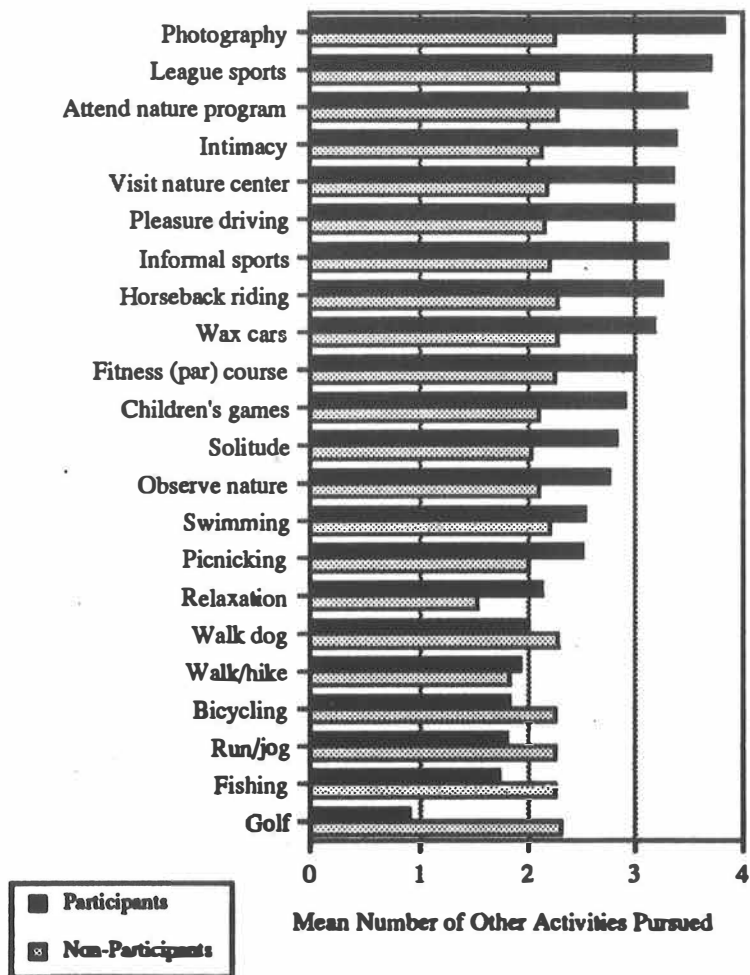


Figure 1. Relationship of activity to number of other activities pursued during visit.

PUBLIC INVOLVEMENT IN DEVELOPING PARK AND OPEN SPACE RECREATION MANAGEMENT STRATEGIES

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In a time of budget cuts, increased scrutiny and accountability of public agencies by the general public, increasing diversity of needs and demands by service users, and increasing grassroots involvement by some segments of the public, it is becoming increasingly important that public input and involvement be solicited during planning and policy development phases. This is true for state park and forest system managing agencies too. A survey of western Massachusetts residents was conducted to determine their state park use patterns, their perceptions of budget cut-related service changes, their perceptions of and current involvement with public meetings, and their interest in participating in an alternative form of public workshop dealing with state park management issues.

Introduction and Significance of Study

The Commonwealth of Massachusetts has a patchwork pattern of public open space and park lands providing watershed protection, wildlife habitat, sports fields, skiing/hiking trails, campgrounds and a variety of other recreation opportunities. They are managed by a complex variety of agencies, including local conservation commissions and recreation departments, private non-profit land trusts, the Metropolitan District Commission, the Department of Environmental Management, and others. Some trails and access sites cross private lands, sometimes with legal easements, sometimes simply as a result of traditional use.

Rapid growth in the Connecticut River Valley (Yaro et al. 1988), a three-county region of Massachusetts located along the Connecticut River corridor and I-91, has resulted in increased demands on and use of the area's land, including its park and recreation resources. With this growth have come new residents, often with different needs, lifestyles and expectations than those of long-time residents, thus further complicating the demands on the area's resources. Accompanying increased development and changes in land use have been physical and aesthetic impacts on the natural environment. The declining economic base of the region has led to budget cuts which have resulted in park and recreation facility, service and site maintenance reductions, thereby exacerbating the negative impacts and increasing the potential for recreation conflicts and changes in park use patterns by residents and other visitors. Efforts to promote economic recovery and development, while simultaneously preserving the New England character and providing outdoor recreation opportunities, often create controversy. Additionally, the variety of regulations governing use of park and recreation lands can be confusing to the general public. As budget cuts necessitate closing of many areas, and force reduced maintenance, staffing and patrolling of other areas, this confusion can be increased. Former uses are restricted,

creating user dissatisfaction. Users desiring different experiences, now displaced to remaining, and often overcrowded park sites, come in contact with each other, frequently resulting in conflict. Reduced and deferred maintenance, as well as reduced surveillance, can lead to increased vandalism and overuse damage, and to reduced safety (or at the least, reduced perceived safety) for visitors.

During the past two years, particularly during the spring and summer peak seasons, there has been public outcry against the budget-related closing of local recreation areas. It is assumed this dissatisfaction will increase as more closings and operations reductions result from spiraling budget cuts. It also is assumed that, in the New England tradition, residents will want to voice their opinions and make suggestions for the management of their park, open space, and other recreation lands. It is imperative that residents' opinions and suggestions for management of their park and open space lands are heard and incorporated into the decision making process. Depending on how it is conducted, the public input process either can incite more controversy and antagonism or can provide opportunities for compromise, problem solving and constituency building.

Historical Use of Public Process

Since the 1620s, town meetings have been an integral part of town governance in New England. This is particularly true for towns in the western part of the state. Local town meetings have provided a direct avenue for public input into town management, the budgeting process, and policy-making decisions.

More recently, and on the national level, with the enactment of the National Environmental Policy Act (NEPA) in late 1969, another channel for public input was mandated. Among the purposes of the act are to "encourage productive and enjoyable harmony between man and his environment [and] to promote efforts which will eliminate damage to the environment and biosphere and stimulate health and welfare of man" (Orloff and Brooks 1980, p. 16). As part of the assessment and planning process of NEPA, Environmental Impact Statements (EISs) are to be written for any major federal actions that may significantly affect the quality of the human environment (natural and social). The assessment process mandated for developing an EIS is to include opportunities for public comment and response to proposed actions. In fact, "both the Council of Environmental Quality (CEQ) and the courts have interpreted the Act as imposing a fairly strict duty on agencies to respond to comments by private citizens" (Orloff and Brooks 1980, p. 425). These comments should be carefully considered and evaluated in the decision process. To ensure careful consideration, draft statements are to be circulated before the first major point of decision so responses are used to make informed decisions rather than to support decisions already made. Section 1500.7 of NEPA stipulates that draft statements should be made available to the public at least 15 days prior to public hearings, then at least 45 days allowed for public comment. More specific guidelines for public involvement are provided in Section 1506.6 of the CEQ Regulations, Implementing 102(2) of NEPA, November 29, 1978.

Following the national example, state and local governments have enacted their own versions of environmental impact assessment and open space planning legislation. State Comprehensive Outdoor Recreation Plans (SCORPs) and local open space master plan processes usually require or recommend that some form of public comment be included in the planning process (Smith et al. 1988; Division of Conservation Services 1982). A major concern, however, is that although the "letter of the law" may be followed in providing public comment opportunities, often the "spirit of the law" is not achieved. Additionally, EISs are conducted prior to development of new areas rather than in situations of site closings and reduced maintenance or operating levels. Such non-pre-development

situations have no legal mandate or process for public input. Lack of public input may result in loss of pertinent information, creation of antagonism among constituents, building of barriers between agencies and the public, creation of "battle lines" between various special interest groups, and loss of support and public trust for managing agencies.

Numerous guidebooks and articles provide suggestions for conducting effective public meetings and mediating public controversy (Burns 1981; Dunsing 1978; Howard and Crompton 1980; Ibrahim 1987; Mater 1984; Vander Stoep 1989; Willey and Boynton 1977). Literature in communications and social psychology identifies social facilitation, group behavior, silent language and other communications variables that can either promote or create barriers against effective public communications (Deaux and Wrightsman 1984; Fabun 1968; Fazio and Gilbert 1986). Recently a new computer software program, EZ-Impact, has been developed (Bonnicksen 1990) for use in a workshop format with representatives of multiple special interest groups to develop effective management strategies. The program can be used to assess alternative futures and evaluate strategies for achieving desired goals within current constraints, assess environmental impacts, assess risks involved with uncertain future events, and build consensus on acceptable action plans for resolving conflict.

Purposes and Significance of Study

The purposes of this study are to:

1. identify park, recreation and natural resource use issues of concern to residents of the Connecticut River Valley (three counties) in Massachusetts, particularly relative to provision of other government-funded services in an environment of recent and projected budget cuts;
2. assess Connecticut River Valley residents' use patterns of state parks and forests;
3. identify changes in resident use patterns of state parks and forests as a result of recent budget cuts and reduced services;
4. assess resident participation patterns in public meetings or other public input processes dealing with issues affecting recreation and natural resource site management;
5. identify barriers to resident participation in public process related to issues affecting recreation and natural resource site management;
6. identify factors affecting perceptions of effectiveness of public meeting participation;
7. solicit resident participation in an alternative format public process workshop;
8. compare cultural (Anglo, Hispanic, Black) participation patterns as well as changes in participation patterns before and after major budget cuts over the past year;
9. compare cultural (Anglo, Hispanic, Black) differences in perceptions of and participation in public process.

Results of this study have both theoretical and applied implications. Theoretically, they can help identify which social facilitation, group behavior and communications variables have the greatest perceived influence on respondents' public process participation levels and their evaluation of public meeting effectiveness when dealing with controversial public land management issues. From an applied perspective, the results can be used to plan and implement EZ-Impact-facilitated workshops (computer-aided workshops which integrate and assess interactions between numerous variables), in this case with the Department of Environmental Management (DEM). Such workshops can involve resource managers in using alternative public input processes which work toward consensus rather than conflict.

Effective public involvement strategies can increase public participation, increase the public's awareness of the complexity of resource management issues, and improve relations among various special interest groups as well as between them and managing agencies. Additional benefits include:

- reduction of residents' (and park users') antagonism toward and legal action against management decisions;
- improved consideration of multiple issues during the decision-making process;
- increased public commitment to and support for final action plans; and
- improved public image of land management agencies.

This study used a mail survey to identify park, recreation and open space issues of concern to Massachusetts residents. Survey results are to be used ultimately to develop and conduct a pilot workshop with DEM staff and interested publics, using the EZ-Impact software package with the goals of achieving at least some of the benefits described above.

Methods

This study involves a mail questionnaire sent to a stratified random sample of 1,609 Connecticut River Valley residents living in communities in Franklin, Hampshire and Hampden counties. Communities were assigned to one of four size categories: 1) small town/rural (population < 15,000), 2) large town (population between 15,000 and 37,999), 3) suburban (population between 38,000 and 65,000), and 4) urban (Springfield and West Springfield, population approximately 185,000). Though population size was a primary determinant in categorizing towns, other variables and characteristics also were considered in determining the nature of the environment. Other factors considered included crime rates, number of rental housing units relative to single-family-owned units, multi-cultural versus homogenous makeup of the community, median income and percent of families below the poverty line, and "general town character" assessment by long-time residents.

A systematic random sample, with one quarter of the total drawn from each size category, was drawn from NYNEX directories of the selected communities. Categories 1, 2 and 3 were selected by NYNEX directory-based data base by Cole Publications, a commercial mailing list firm having data bases current to within the past year. Because this company has dropped the urban zip codes from its data base, the 400 Springfield/West Springfield (category 4-urban) sampling units were hand-selected (systematic random sample) from a NYNEX directory.

A mail survey was used to solicit park-related responses from residents. The survey contained both closed and open ended questions regarding state park use patterns, changes in park use as a result of budget cuts, perceptions about changes in provision of services and maintenance as a result of budget cuts, patterns in public participation processes (particularly related to park and recreation issues), and demographic information. Knowing that a large Hispanic population resides in the category 3 and 4 communities, and wanting good representation from the Hispanic community as well as from the elderly and infirm populations, a separate note (printed on blue paper) was inserted in the cover letter which provided instructions for obtaining either Spanish or large print versions of the survey for those needing them.

The survey was implemented using a modified version of Dillman's (1978) Total Design Method (TDM). Reminder postcards and a third mailing (reminder letter plus duplicate copy of survey instrument) were sent to non-respondents. Due to budget constraints, no certified letters were mailed.

The closed question responses were analyzed using the SYSTAT statistical package. Open ended responses were content analyzed and coded (Labaw 1980), then entered with responses to closed-ended questions into a database for statistical analysis. The intent is to use the survey results as a basis for developing a pilot project to implement a non-traditional public input process, using EZ-Impact software, to work toward consensus on complex park/open space management issues. Based on systems theory, this software package allows participants to use their varied and collective knowledge and experiences to anticipate and evaluate

consequences of different management alternatives. Participants will include those survey respondents who indicated their interest on a separate postcard which was included with the survey mailing. Major benefits of the process include fostering of communication between diverse groups and provision of a detailed picture of relationships involved in a complex issue.

Results

Of 1,609 surveys originally mailed, 144 (9%) were returned as undeliverable, either due to incomplete mailing address, lack of forwarding address or death. Of the deliverable surveys (total of 1,465), 452 (31%) were returned. Of these, 362 (85%) were usable. The other 15% returned their surveys not completed either because their health precluded their use of parks, death, disinterest in the survey, or because they had moved out of the area (yet still had received the survey). Fifty-seven people (15.7% of those who returned usable surveys) returned postcards indicating their interest in participating in a public workshop on state park management.

One large-print survey was requested and sent, but was not returned. No Spanish versions of the survey were requested, though one telephone inquiry by a Spanish sur name respondent was received.

While the purposes of the entire study are several, the results discussed in this paper will focus on the descriptive information related to respondent park use patterns and their involvement in public process. This information is derived primarily from the close-ended questions in the survey. Open-ended questions are still undergoing analysis. Results of the follow-up workshop will be the focus of a future paper. One other note of caution: typically about 35-39% of the respondents did not answer any given question, though the non-respondents were not consistently the same people.

Respondent Demographic Characteristics

Forty percent of the survey respondents were female, while 55% were male (the rest did not respond to the item). Nearly half (48%) were between the ages of 25 and 44, with 15% aged 45-54, 11% aged 55-64, and 18% aged 65 or older. In general, respondents tended to be white, with 64% self-identifying as some form of Anglo (27% did not answer the question and another 4.4% identified themselves simply as American). Respondents tended to be highly educated, with nearly 38% having at least a bachelors degree and almost 26% having one or more years of graduate study. Another 27% had completed their high school education. Only about 5% had less than a high school education.

Sixty percent of the respondents were employed full time, another 20% were retired or semi-retired. The rest (total of 16%) were either unemployed, employed part time, or were students (4-5% did not answer the question). Annual salaries for 45% of the respondents ranged between \$20,000 and \$50,000. Almost 15% earned less than \$20,000 and 23% earned more than \$50,000 annually (17.5% did not respond to this item).

Approximately 78% of the respondents have lived in western Massachusetts 10 years or more, with 57% of these having lived in the area all or almost all of their lives. Though 25% of the surveys were mailed to residents of each of the four town size/ type categories, 34% of the returned usable surveys were from residents of small towns. Twenty-four percent were from suburban areas while almost 21% were from each of the categories "large town" and "city."

State Park/Forest Use Patterns

The first major section of the survey dealt with respondents' use of state parks and forests. Of those responding to the questionnaire, 62% indicated that they had used state parks or forests within the year preceding the survey while only 6-8% used either the DEM skating rinks or swimming pools.

Because the focus of this survey was users of state parks and forests, surveys of respondents who indicated use of ONLY skating rinks and/or swimming pools were not included in the analysis.

Respondents used state parks and forests a variable number of times throughout the year and with extremely variable seasonal use patterns; however, the highest percent (22%) used them 3-5 times per year. Infrequent users (one to two times during the year) accounted for 11.5%; 12% used them six to ten times during the year; and almost 16% used them more than 10 times during the year. (Thirty-eight percent did not answer the question.) While 26% of respondents used parks primarily during summer months, almost 14% indicated consistent use frequencies across all four seasons. Another 14% indicated a variety of two- or three-season use patterns (10 different season combinations). Only 10% used the parks primarily during one non-summer season.

Of the 44 activities listed as participated in by respondents (36 of which were listed on the questionnaire, the others were added in "other" spaces), the following were identified most frequently: walking, picnicking, sightseeing, swimming in a pond or lake, relaxing or hanging out, day hiking, viewing wildlife, and driving for pleasure. See Table 1 for a more complete list of activity participation (except for activities participated in by less than 5% of the population: playing sports, riding bikes on trails, backpacking, playing cards, attending nature/history talks, snowmobiling, motorboating, skateboarding, riding horses, sailing, downhill skiing, windsurfing, jet skiing, informal gambling, rock hunting and geology, participating in special events/training/conferences, running, photography, ice skating, feeding ducks, riding ATVs).

Table 1. Activities participated in during visits to Massachusetts state parks and forests.

Activity	Percent
walking	44.4%
picnicking	34.7%
sightseeing	31.3%
swimming (ponds or lakes)	24.3%
relaxing/hanging out	24.3%
day hiking	23.8%
viewing wildlife	22.2%
driving for pleasure	20.6%
visiting with friends/family	18.5%
taking self-guided nature walks	17.0%
fishing	15.7%
taking children to playground	13.6%
camping	13.0%
birdwatching	12.5%
playing catch	9.1%
cross-country skiing	8.4%
reading	8.4%
hunting	7.8%
canoeing/kayaking	7.0%
listening to music	6.8%
riding bikes on roads	6.3%
swimming (pool)	6.0%

Personal automobiles were the preferred mode of transportation to state parks (55%), while other modes (walking, bicycling, motorcycling, using public transportation, snowmobiling, horseback riding, using other motorized vehicles) received extremely minimal use. (Again, 37% did not answer the question.)

Use of parks tends not to be by nearby (within walking distance) residents. Approximately 10% travel one to five miles to get to a park or forest, 17% travel six to ten miles,

15% travel 11-20 miles, and 12% travel more than 20 miles (37% did not answer the question). Day use rather than overnight camping is the most prevalent. About 20% stay at a park for only a couple of hours, 26% stay about 1/2 day, and 10% stay all day. Only about 5% indicated an overnight stay of one or more nights. (37% did not answer the question.)

Though there is some organized group (e.g., community, church, youth) and solo use of parks and forests, the great majority of people visit with some combination of family and friends (11% of these visit as couples and 18% clearly indicate inclusion of children, though other response categories probably also include children).

Changes in Services Noticed as a Result of Budget Cuts

While the above results provide some indication of park use, we wanted to know if park users had noticed any changes or reductions in park services and, more importantly, if they had changed their park use patterns as a result. The second section of the survey addressed this issue. Twenty-five percent of respondents said they had noticed budget cut-related changes in service (40% did not answer the question), but fewer indicated these changes actually changed their personal park use patterns (9% changed when they visited parks; 8% changed the frequency of their visits; 11% changed the actual sites visited; 8% changed their activities while visiting a park or forest). Further analysis of why and how park users altered their visits, and impacts of service changes on users' enjoyment and safety while visiting parks will be included in analysis of open-ended questions, which is not yet complete.

Types of Services/Facilities to Fund

Almost invariably, when an agency is faced with budget cuts, managers must make decisions about which services to keep and which to reduce or cut (in lieu of alternative funding or service provision strategies). In the third section of the survey, respondents were asked to indicate, for a variety of park services and facilities, which they believed to be very important to fund, nice to have provided, which did not particularly matter to them one way or another, and those which they believed should NOT be funded. Of the services and facilities visitors believed should be funded, those listed in Table 2 were rated as "very important" or "nice to have" by more than 55% of the respondents.

Table 2. Services and facilities rated as "Very Important" or "Nice to Have" by more than 55% of survey respondents.

Service/Facility	Percent
trash collection	87% *
hiking/walking trails	85% *
directional signs	84% *
park info/maps	83% *
picnic tables	83%
ranger presence	80% *
flush toilets	79%
wheelchair access	78% *
law enforcement	78% *
lifeguards	69%
bicycle trails	68%
tent camping facilities	68%
cross country ski trails	64%
swimming facilities	61%
interpretive programs	58%

* indicates more than 45% marked this service/facility as "very important"

When respondents were asked further to identify what they believed to be the 1st, 2nd, and 3rd most important services and facilities to fund, the following were identified consistently by the largest percent of respondents, though

answers overall were extremely varied: provision and maintenance of hiking/walking/generic trails; law enforcement; ranger presence; restroom facilities (with many indicating a clear preference for flush toilets, not pit toilets); and trash collection.

Services and facilities indicated as those that DEM should not fund included motorcycle trails (55%), snowmobile trails (43%), and campgrounds for recreational vehicles (RVs) (15%).

Given a choice between having a few fully operational parks or many limited service parks when budgets cannot maintain full operations of all parks and forests, respondents overwhelmingly preferred the opening and maintenance of many limited service parks (64%) to the full operation of a limited number of parks (20%). Preliminary analysis of related open-ended questions appears to indicate the reason for preferring many parks to be open, even with limited services, is to provide parks which are relatively near to users across the state. Basic access to parks appears to be more important than provision of full services.

Respondents' Participation in Public Process

The fourth, and most central, section of the survey dealt with residents' perceptions of and participation in a variety of public process/public input activities, primarily focused on their involvement in park-related issues. Thirty percent of the respondents had attended some type of public meeting dealing with a single issue (as differentiated from traditional town meetings still conducted in many smaller New England communities).

Of a variety of issue-based actions listed (writing letters to the editor, voting based on an issue, participating in service projects, working as a volunteer, contributing money, being a Friends Group member, participating in single-issue public meetings), the most frequently engaged in behaviors related to parks and recreation issues were voting based partly on park and recreation issues (31%), contributing money to support some aspect of park management (25%), participating in park-related service projects (23%), and being a member of a park Friends Group (14%). Only about 9% had ever attended a single-issue public meeting related to state parks.

Attitudes about public meetings were varied, with respondents being about equally split between positive attitudes (public meetings providing an avenue for expressing personal needs/concerns, providing opportunities to make a difference, and being a way to learn about issues) and negative comments (an outlet for venting frustration, a waste of time because decisions are already made, a battlefield for special interest groups). The most frequent responses were that public meetings are "the best way to learn about issues" (22%) and "a waste of time because officials already have made decisions" (20%). Hand written comments, while infrequent but insightful, indicated that "there are more important things in life [than public meetings dealing with parks]," people are "unsure about how to comment during public meetings," people "care [about the issues] but don't want to get involved," people simply "don't get involved," some felt that "this type of polling [the survey] was more effective," and "public meetings vary." Other handwritten comments indicated that some people are unaware of meetings, do not know they are "invited," and they don't know how to comment or get involved.

When asked about the likelihood of attending a public meeting some time in the future, four percent said "extremely likely" while 51% said "possible" and 34% said "not at all likely."

For those who might attend, their participation would be based primarily on the specific issue (37%), the scheduled time (40%), and the convenience of the place (35%), but also would be affected by the specific park(s) involved (29%). (This may indicate that people may be more likely to become involved with a park relevant to their use.) The meeting length and a variety of other factors were much less important in affecting their decision to attend.

A "one evening" workshop format was the most preferred meeting structure (41% indicating "yes" or "maybe" they would attend such a follow-up workshop) while quite a few were willing to spend as much as 1/2 day (27%) or 2-3 evenings (24%) discussing an issue if they believed it was relevant or important.

When asked who, in addition to survey respondents, should attend a public workshop dealing with state park management issues, respondents generally were in agreement (more than 50% indicating "yes") that the following groups of people (or representatives) should participate:

park users	73%
DEM park rangers	65%
DEM administrators	59%
government representatives	52%
environmental experts	52%
special interest group representatives	52%

They were less enthusiastic about participation by sport/activity club members (37%), representatives from the Governor's office (38%), local business owners (24%), and special need groups such as the physically challenged (< 1%).

Discussion and Implications

Based on analysis of demographic data, it is clear that responses to the survey are biased. They are not representative of the entire population of the Connecticut River Valley Study area because some groups are much more strongly represented than others, showing a demographic distribution much different from the actual demographic profiles of the communities.

Though 25% of the surveys were mailed to residents of each of the four town size/type categories (small town, large town, suburban communities, cities), 34% of the returned usable surveys were from residents of small towns. In general, respondents tended to be *white*, with 64% self-identifying as Anglo (27% did not answer the question and another 4.4% identified themselves as American, with ethnic origin unknown), *highly educated* (with nearly 38% having at least a bachelors degree and almost 26% having one or more years of graduate study), and *working full time* (with annual salaries ranging between \$20,000 and \$50,000). Clearly these demographics are not representative of the western Massachusetts population, particularly of residents in some of the suburban and city communities. Despite efforts to facilitate responses by Spanish-speaking residents (Spanish version of the survey was available upon request), no identifiable Hispanic responses were received. Attempts were made to obtain funding to approach minority groups face-to-face via local community organizations, but they were unsuccessful.

Because the collection of returned surveys is highly biased, the responses to other questions in the survey should be considered with the understanding that they are not truly representative of ALL residents. (Additional efforts should be made to gather input from other resident groups.) Because of the bias in the respondent sample, many of the responses reflect a "traditional" white, educated, middle-to-upper class attitude about parks and park use. These users tend to be able to drive easily to park sites. They tend to participate in

passive and non-motorized while using the parks. They tend also to exhibit a concern for the protection of the "natural" environment (as opposed to extensive development of facilities, particularly when they service motorized recreational use), even to the extent of expressing a desire to exclude users of such facilities (RV campers, snowmobilers, ATV users, and motorcyclists).

Not surprisingly, some activities often associated with other ethnic and cultural groups (such as large group use of picnic facilities, listening to music, playing sports and games) were not mentioned frequently, but this does not mean that opportunities for such activities should not be provided if, in fact, such residents do wish to use state parks. It should be noted that other activities [such as jet skiing, backpacking, horseback riding, attending nature or history talks, bike riding on trails, and snowmobiling] also were mentioned infrequently. Some of the reasons may be that 1) these activities are engaged in in other places, 2) appropriate resources or facilities (such as large open water bodies for jet skiing) do not exist, 3) some of these activities may be prohibited, or 4) people who engage in these activities simply were not represented in the surveys.

Perhaps the most important result relative to general park management is that park users overwhelmingly prefer that many parks be open to residents, even if that means reduction in services or the implementation of fees (again, probably a function of the respondent bias). However, it seems that users are very clear in their desire for visible, sufficient numbers of rangers and law enforcement staff...and lifeguards...(somehow differentiated by respondents) to be present in the parks to ensure safety and to answer questions. Additionally, they expect that trash be collected and flush toilet restrooms maintained, and that there be adequate information (maps, brochures, directional signs, etc.) for them to use the parks easily. Wheelchair access also is rated highly. (NOTE: The survey was conducted before enactment of the American Disabilities Act.) Overall, trails are by far the most desirable recreational facility to be provided and maintained. This is reflective of both the current national interest in trail use and development, and of the temporal patterns of use possible for many residents (short, less-than-a-day outings as opposed to multiple-day trips, or short daily exercise or relaxation activities engaged in in park settings).

While our main interest in the survey was to determine attitudes about public meetings, more specifically public meetings dealing with park and recreation issues, and to determine residents' interest in participating in an alternative form of public process (different from the typical public meeting or public hearing, often conducted in response to a policy or management decision rather than as part of the initial planning), it was important first to have an understanding of how the respondents used parks. After establishing a connection with parks in the minds of respondents, we could move to questions dealing with their participation in public process.

We were surprised that attitudes toward public meetings were so mixed (particularly that so many people expressed positive feelings about them). We had anticipated a much more negative response. Perhaps this is due, once again, to respondent bias. Respondents reflected predominantly the views of those most likely to participate in public meetings (white, educated, middle-to-upper class), and who feel most able to make a difference; those residents who feel less empowered, who feel that government is inaccessible to them, and who would have been most likely to express frustration with public meetings as a tool of "the system," probably did not return their questionnaires. (Perhaps they did not even respond to the survey because they believed their views and comments in the survey would not be listened to or responded to. Perhaps they feel just as intimidated by and alienated from academics as they do from government officials.)

Nevertheless, we were surprised by the number of people who expressed an interest in participating in alternative forms of public input. A majority of the respondents (55%) indicated that it was possible or extremely likely that would participate in a park issue-related public forum some time in the future. In fact, 57 postcards were received from respondents indicating that they would like to be invited to attend the public workshop...if time and scheduling permitted. (Lack of time seems to be the biggest barrier to participation, regardless of desire or interest, particularly when people must choose between many civic activities and causes when juggling them with work and family obligations, particularly in a time of economic stress.) This means that any public forums must be easily accessible to residents (time, scheduling, place), the issues must be highly relevant, and residents must truly believe that their voice will be heard and will have an impact. Other factors mentioned (handwritten comments) that influence participation include direct relevance of the issue (often an activity) to the potential participant, personal notification of such forums (in contrast with newspaper announcements of meetings), having someone to go with, and belief of a real opportunity for making a difference.

Though we expected the majority of willing respondents to favor a single evening workshop format (which was the case, with 41% of all survey respondents indicating preference for a single evening), we were surprised by the number who were willing to spend half a day (27%), two to three evenings (24%), or even a whole day (12%)...again with time and scheduling permitting. Again, it appears that if people believe that an issue is relevant, and that they can really make a difference, they are willing to at least consider spending a fair amount of time participating. This means that agencies should pay careful attention to the details of planning and facilitating a public forum, and to ensuring that participants' responses will REALLY be used, and to letting participants know the session results and HOW their input actually was used or incorporated in planning or management decisions.

Respondents seemed eager to include representatives of a variety of groups in a public forum which would allow all participants to talk and work with each other. However, there was less enthusiasm for participation by three groups: sport/activity club representatives, representatives from the Governor's office, and local business owners. Hesitancy about including representatives of sport and activity clubs (such as hunting and snowmobiling clubs) probably was a reflection of the respondent bias against motorized and consumptive uses of park resources. Respondents were willing to include government officials, but less willing to include representatives from the Governor's office. Perhaps some believed that such representatives would stifle their input, or somehow direct the discussion. Only one quarter of the respondents believed that local business owners should participate. Perhaps they simply didn't see the relevance, though there is no indication of possible reasons.

Conclusion

While there were constraints on the survey results (most notably dealing with respondent bias, as discussed previously), the results about park use can be used as one information source about park users and the impacts they have noticed as a result of budget cuts. However, this should not be the ONLY source of user information. Efforts must be made to target specifically minority user groups, particularly in large towns and cities, as these were the groups most underrepresented in this survey.

If planned, facilitated and conducted properly, with a real desire to gather and use public input, it appears that non-traditional public forums can attract participation, at least by some segments of the population. However, there are still major barriers which must be overcome to ensure open participation and to incorporate input into management decisions, not the least of which involve changing attitudes. One need is changing the public's attitudes that their input may really be

valued and used (also realizing that there are many different publics, with many different viewpoints). Another need is changing agency attitudes 1) that the public may really have some valuable input and insights, 2) that their professional opinions and expertise should not be threatened by honest public input (when collected in a non-adversarial environment), and 3) that there may be long term benefits from gathering public input to counterbalance what may be perceived as short term hassles and nuisances of actually involving the public.

More analysis of survey results (correlations of closed questions and analysis of open-ended questions) needs to be done. Some of the anticipated analyses (such as identifying differences in park use and participation in public meetings between different ethnic or cultural groups), however, will be impossible due to lack of responses from these groups. Therefore, other, more targeted and personal efforts, should be made to gather their input.

It is only with everyone working together, hearing and understanding the ideas and perspectives of those different from themselves, and exchanging ideas in a non-adversarial, non-threatening environment that progress toward inclusive, probably also compromising, decisions can be made. If public land agencies are to manage for the people, and if they are to receive long term support for their efforts (legislatively, financially, in volunteer support, in lack of destructive behavior), they MUST manage for ALL the people, and must include the opinions and needs of all those groups in their decisions. This does not mean that they should try to be all things to all people, or to make decisions counter to agency missions or policies; it means simply that their decisions should acknowledge and be sensitive to diverse needs, and that people's input should be facilitated rather than inhibited.

Literature Cited

- Bonnicksen, Thomas M. 1991. EZ-Impact Handbook. College Station, TX: Biosocial Decisions Systems.
- Burns, David, M.D. 1981. Feeling Good-The New Mood Therapy. New York, NY: Signet.
- Center for Massachusetts Data. 1982. Massachusetts Population and Housing Characteristics: 1980 Complete Count Data. Amherst, MA: University of Massachusetts Center for Massachusetts Data.
- Dillman, Don A. 1978. Mail and Telephone Surveys: The Total Design Method. New York, NY: John Wiley and Sons.
- Division of Conservation Services. 1982. Planning requirements for participation in the federal Land and Water Conservation Fund and the Massachusetts Self-Help Programs. Boston, MA: Division of Conservation Services, State of Massachusetts.
- Dunsing, Richard J. 1978. You and I Have Simply Got to Stop Meeting this Way: How to Run Better Meetings. New York, NY: American Management Associations.
- Fabun, Don. 1968. Communications: The Transfer of Meaning. San Francisco, CA: International Society for General Semantics.
- Fazio, James R. and Douglas L. Gilbert. 1986. Public Relations and Communications for Natural Resource Managers. Dubuque, IA: Kendal/Hunt.
- Gramann, James H. (Ed.) 1990. Proceedings: Symposium on Social Science in Resource Management, May 1990. College Station, TX: Texas A&M University.

Hammitt, William and David Cole. 1987. Wildland Recreation: Ecology and Management. New York, NY: John Wiley and Sons.

Howard, Dennis R. and Crompton John L. 1980. Financing. Managing and Marketing Recreation and Park Resources. Dubuque, IA: William C. Brown.

Ibrahim, Hilmi, Robert Banes, and Gus Gerson. 1987. Effective Parks and Recreation Boards and Commissions. Reston, VA: American Alliance for Health, Physical Education, Recreation and Dance.

Labaw, Patricia. 1980. Advanced Questionnaire Design. Cambridge, MA: Abt Books.

Mater, Jean. 1984. Public Hearings Procedures and Strategies. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Miller, Marc, Richard Gale, Perry Brown. 19--. Social Science in Natural Resource Management Systems. New York, NY: Westview Press.

Smith, Kathy, Lawrence R. Klar, and Rodney B. Warnick. 1988. Massachusetts Outdoors! For Our Common Good. Boston, MA: Executive Office for Environmental Affairs.

Vander Stoep, Gail A. 1989. Public meetings: Reducing antagonism, building constituents. In Proceedings, National Interpreters Workshop, St. Paul MN, November 1989. Fort Collins, CO: National Association for Interpretation.

Willey, John F. and Kathleen R. Boynton. 1977. Conducting a Public Meeting. Amherst, MA: Institute for Governmental Services, University of Massachusetts

Yaro, Robert D., Randall Arendt, Harry Dodson, and Elizabeth Brabec. 1988. Dealing with Change in the Connecticut River Valley: A Design Manual for Conservation and Development. MA: Lincoln Institute of Land Policy and the Environmental Law Foundation.

FEDERAL AGENCIES
National Park Service

A HERITAGE TOURISM TOOL: NATIONAL REGISTER OF HISTORIC PLACES

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"Historic and Architectural Resources of the Upper Delaware Valley, New York and Pennsylvania," a multiple property project nominating nearly 200 sites to the National Register of Historic Places, provides research data important to the promotion of local heritage tourism efforts.

I am, or have been, a professional journalist, a professional historian and a professional sociologist. I'm also a devoted amateur tourist. Whenever I get the chance to travel, whether in Europe, Canada, Florida, California or New England, I look for historic sites, picturesque communities and interesting architecture, the same things visitors look for when they come to my home territory, the Upper Delaware Scenic and Recreational River. The popular term for this kind of visitation is heritage tourism. In this paper, I will describe research which can be an important component in promoting that kind of tourism.

Specifically, the research I am involved with is titled, "Historic and Architectural Resources of the Upper Delaware Valley, New York and Pennsylvania." It incorporates a survey of approximately 400 historic properties and preparation of materials for a multiple property nomination to the National Register of Historic Places.

The research developed for these nominations has given tourism officials a perspective on local heritage, and the information to promote it. In the process of gathering data, researchers heightened the historic and architectural consciousness of the property owners, and uncovered the kind of stories that are appealing to tourists. As a result of this work, advertisements and brochures can tell would-be visitors that Volney Skinner's Milanville House was "a 19th Century Inn for Lumber Jack Rafter," that Roebling Delaware Inn was a Delaware and Hudson Canal Office, and that Mary Pickford signed the register at Rohman's (Shohola Glen Hotel). The research provides information for guides to use on walking tours. It helps communities draw visitors to "heritage days." It finds the stories for storytelling performances. It makes site interpretation and historic markers more interesting and accurate.

By way of background, let me tell you something about the National Register of Historic Places. The Register is basically a federal planning document. It provides a list of historically and architecturally significant properties which should be protected from federal action. That means the Army isn't supposed to use an architectural masterpiece for target practice, and federal dollars are not supposed to be used to build a dam flooding a Civil War battlefield.

Companion legislation in most states sets up a parallel structure for protecting sites from state funded or permitted action.

State and federal listings only protect a property from action funded or permitted by state and federal governments. Local historic designations may go further, restricting what owners do to private property with private funds. Communities like Savannah, Georgia, may go so far as to require that owners

paint their houses with historically appropriate colors. Local designation in New York City recently resulted in litigation when a historic church wanted to build a skyscraper on the back of it, an action the city Landmark Commission decided would damage the architectural significance of the building. These kind of regulations are most often found in areas that place an especially high value on historic architecture as a focus for tourism.

Whether the designation is listing on the National Register of Historic Places or recognition by a local landmarks commission, a considerable amount of research is required. Construction dates, builders' and architects' names, historic significance, architectural styling, the names and stories of important people associated with the site, description of the property, and more must be ferreted out and documented.

With that background in mind, let me tell you about the Upper Delaware National Register project. Started officially in 1983, it built upon data that had been developed by local historians during the Bicentennial Celebration years. A task directive for the project resulted from conversations between the New York State Historic Preservation Office and the National Park Service. Covering about 56,000 acres of land, almost all of it in private ownership, on two sides of the river, in two states, this was an ambitious and unusual, perhaps unique, project.

Initially, the State of Pennsylvania was unwilling to take on such a large, experimental project. So it began with just New York State and the National Park Service developing research, and a local organization, the Upper Delaware Heritage Alliance, assuming official sponsorship. In 1990, Pennsylvania came on board. By June 1991, 400 properties had been inventoried, all of them at least 50 years old and worthy of consideration. The states had gone through their review processes on a staff level, and determined that almost 200 of those properties were eligible for the National Register of Historic Places.

The research was conducted in two stages. During the survey stage an effort was made to identify every building or structure in the river corridor which was at least 50 years old and might have historic or architectural significance. Each of these buildings was located on USGS maps, photographed, exterior and interior described, and historic information noted. Once the states reviewed that material, and made preliminary determinations of eligibility, more detailed documentation was prepared on those properties. The Multiple Property Documentation Form provided an introductory document for all of these nominations. Its two most detailed sections address historic context (a history of the river valley within the framework of important associated contexts), and property types (e.g., historic districts, residences, religious properties, commercial buildings). In addition, a nomination form is prepared for each historic district or individual property to be nominated. These forms include photographs, maps, property owner information, physical description, and detailed justification of historic or architectural significance.

Working with such a large geographic area and involving two states, has been a rewarding and useful experience, but complicated one. The states are not accustomed to working together on National Register projects. This is normally a function that is taken care of on the state level before it gets to the federal government. The federal Keeper of the Register checks over nominations, but in most cases (particularly in states like New York and Pennsylvania, where there are very active state historic preservation offices) the states do the extensive review, and decide whether or not a nomination should be accepted.

The final nomination review stage has now been reached in both states. Beginning in June 1992, it will take more than a year of presenting preliminary material, and nomination forms for state review. Sometime in 1993 we expect to have all of these properties on the National Register.

In practical terms, federal or state designation doesn't mean a lot to the average property owner. As a result, the most important part of the program may not be the designation, but rather the research process itself. There is relatively little threat from federal or state funded projects to these sites. The greatest problems are deterioration, owner neglect, and perhaps most threatening of all, remodeling. The research process, with owner contact, and the attendant educational opportunities, can convince a neglectful property owner that he has something worth preserving. It can even open the eyes of the dedicated remodeler to the value of restoration.

It also has the potential to impact the area's economy. I'm a native of the Upper Delaware Valley, which gives me a special feeling for the economic needs of its residents. The area where I work is a non-traditional National Park Service area. We own very little of the property, and according to our River Management Plan, the National Park Service will never own more than 125 acres; the rest will be primarily in private ownership. Therefore, it is the private owner, and often his economic concerns, that are paramount.

To the private owner, the whole idea of heritage tourism sounds like a money maker. It calls forth images of a "clean," family oriented industry, a tourism opportunity devoid of the immoral, criminal, disruptive elements that may plague other kinds of entertainment attractions.

But successful heritage tourism involves more than the decision to promote history. Here is what an editorial in Preservation News (the publication of the National Trust for Historic Preservation) had to say about it: "To some the words heritage tourism may carry only stereotyped images of horse drawn carriage tours, or docents in period costumes, but the essence of heritage tourism lies in recognizing an area's unique qualities and making the best cultural, economic use of them." This is where the National Register comes in. It helps us in many ways, but most importantly it identifies those unique qualities which characterize an area.

You've probably heard some of the horror stories of places where they got the idea of heritage tourism . . . but not quite. One of my colleagues from Gettysburg tells about a group of people that had gone to Williamsburg, and visited the colonial buildings there, then came back and wanted to tear down all the Victorian houses in Gettysburg and rebuild them, Williamsburg style. The historic research associated with the National Register, and the interest it generates within local communities, can forestall this kind of destructive thinking. It can help a community to understand what is uniquely theirs and develop the kind of tourism that builds on their heritage.

In the Upper Delaware Valley, this has led to important interaction with local property owners, development of promotional materials, and encouragement of a strengthened historic preservation ethic. One of the things we're especially enthusiastic about is the increasing number of bed-and-breakfasts, and other commercial ventures based in restored historic buildings. This not only boosts the economy, it saves a portion of the area's heritage and improves the general quality of life.

In addition to private property owners, business associations, historical societies and cultural groups are very much a part of the heritage tourism picture. Drawing upon National Register research, I do walking tours and assist others in developing interpretive programs for historic sites. I work with people who put on heritage days and street fairs focusing on historic themes. I do armchair trips around the river valley via slide presentations.

One of the most successful promotions utilizing our National Register research has been the Cultural Historic Attractions Tour (CHIAT) map and guide. A glossy, professional quality effort produced by the Sullivan County Office of Public Information, it was funded, and supervised, by the Upper

Delaware Council (UDC), a coalition of river corridor townships. Through the UDC, local historians were brought into the project and information from the National Register research was used to check accuracy, and provide historical background.

The opportunities for using this research have only just begun to surface. Publicity surrounding National Register nominations increases local interest in old and historic properties. A UDC conference on tourism and economic development drew enthusiastic response, and highlighted heritage tourism. The Callicoon Business Association is in the process of developing historic markers for each of its Main Street stores. The Big Eddy Storytellers are planning a performance event featuring local folklore and historic tales. This fall, the Upper Delaware Heritage Alliance will kick off a program to provide recognition plaques for valley buildings over 75 years old.

As more and more people recognize the potential for heritage tourism, the demand for local historic information escalates. Research generated by the National Register nomination process has taken on a life of its own, so that the importance of the information by-product may far exceed the importance of the government designation. Although the program is designed to protect historic and architecturally significant properties from damage by government action, that may turn out to be the least of its usefulness.

One of the special advantages of the multiple property approach to the National Register is its open-ended quality. Once the Multiple Property Documentation Form has been submitted with the first nominations, the supporting documentation is a matter of public record, reviewed, and on file with the states and the Keeper of the Register. The detailed statement of historic contexts, registration requirements, geographic data, summary of identification and evaluation methods, and major bibliographic references are completed, and do not need to be repeated. New nominations can be added with relative ease.

With the Upper Delaware project, we are already aware of at least a dozen properties which may be National Register eligible, despite being omitted from the initial nomination list of nearly 200 sites.

Virtually all of these properties are not now included due to "lack of sufficient information." That means more research is needed. It also means the project may not be completed in my life time. If that sounds like a pessimistic statement, I don't mean it to be. I see it as a continuing opportunity.

As long as human beings are interested in their past and its stories, there will be heritage tourism (by that or some other name). As long as there is heritage tourism, there will be the demand for more information and stories, related to local history. And that means research and more uses for the kind of information a National Register project produces.

THE ENVIRONMENTAL SIGNIFICANCE OF HISTORICAL PARKS: A STUDY OF EVOLVING PARK VALUES

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Introduction

It has been traditional to think about national parks and equivalent reserves in terms of basic "types" or "categories" of parks. Classically, we tend to label parks as "natural," "historical" or "cultural," and "recreational." These labels are based on what are viewed as the park's most significant resources or values. But is this the way visitors view parks? Do park values evolve in the minds of visitors? Can parks serve multiple values? We explored these questions in a study of visitors to Roosevelt Campobello International Park.

The Study

Roosevelt Campobello International Park is located on Campobello Island, New Brunswick, Canada. The park was created to commemorate United States President Franklin D. Roosevelt. The original and traditional focus of the park is the historic Roosevelt family cottage. Created in 1964 by international treaty, the park was initially comprised of the Roosevelt Cottage and the surrounding ten acres of grounds. However, over the years the park has acquired nearly 3,000 acres of surrounding lands which include a variety of fine inland and coastal ecosystems.

Under terms of the treaty creating the park, the Roosevelt Campobello International Park Commission requested technical assistance in park planning and management from the U.S. National Park Service. Accordingly, a survey of park visitors was conducted under the auspices of the North Atlantic Region in the summer and fall of 1989. Park visitors were sampled on ten randomly selected days. Sampling consisted of contacting 1,000 randomly selected visitors and soliciting their cooperation in participating in the study. Names and addresses of visitors were collected and participants were mailed a mail-back questionnaire upon their return home. Using two follow-up mailings a response rate of 90.2% was attained, yielding 902 completed questionnaires. Questions collected information concerning visitor characteristics, and visitor opinions and attitudes about selected park management issues.

Findings

Several study findings relate to the ways in which visitors value the park. First, respondents were asked directly whether they preferred that park management emphasis be placed 1) primarily on historical resources with natural resources of secondary importance, 2) primarily on natural resources with historical resources of secondary importance, or 3) equally on historical and natural resources. The vast majority of visitors (76.7%) preferred the third alternative, indicated that in the minds of most visitors the park has clearly evolved from initial establishment as an historical site to a park with at least equal importance as a natural area.

Second, the activities in which visitors participate and rate as important indicate that park values may be changing. The activities in which visitors now participate tend to be

somewhat passive and oriented toward the historical values of the park. The four most popular activities were touring the historic cottages, driving scenic roads, photography, and touring the flower gardens. However, respondents were also asked to indicate which activities they considered most important for the park; that is, which activities should the park be sure to plan for. Considered in this context, more active and environmentally-oriented activities tend to increase in importance. While touring the historic cottages remained the most important activity, driving scenic roads and photography declined in relative importance. Alternatively, walking or hiking trails, picnicking, and nature study increased in relative importance.

Third, the age distribution of park visitors, and its apparent influence on park values, indicates that the public significance of the park may be evolving. The current visitor population is heavily skewed toward the older age categories. Over 60% of visitors are 50 years of age and older, and nearly 40% are 60 years of age and older. Most of the visitors in these older age categories have direct knowledge and memories of Franklin D. Roosevelt and his importance in national and international affairs. Consequently, their attention tends to be focused on the Roosevelt theme of the park, particularly the purely historical elements of this theme. However, younger visitors evidence a stronger orientation toward the natural and environmental resources of the park. They are also more interested in more active recreational pursuits which are focused on the environment. For example, younger visitors hiked and beachcombed more often and toured flower gardens and viewed the orientation film less often than older visitors. Younger visitors also rated hiking, beachcombing, and bicycling as more important park activities than did older visitors and rated touring the historic cottages and flower gardens as less important. Younger visitors also visited the natural areas of the park more often and tended to favor more park management emphasis on natural resources. They were also more strongly in favor of preserving the park's natural resources and were less favorable about the management practice of vista clearing. Greater interest in the natural aspects of the park on the part of younger visitors may also translate into somewhat less interest on their part in the traditional historic resources of the park. Younger visitors felt they learned less than older visitors about Franklin D. Roosevelt and his life on Campobello Island.

Conclusion

Roosevelt Campobello International Park originated as a traditional "historical" area. However, it appears to be evolving to take on significant environmental and related recreational values as well. This is due to changes in the park itself as it has expanded to take in surrounding natural areas. However, it is also due to changes in the visitor population. The great majority of visitors recognize the significant natural resource base now contained within the park. Perhaps even more importantly, a new generation of younger visitors is clearly more oriented toward this natural resource base than the traditional historical values of the park.

Evolving park values at Roosevelt Campobello International Park do not mean that the traditional historical resources of the park should be somehow diminished in importance. The issue facing the park might best be described as how to maintain public interest in the Roosevelt theme as fewer park visitors in the future may have highly focused and direct interest in Franklin D. Roosevelt. A potential solution to this issue is to tie the historical Roosevelt theme more closely to the natural resources of the park. For example, more emphasis might be placed on how the Roosevelt family used the surrounding natural landscape for recreation, relaxation, and inspiration. Perhaps activities of the Roosevelt family could be recreated providing opportunities for more active recreation pursuits tied more directly to the natural environment. This would be more in keeping with the majority viewpoint of visitors that park management should be balanced between historical and natural resources.

CAMPSITE IMPACT MANAGEMENT: A SURVEY OF NATIONAL PARK SERVICE BACKCOUNTRY MANAGERS

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Though a central purpose for the creation and management of parks, visitation inevitably affects the natural resources of parks. This is particularly true at campsites, where visitation and its effects are concentrated. This paper presents partial results from a survey of National Park Service managers regarding general strategies and specific actions implemented by park managers to address campsite impact problems.

Introduction

The National Park Service (NPS) encourages backcountry recreational uses that promote visitor enjoyment through a direct association with park resources. Backcountry, the primitive, undeveloped portions of parks, is generally open to a variety of dispersed recreational uses. It is recognized that any recreational use will result in some level of impact to park resources. Examples of recreational impacts include trampling and loss of vegetative cover, tree damage, compaction and erosion of organic litter and soil, introduction of exotic vegetation, harassment and/or displacement of wildlife, and pollution of water resources (Hammit and Cole 1987, Marion and Merriam 1985, Ream 1980). Survey research also indicates that some of these impacts are perceived as significant by visitors and may degrade the quality of their recreational experiences (Lucas 1979, Roggenbuck et al. In Press).

NPS managers have responded to recreational impact problems with a considerable variety of visitor and resource management practices. These management approaches may be classified, for example, on the basis of their strategic purpose (Manning 1979). Strategies are broad, general approaches for addressing the basic causes of problems. Reducing recreational use or enhancing resource durability are examples of management strategies.

A second system of classifying backcountry recreation management practices focuses on tactics or actions. Tactics are specific actions implemented by managers to accomplish a management strategy (Cole et al. 1987). Restrictions on length of stay, differential fees, and permit quotas are examples of tactics designed to accomplish the strategy of reducing recreation use. Tactics can be classified according to the directness with which they act on visitor behavior (Peterson and Lime 1979, Lime 1979). Direct management practices regulate and restrict visitor behavior, leaving little or no freedom of choice. Indirect management practices attempt to influence the decision factors that lead to visitor behavior. For example, the objective of reducing backcountry campfire impacts might be achieved through a ban on campfires, a direct management approach, or through an educational program informing visitors of the undesirable

ecological and aesthetic impacts of campfires and encouraging the use of portable stoves, an indirect approach.

This paper reports results from a survey of NPS managers conducted to determine the type and severity of recreational impact problems in backcountry areas of the Nation's parks. The survey also documented general strategies and specific management actions applied by managers to resolve these problems. While the survey covered a wide range of backcountry recreation management problems relating to resource impacts and visitor experiences, this paper focuses on campsite impact problems and their management. Campsites, because they serve as a focal point for visitor activity, receive concentrated use and are usually the most heavily impacted areas in backcountry regions.

Methods

The survey included all NPS units with substantial backcountry resources. Backcountry was defined as those areas managed primarily for natural conditions and processes that are generally not accessed by visitors with standard passenger vehicles. The survey instrument was a mail-back questionnaire that solicited information on backcountry recreation management problems, implemented actions and their perceived effectiveness, carrying capacity, and resource and visitor monitoring.

The survey was sent to 103 park superintendents requesting that they be directed to appropriate backcountry managers or rangers for response. Ninety-three completed surveys were returned for a 90 percent response rate. Completed surveys were input into dBASE III+ databases for distribution to participating park units, and transferred to the SPSS-PC+ statistical package for analysis.

Results

Backcountry managers rated the perceived severity of eight types of campsite impacts using a Problem Severity Scale ranging from 0 (Not a problem) to 3 (A problem in most areas) (Table 1). For seven of the eight types of campsite impacts the most common rating was 1: "A problem in a few areas". Average ratings ranged from 1.3 for herbaceous vegetation and soil impacts to 0.6 for user-constructed facilities. For these impact types, managers perceived more pervasive problems with herbaceous vegetation and soil impacts; approximately one-third of the managers rated these items as being a problem in many or most backcountry areas. Such findings would imply that campsite impacts are generally confined to popular attraction areas rather than prevalent throughout backcountry areas. This finding would be expected given the results of visitor distribution studies that reveal markedly uneven use patterns in wilderness and backcountry areas (Lucas et al. 1971, van Wagtenonk 1981).

The remainder of this paper focuses on specific tactics or actions which backcountry managers have implemented to address campsite impact problems. For presentation, these actions are divided into four groups according to their general strategy: (1) actions to reduce backcountry use, (2) actions to redistribute or contain use, (3) actions to improve minimum impact behavior, and (4) actions to enhance resource durability.

A thorough review of the literature on backcountry and wilderness recreation management practices was conducted during survey development. This review resulted in a compilation of over 100 specific actions which park managers might employ to address backcountry recreation management problems. Managers were asked to review and add to this listing and check all actions that were currently in effect for all or some portion of their backcountry. An effort was made to distinguish between indirect actions (typically indicated by the terms "encourage" and "discourage") and more direct regulatory actions (typically indicated by the terms "require" and "prohibit").

Table 1. Severity of several types of campsite impact as perceived by National Park Service backcountry managers.

Type of Campsite Impact	Severity Scale ^a				Avg
	0	1	2	3	
	(No. of Parks)				
Herbaceous vegetation loss/ compositional change 1.3	14	49	17	10	
Soil exposure/erosion 1.3	12	46	24	8	
Tree and shrub damage/loss 1.0	22	50	13	5	
Multiple fire sites 0.9	32	36	18	3	
Campsite proliferation 0.8	37	38	10	3	
Exotic vegetation introduction 0.8	37	38	12	2	
Excessive site size 0.7	42	30	14	2	
User-constructed facilities 0.6	40	42	6	1	

a/ 0 = Not a problem
1 = A problem in a few areas
2 = A problem in many areas
3 = A problem in most areas

Strategy 1: Actions to Reduce Backcountry Use

The objective of this strategy is to reduce campsite impacts by reducing backcountry use, although other problems or concerns may be addressed by such actions. Of 63 parks that require visitors to obtain backcountry permits, 33 restrict permits by campsite availability (Table 2). Four parks prohibit overnight use. Less restrictive regulations include trip length of stay limits (47 parks) and campsite length of stay limits (58 parks). Indirect use reduction actions include limiting access by closing roads (29 parks) and trails (12 parks), and by reducing road maintenance (11 parks) and trail maintenance (17 parks).

Recreational ecology research indicates that use reduction may be an ineffective strategy for minimizing many types of campsite impacts (Cole 1982, Cole and Marion 1988, Marion and Merriam 1985). Campsite impact studies have consistently shown that the most dramatic changes occur with initial or low levels of site use. Thereafter, the relationship between amount of use and many types of resource impacts diminishes substantially. Consequently, site use reductions, unless substantial, will not significantly improve site conditions.

Table 2. Number of parks employing actions to reduce backcountry use.

33	Permits are restricted/rationed by campsite availability
47	Require trip length of stay limits
Backcountry access is made more difficult by:	
29	closing roads
11	reducing road maintenance
12	closing trails
17	reducing trail maintenance
58	limiting campsite length of stay
1	discouraging overnight use
4	prohibiting overnight use

Strategy 2: Actions to Redistribute or Contain Use

The objective of this strategy is to reduce campsite impacts through use redistribution or use containment. The most common action under this strategy was to discourage or prohibit camping in environmentally sensitive areas (50 and 43 parks, respectively) (Table 3). Prohibitions on camping in fragile ecosystem or vegetation types (24 parks) or near popular park features (14 parks) are also fairly common actions. However, such actions may be largely ineffective unless use can be successfully shifted to impact-resistant areas (Cole 1981). Relocation of campsites from fragile to more durable soils and/or vegetation types is practiced by 32 parks. Twenty-six parks encouraged and eight parks required camping in impact-resistant ecosystem types.

Actions that encourage or require dispersed camping are another form of use redistribution. In its purest form, visitors are directed to camp on sites with no evidence of previous use. Only 12 parks encourage this form of dispersed camping. Such a practice is difficult to implement or enforce and few parks are likely to have a sufficient number of potential camping locations. A more common approach is to discourage or prohibit camping within a certain distance or sight of trails (11 and 28 parks, respectively) or within a certain distance or sight of other campsites (18 and 17 parks, respectively). The effectiveness of dispersed camping is dependent upon maintaining very light use on dispersed sites and encouraging the use of minimum impact camping practices (Cole and Benedict 1983).

Visitor concentration or containment is a more effective approach in areas where use is heavy or camping locations are limited. Most commonly, visitors are required to camp on designated campsites either parkwide (23 parks) or in certain areas (29 parks). Twenty-three parks restrict backcountry camping to designated geographic areas. An alternate, non-regulatory campsite selection approach to visitor containment encourages visitors to use moderately impacted sites and to avoid lightly and severely impacted sites (Cole and Benedict 1983). The objective of this approach is to encourage complete recovery on lightly impacted sites and a reduction of impacts on highly impacted sites. Few parks appear to have adopted this approach. Use of moderately impacted sites is encouraged or required by 9 and 2 parks, respectively. Use of lightly impacted sites is discouraged or prohibited by 11 and 4 parks, respectively, and use of heavily impacted sites is discouraged or prohibited by 17 and 9 parks, respectively.

Strategy 3: Actions to Improve Minimum Impact Behavior

The objective of this strategy is to reduce campsite impacts through educational or regulatory actions that encourage the adoption of minimum impact camping practices. Seventy-two of the surveyed parks indicated that minimum impact backcountry use practices are taught. A wide variety of communication mediums were used: low impact literature (46 parks), backcountry access bulletin board displays (48 parks), personal contact with backcountry rangers (64 parks), and video or slide programs (9 parks) (Table 4). It is difficult to assess the percentage of visitors reached by these efforts, however, 37 parks indicated that low impact literature is provided or shown to most or all backcountry visitors.

Educational approaches are also widely applied to address a number of specific visitor impacts. Nearly all (85) parks emphasize a "pack-it-in, pack-it-out" policy to reduce litter in the backcountry, 22 parks provide free litter bags. Most parks address human waste disposal by instructing visitors to bury fecal material (61 parks), although 13 parks instruct visitors to carry out human wastes (typically river parks). Impacts from campfires and wood gathering are addressed by discouraging the use of axes and saws (14 parks), campfire building (9 parks), and by encouraging the use of stoves (42 parks).

Table 3. Number of parks employing actions to redistribute or contain use.

	Discouraged	Prohibited
Camping in environmentally sensitive areas is	5	43
Camping in fragile ecosystem or vegetation types	26	24
Camping within a certain distance or sight of popular features	10	14
Camping in certain designated geographic areas	6	33
Camping within a certain distance or sight of roads/facilities	6	43
Camping within a certain distance or sight of trails	11	28
Camping within a certain distance or sight of other campsites	18	17
Camping within a certain distance of water	4	41
Camping on lightly impacted sites is	11	4
Camping on heavily impacted sites is	17	9
	Encouraged	Required
Camping in impact-resistant ecosystem/vegetation types	26	8
Camping on designated campsites parkwide	16	23
Camping on designated campsites in certain areas	11	29
Camping in certain designated geographic areas	11	23
Camping on sites with no evidence of use is	12	0
Camping on moderately impacted sites is	9	2
<u>32</u> Relocate campsites from fragile to more durable soils and/or vegetation types		
<u>37</u> Locate campsites/facilities on durable sites		

Regulatory actions designed to compel minimum impact behavior provide more direct options for implementing this strategy. For example, campfires are prohibited by 40 parks and backpacking stoves are required in 34 parks.

Strategy 4: Actions to Enhance Resource Durability

The objective of this strategy is to reduce campsite impacts through campsite maintenance and rehabilitation and the provision of facilities. Forty-six parks indicated that they perform general campsite maintenance and 25 parks seed and transplant vegetation on campsites (Table 5). Impacts are also reduced by concentrating or channeling use through the location of firepits or other facilities (40 parks). Resource protection facilities that reduce impacts by containing use include shelters (9 parks), tent platforms (12 parks), firegrates (28 parks), and tables (19 parks).

Discussion and Conclusion

The diversity of backcountry recreation management problems and potential management strategies and tactics results in considerable complexity for backcountry managers. A principal objective of this study was to gather, analyze, and share information about backcountry management problems and alternative solutions. The communication of this information will be facilitated by distributing survey results in

Table 4. Number of parks employing actions to improve minimum impact behavior.

	Discouraged	Prohibited
<u>72</u> Teach minimum impact backcountry use practices		
<u>42</u> Teach minimum impact camping techniques		
<u>46</u> Low impact literature is available on request		
<u>45</u> Low impact literature is displayed at visitor centers and ranger stations		
<u>48</u> Low impact literature is displayed on bulletin boards at backcountry access points		
<u>37</u> Low impact literature is provided or shown to most or all backcountry visitors		
<u>64</u> Park rangers are instructed to convey low impact messages during backcountry visitor contacts		
<u>9</u> Low impact videos or slide programs are routinely shown at visitor centers		
<u>85</u> Emphasize "pack-it-in, pack-it-out" policy		
<u>22</u> Provide free litter bags		
<u>61</u> Visitors are instructed to bury human wastes		
<u>13</u> Visitors are instructed to carry out human wastes		
<u>53</u> Visitors are instructed to defecate away from all water sources		
<u>42</u> Backpacking stoves are encouraged		
<u>34</u> Backpacking stoves are required		
	Discouraged	Prohibited
Ground fires, parkwide, are	9	40
Ground fires, in certain park areas, are	9	44
Cutting standing dead wood is	7	77
Axes/saws are	14	17

Table 5. Number of parks employing actions to improve resource durability.

<u>40</u> Concentrate or channel use on sites through location of firepits or other facilities
<u>46</u> General campsite maintenance
<u>25</u> Seed/transplant vegetation on campsites
<u>9</u> Provide shelters for visitor overnight use
<u>12</u> Provide tent platforms
<u>28</u> Provide firegrates
<u>19</u> Provide tables

both printed and electronic formats. Databases in dBASE III+ will allow parks to identify potential management alternatives and contacts at other parks who have had experience with various management strategies and actions. Encouraging technology transfer between parks can be an effective means for sharing the expertise of backcountry managers regarding both successful and unsuccessful approaches for addressing backcountry recreation problems.

Actions implemented by backcountry managers to address campsite impacts range from indirect lighthanded options to direct, authoritarian options. A common wilderness management principle is to apply the minimum action required to accomplish established objectives. Due to their "costs" to visitors, managers should evaluate and implement the most effective indirect controls to delay or minimize the imposition of direct controls (Hendee et al. 1990). While no effort was made to distinguish between backcountry versus wilderness management in this survey, the NPS draws few distinctions between its management of these two land classifications.

between its management of these two land classifications. Previous surveys of wilderness management practices have generally shown more reliance on regulations than nonregulatory alternatives (Washburne and Cole 1983, Fish and Bury 1981). This was particularly true for the NPS, as compared to the other wilderness management agencies. A review of Tables 2-4 supports the finding that direct actions are also used more frequently than indirect actions with respect to the mitigation of campsite impact problems in NPS backcountry areas.

NPS Management Policies (USDI 1988) direct managers to avoid unacceptable impacts on backcountry resources or adverse effects on visitor enjoyment of appropriate recreational experiences. In effect, managers must weigh recreational use against its associated resource impacts, implementing visitor management actions as necessary to maintain an acceptable balance. Direct regulations are both necessary and appropriate under certain circumstances, for example when recreational use threatens irreversible resource damage (camping in environmentally sensitive areas) or the safety of visitors and park wildlife (feeding bears). Additionally, McAvoy and Dustin (1983) cite self perception theory in arguing that direct regulations, in conjunction with indirect measures, can assist visitors in forming and internalizing attitudes and beliefs that support subsequent low impact behaviors.

Little formal data exists regarding the effectiveness of alternative management actions, although indirect actions are generally regarded as less effective than direct actions (Hendee et al. 1991, McAvoy and Dustin 1983). Perhaps the most significant shortcoming of NPS backcountry recreation management is that managers lack the means to evaluate the success or continuing need for implemented actions. For example, the accuracy and longevity of most campsite impact monitoring programs are insufficient to provide the data necessary for such analyses. Recent guidance provided by Cole (1989) and Marion (1991) may aid in the development of such programs. Monitoring can provide an objective record of resource conditions over time that permit early detection of problems, suggest effective mitigating actions, and enable evaluations of management action effectiveness.

Another fundamental shortcoming of NPS backcountry recreation management is that most parks lack a formal management framework to guide decision making necessary to balance recreational use and resource impacts. Several new frameworks evolved from and are currently replacing management approaches based on carrying capacities. Our survey revealed that an increasing number of parks are adopting these frameworks, which include the Limits of Acceptable Change (14 parks), Visitor Impact Management (2 parks), and the Carrying Capacity Assessment Process (1 park). The revised NPS Management Policies (USDI 1988) offers guidance to parks that, over time, should address these deficiencies: "The National Park Service will identify acceptable limits of impacts, monitor backcountry use levels and resource conditions, and take prompt corrective action when unacceptable impacts occur."

Literature Cited

Cole, D.N. 1981. Managing ecological impacts at wilderness campsites: an evaluation of techniques. *Journal of Forestry* 79(2):86-89.

Cole, D.N. 1982. Wilderness campsite impacts: effect of amount of use. Res. Pap. INT-284. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 34 p.

Cole, D.N.; Benedict, J. 1983. Coverups: How to pick a campsite you can leave without a trace. *Backpacker* 11(5): 40,44,87.

Cole, D.N.; Marion, J.L. 1988. Recreational impacts in some riparian forests of the eastern United States. *Environmental Management* 12(1): 99-107.

Cole, D.N.; Petersen, M.E.; Lucas, R.C. 1987. Managing wilderness recreation use: common problems and potential solutions. Gen. Tech. Rpt. INT-230. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 60 p.

Fish, C.B.; Bury, R.L. 1981. Wilderness visitor management: Diversity and agency policies. *Journal of Forestry* 79(9): 608-612.

Hammit, W.E.; Cole, D.N. 1987. *Wildland Recreation: Ecology and Management*. New York, NY: John Wiley and Sons. 341 p.

Hendee, J.C.; Stankey, G.H.; Lucas, R.C. 1990. *Wilderness Management*, 2d ed. Colorado: North American Press. 546 p.

Lime, D.W. 1979. Carrying capacity. *Trends* 16(2): 37-40.

Lucas, R.C. 1979. Perceptions of non-motorized recreational impacts: a review of research findings. In: *Proceedings, Recreational impact on wildlands conference*. R-6-001-1979; 1978 October 27-29; Portland, OR. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region: 24-31.

Lucas, R.C.; Schreuder, H.T.; James, G.A. 1971. Wilderness use estimation: a pilot test of sampling procedures on the Mission Mountains Primitive Area. Res. Pap. INT-109. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 44 p.

McAvoy, L.H.; Dustin, D.L. 1983. Indirect versus direct regulation of recreation behavior. *Journal of Park and Recreation Administration* 1(3): 12-17.

Manning, R.E. 1979. Strategies for managing recreational use of national parks. *Parks* 4(1):13-15.

Marion, J.L.; Merriam, L.C. 1985. Recreational impacts on well-established campsites in the Boundary Waters Canoe Area Wilderness. Bull. AD-SB-2502. St. Paul, MN: University of Minnesota, Agricultural Experiment Station. 16 p.

Petersen, G.L.; Lime, D.W. 1979. People and their behavior: A challenge for recreation management. *Journal of Forestry* 77(6): 343-346.

Ream, C.H. 1980. Impacts of backcountry recreationists on wildlife: An annotated bibliography. Gen. Tech. Rep. INT-81. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 62 p.

Roggenbuck, J.W.; Watson, A.E.; Williams, D.R. In Press. Visitor input to defining acceptable conditions in wilderness. *Environmental Management*.

U.S. Department of Interior, National Park Service. 1988. *Management Policies*.

van Wagendonk, J.W. 1981. The effect of use limits on backcountry visitation trends in Yosemite National Park. *Leisure Scientists* 4(3): 311-323.

Washburne, R.F.; Cole, D.N. 1983. Problems and practices in wilderness management: A survey of managers. Res. Pap. INT-304. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 56 p.

TRAIL INVENTORY AND ASSESSMENT

APPROACHES APPLIED TO TRAIL SYSTEM

PLANNING AT DELAWARE WATER GAP

NATIONAL RECREATION AREA

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Trail system planning and management require accurate assessments of existing trail resources and their condition. A standardized and efficient process for surveying, inventorying, and assessing trail systems was developed and applied in the Delaware Water Gap National Recreation Area. Two approaches employed were (1) a Trail System Inventory, and (2) Prescriptive Work Logs. These complementary approaches provide resource managers with valuable information regarding the location and length of individual trails, their current condition and needed maintenance work, and material and labor estimates necessary to conduct such work.

Introduction

This paper describes two trail inventory and assessment approaches developed and applied at Delaware Water Gap National Recreation Area (DWGNRA) in support of a comprehensive trail planning effort. The trail surveys and final report were developed by the Appalachian Mountain Club (AMC) Trails Program under cooperative agreement with the National Park Service (NPS)¹. Here, we review the criteria used to select the specific trail survey approaches, discuss our application of these approaches, and critique the capabilities and limitations of the approaches. We believe the standardized, yet flexible, techniques applied in DWGNRA offer significant advancement over earlier, less structured approaches.

Trail System Planning in DWGNRA

The objective of natural resource management planning is to translate legislation, regulations, and policies into objectives, programs, and specific actions (Hendee and von Koch 1990). The trail system planning strategy for DWGNRA mirrored this process by translating DWGNRA General Management Plan (GMP) goals into specific trail resource

recreation alternatives for visitors. To meet the needs of resource visitors and resource managers, the strategy for DWGNRA included: (1) identification of recreation interests, (2) identification of management objectives, (3) documentation of trail resources, and (4) prescriptions for correcting resource problems in light of recreation interest and management concerns. To be effective, this plan had to be flexible by design in order to address both current and future trail resource needs.

Approaches to trail system planning are selected according to management objectives, often derived with cooperative involvement of interested and involved individuals and organizations. The process adopted here is marked by the cooperation of an external organization in analyzing the suitability of trails to address recreation demands and concerns. The results of this effort are intended to feed a public review process.

Project Background

DWGNRA is managed by the NPS and is located in the states of Pennsylvania and New Jersey. Established along a 35 mile stretch of the Delaware River by an Act of Congress in 1965 as part of the Tocks Island hydroelectric project, DWGNRA today embraces some 54,000 acres of the nearly 70,000 acres originally circumscribed. Congress, as part of the Tocks Island Dam legislation, directed the Army Corp of Engineers to assemble a detailed set of maps for the area within the congressionally mandated boundaries. These cartographic documents provided a rich resource for this project. The 1987 DWGNRA GMP called for the enhancement of day and overnight hiking opportunities, to be accomplished with the provision of an expanded trails network. The GMP specifically obligated DWGNRA to work with trail clubs and organizations in planning for expanding and maintaining the trail system. The AMC, though headquartered in Boston, met the NPS needs as a conservation and recreation organization with an organizational chapter located in the DWGNRA region. In 1975, the AMC had performed a study under cooperative agreement with DWGNRA (Appalachian Mountain Club). More significantly, in 1988 the AMC had completed a park-wide trail study for Acadia National Park in Maine². In 1989 DWGNRA invited the AMC to complete a similar study of their trails.

Primary Goals of the Project

DWGNRA faced a situation common to many parks and forests: how to upgrade an existing, partially informal trail system in an organized manner when both the current conditions and viable options for improving the system are incompletely documented. DWGNRA intended to offer a trail system with a diversity of dispersed recreation opportunities, but required information to direct the necessary efforts in a cost-effective manner.

The primary goals of this project, then, were to:

1. Emphasize the protection of the existing and proposed trail system resources by identifying deficiencies, alternative engineering solutions, and visitor management actions.
2. Produce a report for DWGNRA containing documentation of the trail system's current status, options for future alignment, and estimated costs required to realize potential alignments. This report was intended to provide a preliminary set of recommendations for the comprehensive trail planning process.
3. Incorporate the objectives of the DWGNRA GMP wherever possible, especially those to: (a) provide a quality trail system that emphasizes a minimal disruption of natural processes while servicing a broad range of visitors, and (b) employ existing dirt roads, trails, and woods roads to the greatest advantage.

1/ Williams, Peter B.; Marion, J.L.; Rajala, R.R. 1992. A comprehensive trail inventory and preliminary recommendations for development and maintenance of a trail system in Delaware Water Gap National Recreation Area. Gorham, NH: Appalachian Mountain Club, Trails Program. 93 p. [unpublished].

2/ Williams, Peter B.; Rajala, R.R.; Martin, B.H. 1988. Acadia National Park trail system assessment. Gorham, NH: Appalachian Mountain Club, Trails Program. 69 p. [unpublished].

Selection of Inventory and Assessment Approaches

The cooperative agreement between DWGNRA and the AMC addressed the need to document existing conditions through a comprehensive trail resource inventory and assessment. The purpose for the report was to fuel a public review period, to provide a starting point for comments by managers and interested members of the public. To achieve these ends, two state-of-the-knowledge techniques for trail inventory and assessment were applied: (1) a *Trail System Inventory* and (2) *Prescriptive Trail Work Log* assessments.

Four techniques were considered (Table 1). Each approach has its own unique capabilities. Of the techniques applied in DWGNRA, a *Trail System Inventory* approach provides a broad description of the system as a whole, including the location, classification, and general features of individual trails. The *Prescriptive Work Log* approach, in contrast, catalogs specific features of a trail. Groups of trails may then be reviewed

according to their features or deficiencies (e.g.: drainage needed in a local area, district, park, or forest). Originally, prescriptive work logs served trail maintenance purposes. The location of existing trail engineering features were catalogued along with any work needed to maintain those features. A modern prescriptive work log, however, fulfills management, as well as maintenance, objectives. Contents of prescriptive work logs completed in DWGNRA consist of observations oriented toward maintenance and management of the trail resource, oftentimes coupled with references to selected visitor management and recreation features (e.g.: viewsheds, camping potential, general parking availability). Such techniques can be modified according to a manager's need to obtain information for a variety of purposes, including maintenance, visitor interpretation, natural resource protection, or any combination. The information gathered by each of the two techniques selected for application in DWGNRA, then, was intended to complement the information gathered by the other.

Table 1. Four trail inventory and assessment techniques.

Technique	Purpose
Trail (System) Inventory	Identify and catalog the trail system's physical resources including surface type, location, or access opportunities. Often incorporates non-physical classifications such as ownership, type of use, or maintenance level.
Prescriptive Trail Work Logs	Identify trail tread deficiencies and prescribe tread engineering solutions. Adaptable to resource and visitor management purposes. Provides basis for cost and staff estimates and recommendations.
Research Level Measurements	Studies designed to understand processes such as relationships between visitation and resource degradation.
Monitoring Level Measurements	Monitoring resource conditions over time. Oriented toward measuring parameters documenting resource impacts rather than resource maintenance and management.

Monitoring and Work Log Approaches Compared

Of the four approaches outlined in Table 1, heaviest debate focused on whether to apply monitoring or prescriptive work log techniques to support the anticipated report's recommendations. Monitoring is done to measure physical changes to the environment resulting from an influential factor, typically recreational use. For example, soil loss occurring over a period of time may be measured. While monitoring might provide objective assessments of trail resource conditions, such measurements do not provide the information necessary to estimate the cost for repairing the effects or mitigating the cause of resource degradation. Yet, estimating these costs was an important management objective for the project. Further, monitoring is not intended to prescribe recommendations for addressing concerns about the resource or visitors, a primary goal of the cooperative agreement.

For this project, a monitoring effort would have yielded a description of the changes occurring as a result of recreation. A prescriptive work log approach, however, would yield a description of the recommended solutions to such physical changes. One final factor was considered: trail maintenance recommendations will vary according to the type and amount of existing or anticipated recreational use. In many ways, trail work is discretionary by its very nature; those who work on trails must make judgments concerning how best to remedy a perceived problem. The need for flexibility in describing trail maintenance recommendations became the crucial criteria for selecting an approach. Because prescriptive work logs originally were devised to document recommendations based on direct field observations, they are most easily adapted to provide information necessary for estimating costs.

Trail System Inventory: Methodology

Three objectives of equal priority guided the trail system inventory. First, the twenty-five year old Army Corps of Engineers maps required ground verification of all trails and

roads features. Second, an inventory of the basic features of the trail system was to be completed. And, third, the cartographic data would be prepared for transfer to DWGNRA's Geographic Information System (GIS). Using the Corps' maps (1:400 scale) as a baseline, two surveyors were directed to hike all roads and trails appearing on the maps, confirm the existence and location of these features, and accurately locate any roads or trails not appearing on the maps. While hiking the system, the inventoried roads and trails were categorized according to NPS management classifications, access, ownership, surface, average width, and maintenance level. Scenic features, water courses, major maintenance needs, and vehicle barriers also were noted on the maps.

Trail System Inventory: Applications

The trail system inventory painted a broad overview of the entire system of roads and trails found in DWGNRA. From this baseline information, a preliminary trail system was selected during a consultation period involving NPS and AMC staff. This period of *intermediate evaluation* was built into the field schedule of the project. The prescriptive work log technique for assessing trails was applied to the trails comprising this preliminary system.

The GIS applications of the inventory data are perhaps the most beneficial. Access to high quality maps during the trail planning review process will encourage constructive criticism of the preliminary trail system's layout. Not all roads and trails inventoried in DWGNRA were selected for the proposed system. Only those that appealed to the perceived visitation demands and the indicated management objectives were selected. However, access to an accurate set of trail resource maps will better communicate the AMC's rationale for recommending the particular system found in their report. Also, computer generated maps will likely facilitate interpretive efforts, maintenance efforts, resource protection efforts, and resource management efforts, as well as search and rescue, and fire fighting operations.

A well formulated trail system inventory should remain applicable for many years. However, a new inventory of specific trails or areas, possibly with new parameters, may be necessary following the onset of natural disasters (extensive flooding or heavy snow-melt), introduction of a new form of recreation (mountain bike or horse use), or inauguration of new management directives (management zoning).

Prescriptive Work Logs: Methodology

Various forms of prescriptive work logs have been applied by agencies and organizations in diffuse regions of the country. Hooper (1988) describes a trail log format employed by the NPS, though this particular approach is considered to be a physical inventory separate from what Hooper refers to as a condition/ corrective survey. Prescriptive work logs have traditionally blended a detailed physical inventory with a series of corrective prescriptions intended to remedy any trail tread and alignment deficiencies observed along a trail. The AMC Trails Program has applied such assessments extensively for some fifteen to twenty years. Proudman and Rajala (1981) describe several methods for conducting prescriptive work logs. Recent incorporation of the capabilities of personal computer technology to store, analyze, and present information has made the prescriptive work log format even more useful than in the past.

For a prescriptive work log to be a reasonable estimate of a trail's condition, the individual conducting the survey must be accomplished in trail construction and design. Prescriptive work logs completed in the DWGNRA were compiled by an

individual proficient with a wide range of trail work techniques and the many options for mitigating trail resource damage. In general, prescriptions for trail work actions should be the minimal necessary to stabilize the trail tread, should emphasize protection of natural resources, and should exhibit a clear understanding of the trail's role within the locally available recreational opportunities. Further, those who are compiling the surveys should be given clear understanding and directions regarding the intentions for the trail.

In DWGNRA, a format for prescriptive work logs was selected that relied upon pocket dictation device to record comments. These comments were organized by verbal reference to distances indicated by a five foot circumference trail-measuring wheel pushed along each trail. The wheel's counter displayed the distance from a starting point within six (6) inches by tallying five foot intervals to the nearest tenth of an interval. The location of permanent reference features such as stream crossings or conspicuous rocks was noted to facilitate accurate future location of sites requiring work.

The dictation notes were later transcribed and formatted on a computer word-processor. A standard format has evolved at the AMC (Example 1.). The work logs can then be printed and placed in a ring-binder for simple access. A well-documented prescriptive work log done in the Northeast will remain a good gauge of a trail's condition for roughly five to ten years, depending on the amount of recreation use, the form of that recreation, and any severe weather.

Example 1. Format of an AMC Prescriptive Work Log.

Project Title (if appropriate)		
Trail: ADAM'S CREEK TRAIL file name: "ADAMCRKLOG" pages: 12 Area: West of Rt. 209, north of Dingman's. Date: Aug. 26, 1989 Synopsis: Containing a summary of the work log's highlights. Appropriate comments include trailhead information (sings, parking, access, etc.), safety concerns, natural features, basic geology (helpful for work crews), and major issues or problems associated with the trail.		
<u>1=5 ft</u>	<u>Comments</u>	<u>Work</u>
006	[EX: information that a work crew would use to orient themselves or to find a work site, suggestions for installing the work, or dimensions of existing trail work.]	6' Water Bar, Right; install 20" ditch parallel to tread [in gully adjacent to road].
012	ref. trail traverses section of old road w/ stone wall, Left; terrain drops off down to creek, Right; no work needed.	
173	ref. remains of old jeep road joins from Left; 2 large red pines on ground	Install 5 Rock Steps to harden 3-foot-deep gully.

The dictation method of recording prescriptive work logs has advantages and disadvantages. Occasional errors in handling the tape recordings do occur, and clear enunciation of concise comments is imperative. Furthermore, the dictation tapes must be transcribed, introducing another potential source of error. However, compared to the alternative of recording comments on paper forms, dictation devices have several advantages. The devices are more efficient in the field since they require only one hand to operate, as compared to taking notes on a clipboard. Further, notes on paper are more time-consuming to write and there is a tendency to be too brief. If a prescriptive work log is to be used as a document in a trail work labor contract, or is to be used by a field crew who is unfamiliar with an area, detailed descriptions of work locations are very important. Finally, dictation devices work well in plastic bags under wet conditions, allowing assessment of trail

drainage problems at times when those problems are most obvious.

Prescriptive Work Logs: Applications

By following standardized procedures for recording comments, managers and their staff can assemble information in a format that facilitates field efforts and trail work planning. Managers concerned with allocating budgets and staff, and staff concerned with completing field projects, benefit from the information in prescriptive work logs, originally developed for specifically these purposes. In DWGNRA prescriptive work logs facilitated planning efforts by providing information about the proposed trail system's strengths and limitations. Prescriptive work log trail maintenance assessment figures for each trail were entered into a computer database and printed in a catalog format (Example 2). A database also permits managers to calculate labor and materials

necessary to complete the estimated work needed on a trail. Data from the prescriptive work logs completed in DWGNRA can effectively summarize the trail maintenance work required

for a single trail or any selected grouping of trails. Additionally, prescriptive work logs are commonly used as a field guide for trail work contractors and cooperators.

Example 2. Format of an AMC Catalog Entry of Prescriptive Work Log Summary.

Project Title (if appropriate)				
Trail Name:	Adam's Creek			
Length:	0.93 mi.			
Date of Log:	Aug. 26, 1989			
Logged By:	Name			
General Characteristics		Maintenance Figures		
		Item	Total Feet	Units
Difficulty:	moderate	Rock Steps	n/a	43
Existing use:	Hiking	Log Steps	n/a	0
Level of use:	moderate	Step Stones	n/a	32
Recommended use:	Hiking	Ditching	6	1
Expected level of Maintenance:	moderate	Wood Water Bar	16	2
Sensitive areas?:	Yes	Rock Water Bar	0	0
Potential safety concerns?:	Yes	Cribbing	75	1
		Stream Bridge	0	0
		Bog Bridge	0	0
		Sidehilling	0	n/a

Comment:

Adam's Creek has several stream crossings. The streams are shallow, except in flood. Step-stones are needed to traverse somewhat deeper sections. Beyond the upper falls is a mill. A number of options are present for connecting the current trail with the mill area if this is desired. Additional route-finding work will be necessary to determine the preferred route. The south bank is recommended for accessing the mill. The north bank is steep and has more obstacles. Management decisions concerning use, type of use, local loop hikes, etc. should be made prior to the installation of this route.

Discussion

Trail inventories and prescriptive trail work logs offer managers a standardized, yet flexible, method for inventorying and assessing individual trails or entire trail systems. A consistent methodology for compiling information about trails enhances the capacity of an agency or other organization to manage those trail resources. This paper illustrates the application of two separate but complementary trail surveys which provided information vital to the DWGNRA comprehensive trail system planning process. The trail survey information formed the basis for AMC recommendations regarding the proposed DWGNRA trails system, including the type, extent, and cost estimates of the trail work required to fully establish the proposed system.

Trail surveys provide objective information about trail resource conditions and the capabilities of the trail resource to sustain various forms of recreation. Such information should be integrated with expressed public needs and views when formulating a final trail system plan. It is recommended that the results provided by trail surveys be presented to the public as background information supporting public involvement and review. Such input is viewed as critical to the design and implementation of a broadly accepted network of trails appealing to recreationists of all interests, whether hikers, walkers, horse-riders, or bicyclers.

Literature Cited

- Appalachian Mountain Club. 1975. A proposal for dispersed recreation in the Delaware Water Gap National Recreation Area. Boston, MA: Appalachian Mountain Club. 62 p.
- Cole, David N. 1983. Assessing and monitoring backcountry trail conditions. Research Paper INT-303. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 10 p.
- Hendee, John C.; von Koch, R. 1990. Wilderness management planning. In: Wilderness Management. John C. Hendee, George H. Stankey, and Robert C. Lucas., eds. Golden, CO: North American Press: 195-213.
- Hooper, Lennon 1988. NPS trails management handbook. Denver, CO: U.S. Department of the Interior, National Park Service, Denver Service Center. GPO, 1988-576-279/85200. 53 p.
- Proudman, Robert D.; Rajala, R.R. 1981. Trail Building and Maintenance, 2nd Edition. Boston, MA: Appalachian Mountain Club. 286 p.

FEDERAL AGENCIES
U.S. Forest Service

CUSTOMER EVALUATION OF CAMPGROUND MANAGEMENT: HURON-MANISTEE NATIONAL FORESTS

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Customers gave high satisfaction ratings for seven campground management attributes. Friendly staff received the highest average rating. Correlations among attribute ratings, and written comments suggest that a friendly staff is associated with high ratings for a number of other important attributes. Preferences for increased development were mixed.

Introduction

High customer satisfaction ratings for each of the seven campground management attributes included on a customer satisfaction survey stand out in the responses of 120 visitors who were surveyed at Huron-Manistee National Forest campgrounds during summer, 1989. "Excellent" was by far the most common rating for each of the attributes, and there were very few responses in the "below average" or "poor" categories. "Friendly staff" and "safe and secure" received the highest average ratings, followed by "first impression" and "clean and in good condition." Other attributes were not far behind:

Table 1. Mean customer ratings of campground management attributes.

Attribute	Mean rating*
Friendly staff**	1.2
Safe and secure	1.2
First impression	1.3
Clean and good condition	1.3
Information	1.4
Fees were fair	1.6
Opportunities for family	1.8

* Based on excellent = 1, better than average = 2, average = 3, below average = 4, and poor = 5.

** For actual wordings of the questions a copy of the questionnaire can be obtained from the author.

Individuals were given the opportunity to provide additional comments on each of the attributes as well as general comments, and most did so. The full text of all comments is available from the author, and it provides good insight into the preferences of campers. The following summaries of each attribute were developed from those comments to help convey how individuals interpreted each question:

Friendly staff: Most comments referred to campground hosts and a few to concessionaires.

Safe and secure: Many comments referred to an absence of anti-social behavior such as thefts, loud noise, motorcycles, etc. Many mentioned that a person on site in a position of authority is a key to a safe and secure campground.

First impression: Most comments on first impressions related to the presence of hosts, the beautiful natural settings, and nice facilities.

Clean and good condition: Many comments referred to toilet facilities, pumps, and the condition of sites.

Information: Most comments related to maps and rules and regulations. Several suggested the desirability of maps of the area and nearby attractions.

Fees were fair: Those who thought that fees were high made comparisons with current fees for rustic campgrounds in State Parks.

Opportunities for family: Comments focused on facilities for children and sports activities.

There was a high correlation between "friendly staff" and "information," meaning that people who rated one of these attributes high tended to also rate the other high (and similarly for low ratings). Both of these attributes also had quite high correlations with "first impressions." These suggest that friendly employees provide information and promote a good first impression, something that a number of respondents noted in their written comments.

Selected comments about "first impressions" that point out the importance of "friendly employees:"

"our hosts have made us very welcome and we love it here"

"the host was a great help"

Selected comments about "information" that illustrate the importance of "friendly employees:"

"Mr. Gleason is tops"

"all handed right to us very clear"

Other comments about first impressions suggest that the setting and facilities also contributed to first impressions. Selected quotes from first impressions include:

"beautiful setting"

"love natural setting"

"like the large lots"

There was also a high correlation between "safe and secure" and "information." This is not surprising since the question about safety and security focused on the prompt and fair enforcement of rules and regulations; while the information question focused, in part, on the availability and understandability of rules and regulations. It would seem reasonable to expect a tie between clear information about rules and regulations and their subsequent enforcement. Perhaps friendly people working in a campground could also be expected to make users feel more safe and secure. This is apparent in comments such as the following:

"the man in charge gave us a feeling of feeling safe here - very pleasant"

"Chuck and Norma do a wonderful job of running this campground. The rules are enforced and it is a very peaceful place"

Comments on the questionnaires stress the importance of having a person on site to enforce rules and regulations and prevent anti-social behavior such as loud noise, driving through at night in vehicles, and using fireworks:

"Yes (feel safe and secure); but not without our hosts enforcing it"

"A park like this needs a host, or motorcycles would be running up and down the park road all the time"

Campground hosts received considerable praise for their work in providing a safe and pleasing environment, as did concessionaires. Some users mentioned a desire for more of a uniformed presence such as a "ranger." Many comments noted that a breakdown in control at a campground leads to major problems for users. Discussions with Forest staff indicate that one of the sites, which provided nearly half of the interviews, had previously been heavily used as a "party spot" until a concessionaire set up operations at the entrance and maintained tight control over the traffic flow and inappropriate behavior. The concessionaire maintained close personal contact with the campers. The fairly high correlation between cleanliness and safety also suggests that a clean and well-maintained campground suggests a safe and secure environment where rules are enforced. The high ratings for "safe and secure" and the written responses suggest that the campers generally feel very safe and secure in the campgrounds where they were surveyed. For example:

"felt secure in leaving camp unattended while running to store, etc."

Satisfaction with fees was not highly correlated with satisfaction with other campground attributes; but in all instances the correlations were positive, suggesting that individuals were more likely to be satisfied with fees if they were satisfied with other aspects of the campground. Fees had their highest correlation with "opportunities for family," suggesting the importance of these opportunities to respondents. Individual comments on the questionnaire indicated that many respondents associated "opportunities for family" with additional developments in the campground or adjacent areas. Since the question focused on whether the campground and surroundings provided "recreation opportunities for the entire family," many respondents suggested playground equipment and related facilities for children -- particularly at Round Lake. Others suggested higher levels of development to include showers, dump stations, electricity, etc. The correlation between fees and "opportunities for family" may also be attributable to a tendency to set campground fees according to level of development i.e., higher charges for sites with electricity, dump stations, etc. For example, the following comments that were provided on the fees question:

"State Parks get \$4.00 for rustic campsites"

"For \$6.00 a night we should at least have electric"

Variations by Site

Data were available for seven sites; but only the five that had 9 or more observations were included in the analysis of variation among sites. The number of observations per site at these five facilities ranged from 9 to 56. Due to the small number of responses, subsequent discussion is limited to the individuals interviewed and should not be extrapolated widely.

Round Lake (57 observations) ranked higher than the other five sites in "clean and good condition," "fees were fair," "friendly staff," "information," and "safe and secure." It rated a close second in the other two categories of "first impression" and "opportunities for family." Old Grade (11 observations) fared the worst of the campgrounds, ranking last in all attributes but "safe and secure." It was not possible to explain the differences in ratings between the two sites on the basis of the comments given by respondents, other than to note strong support for the new concessionaire/host at Round Lake.

Levels of Development

Individuals interviewed at Round Lake were asked an additional question concerning the appropriate level of development for that campground. They were asked to respond "yes" or "no" to the following question: "Do you feel this campground would be better served with additional facilities such as electricity, showers, etc.?" Responses were divided almost evenly between the two choices (28 "yes" and 27 "no."). Illustrative responses include the following:

"we would love to see electricity at least"

"dump station and a small playground for kids"

"keep it like it is"

"putting in those would take away from what people want to get away from"

Those who opposed the additional facilities often mentioned a desire to keep the rustic nature of the campground, and one who supported the developments qualified their support with the comment "providing the current rustic atmosphere was kept." Opponents of upgraded facilities also mentioned that there were other campgrounds available that provided such developments. Some who said "no" to the developments cited the small size of the campground. Ten respondents who were in favor of additional facilities also mentioned a need for a dump or pumping station for RVs. Some also mentioned the need for an upgraded water system and playgrounds.

Summary and Conclusions

Subsequent discussion focuses on implications for management and research:

Management

Customers reported high levels of satisfaction with the management of campgrounds. They were most satisfied with friendly staff, safe and secure environment, and their first impressions; but the ratings for clean and good condition, information, fees, and opportunities for the entire family were quite good. For example, although "opportunities for family" received the lowest average rating, half of the respondents rated those opportunities as "excellent."

Friendly staff not only received the highest average rating; but correlations with other attributes and written comments suggest that a friendly staff is associated with good information, a safe and secure campground, and good first impressions. This underscores the association between a friendly staff and a high-quality camping experience.

While limited data restricted comparisons among sites, there is some indication that Round Lake provides higher quality experiences than the other sites, particularly Old Grade. The reasons for this appear to be attributable to a particularly good concessionaire and host.

Respondents at Round Lake were almost evenly divided in their support for "additional facilities such as electricity, showers, etc." The issue appears divided along the dimension of a primitive environment vs. high levels of facilities. It points out the need to provide for a range of camping experiences in the National Forests.

Research

The written responses provided useful insight into the ratings and sound recommendations for management. It appears useful to include them on subsequent evaluations of customer satisfaction.

The small number of responses limited comparisons among sites and it was surprising that written comments did not help to explain differences in average ratings between sites. Subsequent efforts might involve additional respondents and might inquire directly about the difference between the site

where the individual is located and other sites that they have used or know about. For example, "What do you like most (or least) about this site in comparisons with others that you use or know about?" or perhaps "What would have to be offered at another site in order to induce you to use it instead of this one?"

The camping experience is also influenced by the setting in which the campground is located, including the local landscape and nearby opportunities for recreation. Questions about these attributes might provide useful guidance for locating subsequent campgrounds or managing areas around them.

A number of comments about facilities for the entire family and the desirability of additional facilities such as electricity and showers mentioned the "image" of a National Forest campground. Perhaps subsequent studies could explore the "expectations" or "image" held by the public for National Forest campgrounds.

Individuals express their evaluations of campgrounds and campsites in their choices of places to camp. Much could possibly be learned by evaluating the use patterns of sites and campgrounds or presenting individuals with hypothetical choices of campgrounds and campsites and evaluating their responses. The use of hypothetical choices enables the evaluation of settings that do not currently exist and also makes it possible to evaluate the preferences of those who do not currently use National Forest campgrounds.

URBANITES' AWARENESS AND USE OF SIX LAKE STATES NATIONAL FORESTS:

A SPATIAL ANALYSIS

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Awareness and use of six Lake States National Forests decreases with distance from a Forest, number of Forests that are closer to home, and crossing a state line. When these distance-related variables are accounted for, awareness and use of the Superior National Forest is higher than the other Forests.

Introduction

Recreation managers of National Forests and other public lands are increasingly interested in developing marketing strategies that will help them serve the public most effectively. The USDA Forest Service's National Recreation Strategy identifies a range of marketing information needs that outdoor recreation research can help meet (Dwyer, 1990). An important first step is identifying the existing and potential customer base so that marketing programs can be targeted. For example, National Forests in the Lake States and other regions in the U.S. often exist in relatively close proximity to one another, in some cases side-by-side divided only by a state line. What factors influence people's awareness and use of different forests? Basic information like this is needed before an effective marketing program can be implemented.

This paper examines awareness and use of National Forests in the Lake States by those who live in selected urban centers within the region. Urbanites constitute a major customer base for forest recreation, and the concentration of existing and potential customers in urban areas is an important consideration in any marketing effort. But while on-site recreation surveys consistently reveal a strong base of satisfied urban customers, very few studies have looked at general samples of urban users and nonusers. Thus little is known about how the general urban public perceives forest recreation opportunities.

Methods

A random sample of residents in four major urban centers (Duluth, Minneapolis/St. Paul, Green Bay, and Milwaukee) were surveyed by mail. In one section of the survey, individuals were asked if they were aware of or had ever used any of six Lake states National Forests; the Superior, Chippewa, Chequamegon, Nicolet, Hiawatha, and Ottawa. Respondents were considered to be "aware" of a Forest if they had ever visited or "knew of but never visited" the Forest. There were approximately 200 respondents in each of the four urban centers.

This discussion focuses on awareness and use of the six National Forests by respondents in the four urban centers, a total of twenty-four origin-destination pairs. The percent of respondents from each origin who reported that they had heard of or visited individual Forests is presented in Table 1. Travel distance between each origin-destination pair was calculated from road maps and represents the actual road distance from city centers to the nearest point on the Forest (Table 2). Data were also gathered on whether a state line must be crossed during the trip as well as the number of Forests that were closer to the

origin than the destination Forest. While the limited number of observations (24 origin-destination pairs) restricts the analysis, some insight into awareness and use of Forests by urbanites can be gained from analysis of the data.

Results

A state line separating a city from a Forest reduces awareness and use of a Forest more than travel distance or the number of other Forests that are closer to the city. The significance of state boundaries appears to reflect barriers to information and the increased cost of out-of-state hunting and fishing licenses.

Individuals may be less aware of Forests in other states since most tourism promotion is done by the state, and National Forests may not be featured in efforts to draw individuals from out-of-state. Information dissemination programs of individual Forests may contribute to this pattern as well.

The need to cross a state line was a significant explanatory variable for individuals who reported that someone in their household had hunted or fished in the past three years, as well as for individuals who reported no hunting and fishing activity. However, a state line was a significantly greater barrier to use for individuals from households where someone had hunted or fished. This suggests that the need for hunting and fishing licenses explains part, but not all, of the role of state lines in travel behavior.

The effect of a state line on levels of awareness and use is illustrated by the Chippewa and Chequamegon National Forests. These two forests are about the same distance from Minneapolis/St. Paul; but the awareness level of the Chippewa for this urban center is 37 percent higher than the Chequamegon, and the percent reporting that they visited it is 19 percent higher. Our analysis suggests no significant differences in the reputation and attractiveness of the two Forests, so much of the difference might be attributed to crossing the state line between Minnesota and Wisconsin. Similarly, the Ottawa is only slightly farther from Milwaukee than the Chequamegon; but its levels of awareness among Milwaukee respondents is 33 percent lower than the Chequamegon and the proportion who have ever used it is 32 percent lower. Much of this difference might be attributed to the need to cross the state line from Wisconsin into Michigan in order to reach the Ottawa.

Once distance, state lines, and closer forests are accounted for, there are still differences in levels of awareness and use of the six National Forests. The awareness of the Superior among respondents is 25 to 41 percent higher than the five other Forests, and the percent of respondents who had ever used it is 18 to 27 percent higher. Also, there is an unusually high level of awareness of the Superior National Forest among people who live 400 or more miles from the Forest, even though few of them actually visit it. The popularity of the Boundary Waters Canoe Area Wilderness as a destination, along with the controversy surrounding its establishment, management, and use may have brought significant publicity to the Superior. The Superior is also two to three times larger than the other Forests, which most likely adds significantly to its awareness and use. There did not appear to be significant differences in reputation and attractiveness among the five other Forests.

The high levels of awareness and use of the Superior National Forest are illustrated by respondents from Minneapolis/St. Paul. The Superior is farther from Minneapolis/St. Paul than the Chippewa; but the awareness level for the Superior is 19 percent higher and 27 percent more of the respondents reported that they had ever used it. Much of this difference can be attributed to increased reputation and attractiveness of the Superior. Similarly, the Superior is also farther from Milwaukee than the Chippewa; but 30 percent more of the Milwaukee respondents were aware of the Superior and 23 percent more had used it.

Table 1. Percent of respondents who were aware of or have visited a National Forest, by urban center.

NATIONAL FOREST	Duluth		Minneapolis/St. Paul		Green Bay		Milwaukee	
	% Aware	% Used	% Aware	% Used	% Aware	% Used	% Aware	% Used
Superior	99	83	98	66	78	25	77	26
Chippewa	83	45	79	39	46	6	47	3
Chequamegon	67	27	42	20	88	44	73	44
Nicolet	25	3	27	8	96	77	87	62
Hiawatha	27	5	19	8	49	19	40	12
Ottawa	24	5	19	4	45	17	40	12

Table 2. Distance to National Forest from urban centers, in miles.

NATIONAL FOREST	Duluth	Minneapolis/St. Paul	Green Bay	Milwaukee
Superior	61	198	403	497
Chippewa	102	176	454	463
Chequamegon	50	181	163	275
Nicolet	196	294	52	181
Hiawatha	521	455	130	259
Ottawa	233	316	155	284

Before discussing implications of the study, two possible problems with the data must be explained:

- 1) The average levels of awareness and use presented in Table 1 appear to be unusually high. Part of the reason may be that individuals who were aware of or had used the National Forests were more likely to respond to the questionnaire -- 70 percent chose not to respond. The questionnaire cover boldly referred to "YOUR NATIONAL FORESTS" with a drawing of a densely forested setting as well as symbols for a wide range of outdoor recreation activities. This report focuses on differences in average levels of awareness and use across cities and Forests. These differences are not influenced by the "response bias" unless there is a tendency for a different segment of the population to respond in each of the urban centers or about each of the Forests. We do not think that this is the case.
- 2) Information was not available on distance to other comparable opportunities on areas administered by other agencies (i.e., state and county parks or other Federal facilities). The lack of this information will influence the results to the extent that these other opportunities are substitutes for experiences on National Forests, and their availability is correlated with other variables in the analysis. For example, if with increasing distance from an urban area there are increasing numbers of state and local parks that can substitute for National Forests. We suspect that the problems from not considering these areas are not great; but perhaps individuals working on specific Forests have some insights here.

Implications for Management and Use

Within the Lakes States region, urbanites' awareness and use of National Forests appears to be strongly influenced by state lines, travel distance, and the number of National Forests closer to their homes. The close relationship between these three distance-related variables made it difficult to attribute variations in people's knowledge and use of the Forests to any single cause. However, it is clear that state lines act as barriers to knowledge and use of Forests for people who live outside the state. When distance-related variables are accounted for, residents of the four urban centers do not differ in their awareness and use of the Forests; but among the Forests the Superior has a significantly higher level of awareness and use. This may be due to the large size of the Superior (two to three times the size of the other Forests) or its reputation, including that of the Boundary Waters Canoe Area Wilderness.

The analysis calls for careful consideration of (1) the reasons for the particularly high levels of awareness and use of the Superior (beyond size and the BWCA), and (2) the nature of the apparent barrier to awareness and use associated with state boundaries. The reasons for the generally higher levels of awareness and use of the Superior National Forest may provide a useful guide for efforts to increase the awareness and use of other Forests.

The significance of state boundaries may have important implications for marketing strategies that target urban centers with information programs about a Forest. If it is a matter of information flows, then perhaps efforts to increase awareness and use of Forests across state lines could take a regional approach to information dissemination. However, if fishing and hunting licenses or other barriers are important, regional information programs would probably be ineffective. Very different strategies, such as reciprocal licenses, would be needed to expand the market area of individual Forests beyond the state in which they are located.

Literature Cited

Dwyer, John F. 1990. USDA Forest Service's National Recreation Strategy: Implications for outdoor recreation research. In: Proceedings of the 1989 Northeastern Recreation Research Symposium; 1989 April 3-5: Saratoga Springs, NY. General Technical Report NE-132. Radnor, PA: USDA Forest Service, Northeastern Forest Experiment Station. pp. 5-8.



MEASUREMENT and MODELING

THE ANATOMY OF COMPLEX DATA: THE UNDERLYING STRUCTURE OF QUESTIONNAIRES AND FORMS

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Information about people's behaviour has a structure underlying it which is lost when the information is captured in traditional surveys and analyzed using traditional computerized statistical packages. Important conceptual errors arise in the analysis as a result. By using an entity-relationship approach to data, these errors can be avoided.

The Problem with Questionnaire Data

When conducting a visitor survey in a Canadian national park, you typically intercept parties exiting a park or facility, and apply questionnaires to members of the party. You may ask them about activities participated in, and how satisfied they were with their experiences of these activities. At the end of the day, you have collected a number of records which have data on a variety of things such as the time and location of the interview, the number in the party, trip purpose, sex of respondent, activities participated in and satisfaction scores for each of them. (Although not obvious at first, you end up with the same kind of record set when you gather information on a form to register a party into a campground. Everything said here about a questionnaire applies equally well to an administrative form.

In both cases, the collection of data seems quite straightforward. Yet there are a number of problems that lurk beneath the placid surface of this example.

Typically, you capture this data for analysis in a computer by putting it into a table with each record (each questionnaire or form) being a row of the table, and each variable being a column or field. This table will have to have columns or fields provided for each of the activities you can potentially ask about. Figure 1 illustrates such a record layout and gives an example of a record. Here the row is arranged vertically because of space limitations, but typically it is horizontal. If there are twenty activities in the park, your record is going to have to contain twenty fields to hold the satisfaction scores for the activities and twenty additional fields for any of the other variables you might want to collect about the activity. No one, of course, is expected to do all twenty activities, so there are going to be a lot empty spaces your data set. Similarly, your questionnaire is going to have to have to list the same number of activities if you are going to record this data.

Now, what happens when a respondent comes along who has participated in activity number 21? You have to leave it out, or anticipate an "other" category. What if there are 200 possible activities? Your questionnaire and your record layout start getting rather long. You could, of course, just record "first activity," "second activity," and so forth, but you still have to anticipate the total number of activities respondents are going to answer, or you are going to let them answer, and set aside that space in your record layout. And you are going to have some complicated data manipulation to do if you wanted to sort the data according to a specific activity.

You have stopped a party, and you ask one individual about his or her activities. What if you want to ask the second, and third individual in the party about their activities, which could be quite different? You have to anticipate more record space and a longer questionnaire. Alternatively, you could capture your enquiry on a second and third questionnaire, and lose the information about the party, or have to repeat it, adding risk of error by duplicating the information incorrectly.

VARIABLE NAME (field name)	TYPICAL RECORD
QUESTIONNAIRE ID	321
TYPE	ip
LOCATION	main gate
STINT	11 am
PARTY SIZE	3
LAST EXIT	yes
TRIP PURPOSE	4
SEX OF RESPONDENT	m
OVERALL SATISFACTION	4
ACTIVITY 1 PARTICIPATED	no
NUMBER OF TIMES	.
SATISFACTION	.
ACTIVITY 2 PARTICIPATED	no
NUMBER OF TIMES	.
SATISFACTION	.
ACTIVITY 3 PARTICIPATED	no
NUMBER OF TIMES	.
SATISFACTION	.
ACTIVITY 4 PARTICIPATED	no
NUMBER OF TIMES	.
SATISFACTION	.
ACTIVITY 5 PARTICIPATED	yes
NUMBER OF TIMES	1
SATISFACTION	5
ACTIVITY 6 PARTICIPATED	no
NUMBER OF TIMES	.
SATISFACTION	.
	etc.
	etc.

Figure 1. Typical record layout.

That is one good reason why we rarely interview every member of a party individually, and why we develop simple activity lists. The use of traditional questionnaires and record layouts has a lot of influence on the kinds of information we gather and analyses we undertake.

Our problems do not stop there, however. We recorded information about the interview, the party, the respondent, and his or her satisfaction with activity five all in the same record. Now, there is nothing to stop an analyst from creating a query which relates data about the party to the satisfaction with activity five. But the party did not do activity five, the respondent did. Even if other members of the party did activity five, we do not know if they shared the respondent's level of satisfaction with it.

It gets worse. Our analyst now takes the information about the party's satisfaction with activity 5, combines it with other information about parties, and uses it to project the amount of use activity 5 will get over the next decade; then he recommends a multi-million dollar investment in facilities to support activity five, because of high use levels...a costly mistake.

Of course, such an elementary mistake as using individual data and applying it in a party context is not likely to be made by an experienced researcher. However, it is often the case, at least in a large organization like the CPS, that an analyst (who may not be experienced) comes upon the data a year later, without a lot of context knowledge about how the data were gathered. There is

nothing inherent in the data structure to prevent him or her from making the mistake just described. On the contrary, the data being all on one line encourages him to think that any of the variables can be related to any others.

Underlying Structure

Figure 2 presents an alternative way to view the structure of the data in our example. Here each datum collected hangs on the

branches of a tree like leaves. The first branch on the left captures the idea that there is an interview, which has certain characteristics such as time, location, and methodology (say to identify which of several standard ones is being used) and, of course, some sort of unique identifier such as a serial number. These "characteristics" we call attributes or the interview.

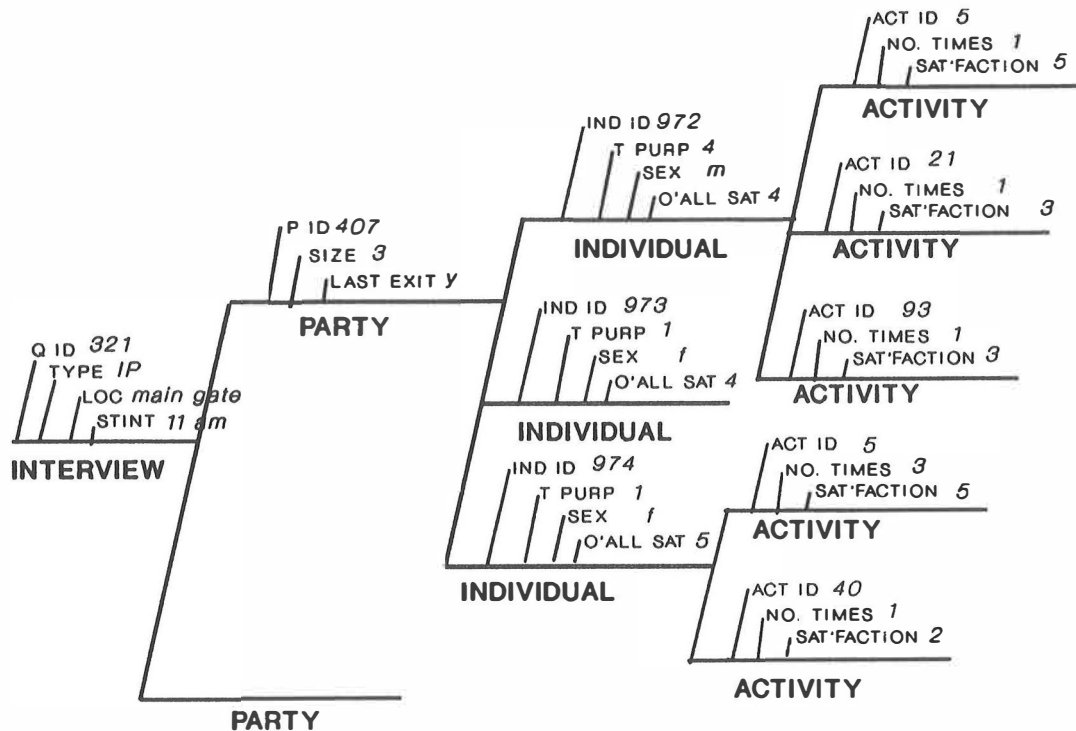


Figure 2. The underlying structure of the data.

In order to conduct the interview, the interviewer has to stop a group of people. There is the possibility that the group stopped, which is normally a party, is in fact several parties (e.g., traveling together by chance in a mini-van). The branching allows us to reflect this, by showing that we can display attributes of as many parties as we find. However, we typically find only one party, so other branches are not elaborated in this example.

We see the same logic at the next branch, where we reflect that there are several individuals in the party we have stopped. Branches can be added vertically to illustrate as many individuals as it takes to describe our party. And each branch displays the attributes of the individual that we had chosen to collect: trip purpose, sex, overall satisfaction, and an identifying number.

If you examine this structure overall, you can see that it illustrates the answers to a single questionnaire, or, in terms we were using in Figure 1, a record. Traditionally, the record would have been stored as a series of fields in a single line. The number of individuals in the party, the number of activities an individual practiced, even the number of parties in an interview, would all have to have been anticipated and built in. With this

branching structure, another individual or activity can just be tacked on the bottom of its branch. This structure, unlike the table in Figure 1, does not get longer. However, when necessary, the branches get deeper.

The second thing to notice about this structure is that it handles answers in two different ways. For questions that can have only one answer (sex of respondent, party size), the answer is displayed on the branch as an attribute. For questions that can have more than one answer at the same time (what activities did you participate in, who are the individuals in our party), the structure sprouts another branch. This is crucial. Every multiple answer question must create another branch or you are back into the problem of elongating your record length. Note however, that you can ask the multiple answer questions in as single answer way, and avoid branching (e.g., "How many activities did you participate in?") "How many people were in your party?" are both questions that have a unique answer.) They net you a lot less information than if they were asked as multi-answer questions, but that information might well not be useful for your purposes, so you have lost nothing.

The third thing to note is that some attributes are more appropriate on some branches than on others. You can ask sex

of an individual, but it makes no sense to ask it of a party. By the same token, you can ask trip purpose of an individual. It might appear that a party can have a trip purpose, but the fact that the structure recognizes the party as different from the individual helps reveal that the party which has a common trip purpose is only a special case where all the individuals in the party happen to have the same trip purpose. There is no necessity that this should happen.

More subtle is the case with satisfaction. Parties do not express satisfaction, individuals do; but when they do, the satisfaction expression that they give is either attached to their own branch (it is a satisfaction with the overall visit) or they express several satisfactions. If they express several satisfactions, all of them cannot be displayed on the individual's branch, they must be displayed on the activity branches.

Capturing the Structure in an Automated Data Base

But so what? We can draw a diagram on paper and pretend to model the data, but when we go back to the computer, the statistical package still seems to demand that we put it all in a table. And if we want these questions to occur on a questionnaire, or in a form, we have to give the respondent enough boxes to put down all his possible choices; we still have the problem of listing the 20 activities only to have a visitor arrive having done activity 21.

There is, however, another way to organize the data, using an entity relationship model (Beaman 1985). An entity relationship model breaks the data into a series of tables, instead of as a single, large table. Each smaller table refers to a single "subject" or entity. Long records in a traditional data set contain many "subjects" (e.g., description of interview, party characteristics, individual characteristics) linked by the fact that they are in the same record. Entity relationship tables link their subjects explicitly by keys, or identifiers in each record which tell the user which data in one table goes with which data in another table. This approach gives us the flexibility we need to capture the tree structure of Figure 2.

Figure 3 shows that each of the branches becomes an entity, or separate table. The attributes of each branch become the fields of the table. In this way, if we add an individual, or an activity, we are just adding another row to a table, not changing the structure of the records themselves. The points at which the branching takes place are stored as keys. For example, if individual 972 (his key) participated in activities 5, 21, and 93, the lines on which those activities were stored in the activities table would also contain the individual's key, 972. This is, of course, a very superficial explanation of entity-relationship modeling, but it is beyond the scope of this paper to go further. The feasibility and power of storing data in ways like this can already be seen in some applications that constitutes variants on the idea presented here (see for example Jaro, 1989, Lewkowicz 1989).

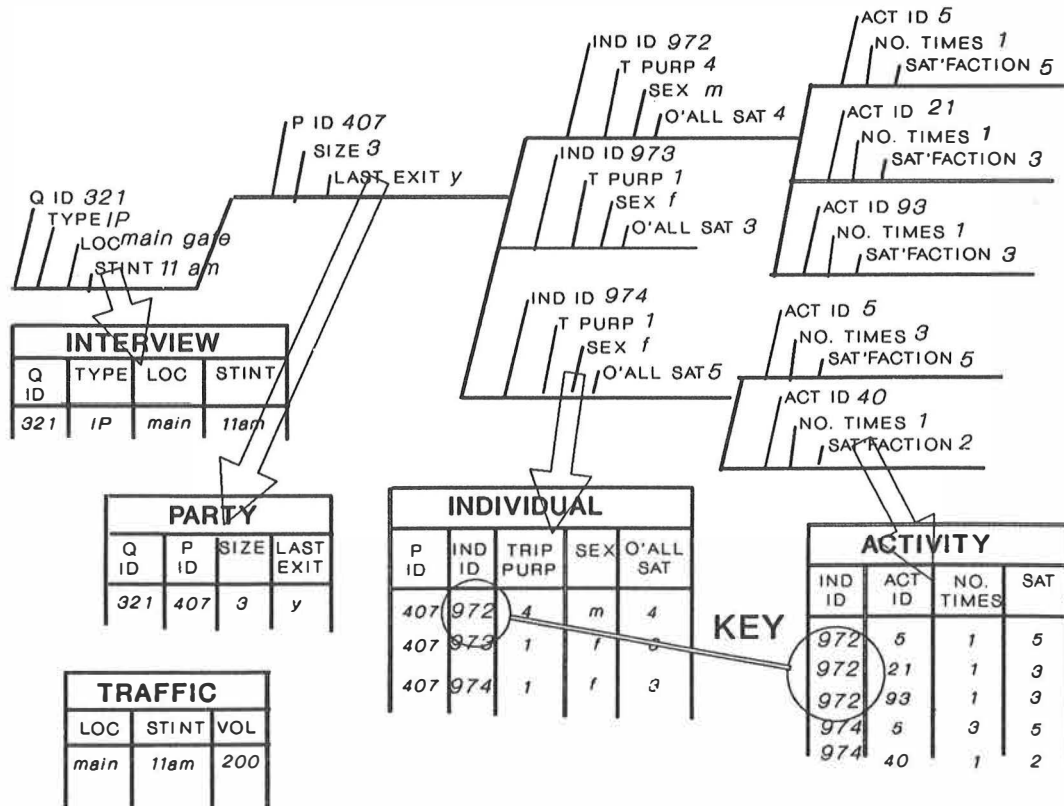


Figure 3. Transforming the tree into an entity-relationship data base.

With a set of such tables, properly keyed, I can reconstruct any record just as I could with the tree. Figure 3 shows how I can identify individual number 972 and his three activities, which party he belonged to, when he was interviewed, and so on.

I can reconstruct a record, add an unanticipated activity, or handle more than the foreseen maximum number of individuals to the record without destroying any record structure. I can support open-ended lists of activities. Of course, the open-ended character of the data base is best exploited by computer aided questionnaires. If I add an activity, it would be nice if it came up on my prompt list the next time I asked the question. If I used a pre-existing list of activities, it would be nice if I didn't have to recreate it on the questionnaire, but merely have the computer go and get it for the prompt list.

I can even get my prompt list of activities from some other, official list, or from a standard list used for some other purpose, if I am interested in corporate data consistency (which CPS ought to be). This is an extremely important feature. Inconsistency in coding from one data collection to the next makes it very difficult to combine data from different sources. As a result, organizations collect enormous amounts of duplicate information. Using official lists as coding lists ensures that financial, administrative, socio-economic and other forms of data are all collected on a consistent basis and can all be easily combined (Beaman and Grimm, 1989).

I can incorporate independent data sources into my data base. Take the example of a sampling weight. To calculate a weight for my record in the traditional table, I have to find some data on the size of the total universe which passed by the intercept point and calculate the sampling fraction. The I have to enter this ratio into each traditional record as a new variable, probably called WEIGHT. The raw data is lost.

In an entity relationship mode, if I have recorded stint as an attribute of the interview in the interview entity, and if I have data by stint from a traffic counter, I merely have to take the attribute stint as a key (since it occurs in both entities) and I have all the information I need to calculate the weight built into the data base. I still have to calculate the weight for each record when I come to do the analysis, but I do it each time from the raw data in the original source. There are two advantages of this. First, I know where the data to calculate the weight came from, so I know how the weight was calculated, even if I return several years after the survey. In a traditional structure, I have as a weight a single number and it is no longer clear where it came from. Second, if the universe count is corrected later, my data do not become obsolete. The weights are calculated from original data each time I do analysis, so my weights are automatically corrected for the new universe data.

This essentially means that whole tree structures (see Fig. 2) can intersect. I can combine the information from two questionnaires or a questionnaire and a number of forms. In fact, the tree structures are not unique. The data managed according to an entity-relationship model can be combined in any number of ways, depending on your analysis needs. trees are not unique. However, the combinations are not infinite, but limited by the relationships between them (the keys); that is, the combinations are constrained by the logic of the model. Users are protected from error.

I can incorporate data from different sources just by finding the right key; I can also reuse entities. This has important consequences for building up a corporate data base, and for making the development of questionnaires easier. Once I have entities defined, I can use them as building blocks for future surveys. This ensures that from survey to survey I am building up a corporate data set. I may not want to do exactly the survey that my colleague did in another park. However, I probably want to explore many of the same concepts. So I can use many of the same entities. In fact, I have an advantage even in using the same questions. The corporate data base gets augmented without my having to produce exactly the same survey, since

the new information I gather can increase the tables that already exist, and any new questions that I ask create some new entities. These are all available to the next analyst that comes along without him having to know how the survey was done.

If entities can be reused, so can attributes. Just as we related certain attributes to one entity and not to another, because it was not logically valid to do so, we can define a set of logically appropriate attributes for each entity, so that any future user of that entity can have a choice of logically valid attributes. He does not have to use them all, but he is helped in his use because he is offered choice of only what is sensible to use. This is the concept of a context set; that is, the set of all attributes which are logically consistent with the entity and so are available to use. It is called a context set because it provides the complete set of measures which any specific implementation of the entity is made up of.

Reusing entities also implies that data for entities can come from sources other than a questionnaire, such as an administrative form. Cotter (1992) has described the use of automation to register campers, thus creating a base of information about camper characteristics, length of stay, preference for types of campsite, and equipment type. These things are captured as part of regular administrative processes, and so add no cost or burden to research. However, they are in fact information that would normally require a survey to collect. Even better, they are often census data, and this fact can be exploited to leverage sample data, such as using it for weighting or recognition of bias. By using entity relationship data base models, it is possible to exploit this source of data to supplement research efforts, and in certain circumstances to eliminate it all together. This solves the problem of open-ended lists and record layouts, but does it solve the analysis problem?

The Analysis Problem Solved

Most of the problems of analysis arise because we confuse what variables can logically go together. For example, we relate satisfaction to parties or participation in activities to parties, because the party, individual and activity information is all in the same record. It is easy to ask for data on satisfaction by party characteristics, and nothing will indicate how wrong that is. If the data is stored in an entity relationship structure, this query is much harder to do. In our example, satisfaction scores are stored in a table called activities, which does not contain any information on parties. It does, however, contain information which points to the individuals who did the activities (the key). Therefore, it is relatively easy to relate satisfaction scores to the characteristics of individuals, and quite difficult to formulate a query which relates those scores directly to parties without going through individuals. The structure of the data contains the logic of the phenomenon being studied.

Literature Cited

- Beaman, Jay. 1985. A Data Base Model for Parks Canada. Heritage Resources Programme presentation. Waterloo, Ontario: University of Waterloo.
- Beaman, Jay; Grimm, Sylvanna. 1989. Park use related data recording: A new direction of the Canadian Parks Service. In: Proceedings, 1989 Northeastern Recreation Research Symposium: 1989 April 3-5; Saratoga Springs, New York. U.S.D.A. Forest Service, Northeastern Forest Experiment Station NE-132:69-76.
- Cotter, Mary. 1992. Smart Kiosk 1991 Evaluation. Ottawa, Ontario: Canadian Parks Service, Socio-Economic Branch.
- Jaro, M.A. 1989. Hyperquest: A new method for interviewing using laptop computers. In: Symposium 88: The Impact of High Technology on Survey Taking: 65-73.
- Lewkowicz, J.M. 1989. The Complete MUMPS: An Introduction and Reference Manual for the MUMPS Programming Language. Englewood Cliffs, NJ: Prentice-Hall.

SYSTEM DYNAMICS MODELING OF

RECREATION SYSTEMS

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Interactive system dynamics computer models are useful to recreation researchers for a wide variety of problems ranging from forecasting to impact assessment. This paper describes how problems of recreation and resource use can be understood from a dynamic point of view. Stress was primarily placed upon explanation of causal structure, using the System Dynamics approach to simulation and implementation of models for decision making and education.

Introduction

We live in a world of rapid change. This particularly significant for recreation systems analysis because of the strong interactions between recreation and the rest of society. The purpose of this paper is to describe the construction, refinement and application of interactive system dynamics computer simulation to model recreation system to assist in research and decision making efforts. It also demonstrates how these models can be used as graphic educational tools to facilitate the understanding of complex relationships in recreation systems.

The Concept of System Dynamics

System Dynamics was developed at the Massachusetts Institute of Technology in 1956 by a small group of modelers led by Professor Jay Forrester, who set up the first System Dynamics program at M.I.T.'s Sloan School of Management. The method is aimed at providing a distinctive set of easily usable tools which might be used by system owners, rather than just analysts; centered on a very generic set of building blocks which are universally applicable.

The purpose in applying System Dynamics is to facilitate understanding of the relationship between the behavior of a system over time and its underlying structure and strategies, policies and decision rules.

In summary, the System Dynamics method:

1. searches for the conscious or unconscious goals of the system and for the related feedback processes associated with specific problem behavior.
2. specifies the complex dynamics associated with situations where goals cannot be reached or are in conflict.
3. follows the flow of information and the processes involved in decision making and policy setting.
4. frequently deals with feedforward processes, in which people attempt to forecast the future in order to act in the present.
5. is sensitive to the impacts of lags and delays in decision making for the system as a whole.
6. represents non-linear as well as linear relationships among the variables in the system to make the model as realistic as possible.
7. uses computer simulation techniques to model system problems.

The Model

The major use of a System Dynamics diagram is to identify information feedback loops which have been created by linking resource and information flows. It is the analysis of such loops which facilitates understanding of how the process, organizational boundaries, delays, information and strategies of systems interact to create system behavior. The contribution of

feedback loops to system behavior depends primarily on whether they are positive or negative.

Influence diagrams facilitate identification of whether a feedback loop is positive or negative. The rule for this is that if the net effect of all individual influence links in a feedback loop is negative, then the whole loop is negative. Conversely, if the net effect is positive then the loop is positive. The net effect can be obtained by multiplying together the signs of the individual influence links.

A simplified feedback loop diagram of the model is present in Figure 1. To clarify the discussion of the model, the diagram is divided into five subsystems: (1) infrastructure subsystem, (2) superstructure subsystem, (3) recreation resources subsystem, (4) management subsystem, and (5) visitor subsystem. These subsystems are briefly discussed in the following sections.

Infrastructure Subsystem

Infrastructure capacity will increase due to investment and will decrease due to depreciation. The investment of infrastructure depends on accessibility, load index and development plans. The first mechanism is the existence of a negative feedback loop outlined in Figure 1.

Superstructure Subsystem

Increasing visitors would increase user rate (i.e. visitors/superstructure capacity). Thus, increasing user rate would promote the construction of superstructure capacity. Also, the construction of superstructure capacity is not only increasing superstructure capacity but also increasing level of service. The basic structure of the subsystem is shown in Figure 1.

Recreation Resources Subsystem

The magnitude of recreation resources would increase due to development. The larger magnitude of recreation resources, the more attraction for visitors. Meanwhile, the magnitude of recreation resources would influence the carrying capacity. The load index would depend on carrying capacity and visitors. The behavior circuit is outlined in Figure 1.

Management Subsystem

Two functions of management subsystem: one is resources maintenance, another is resources development. The magnitude of recreation resource could expand the maintenance capability. If there is a gap between potential maintenance capability and real maintenance ability, then recreation resource will contribute to the decline. The basic progression is depicted in Figure 1.

Visitor Subsystem

In this paper, we assume that the foundation for sustained visitor growth is dependent on the magnitude of load index and the recreation resources. If the infrastructure is available, the visitors will make use of the resources. The feedback loop (Fig. 1) model indicates growth due to changes in the infrastructure capacity and the magnitude of recreation resources.

The STELLA Software

STELLA is a software program that has been designed to bring system dynamics to broad-based audiences and designed to let you quickly build, simulate, and analyze a system. The STELLA software exerts a discipline on the modeler by only allowing information links on the computer screen to be made between certain variables. In Figure 2, shows our structural diagram of the recreation system.

Results of Simulation

The model has been simulated for 15 years of period using STELLA II for Macintosh computer. The year 1991 is selected as an initial year for the simulation. The simulation period is set for 15 years. Figure 3. describes an example of the total visitors trend. The vertical axis is the simulation time and the horizontal axis is the number of people.

Conclusion

The foregoing study represents an investigation into a 'hard' type of system where, despite the lack of a reference mode of behavior, it was not difficult to conceptualize an appropriate model and to build user confidence in its ability to adequately represent the real world situation. The model created was clearly not totally endogenous, but aimed at designing control to

enable the system to improve its ability to deal with a set of fluctuating exogenous inputs.

In summary, the model has the following advantages:

1. The model is logical and simple. It is easy to understand the system analysis for the recreation system.
2. The model is flexible and general. Components can be easily added and deleted. The model can be applied to any other activities and any county, region, or state level.

Limitation of the model is mainly concerned with the lack of the data that are suited for parameter estimation or model validation.

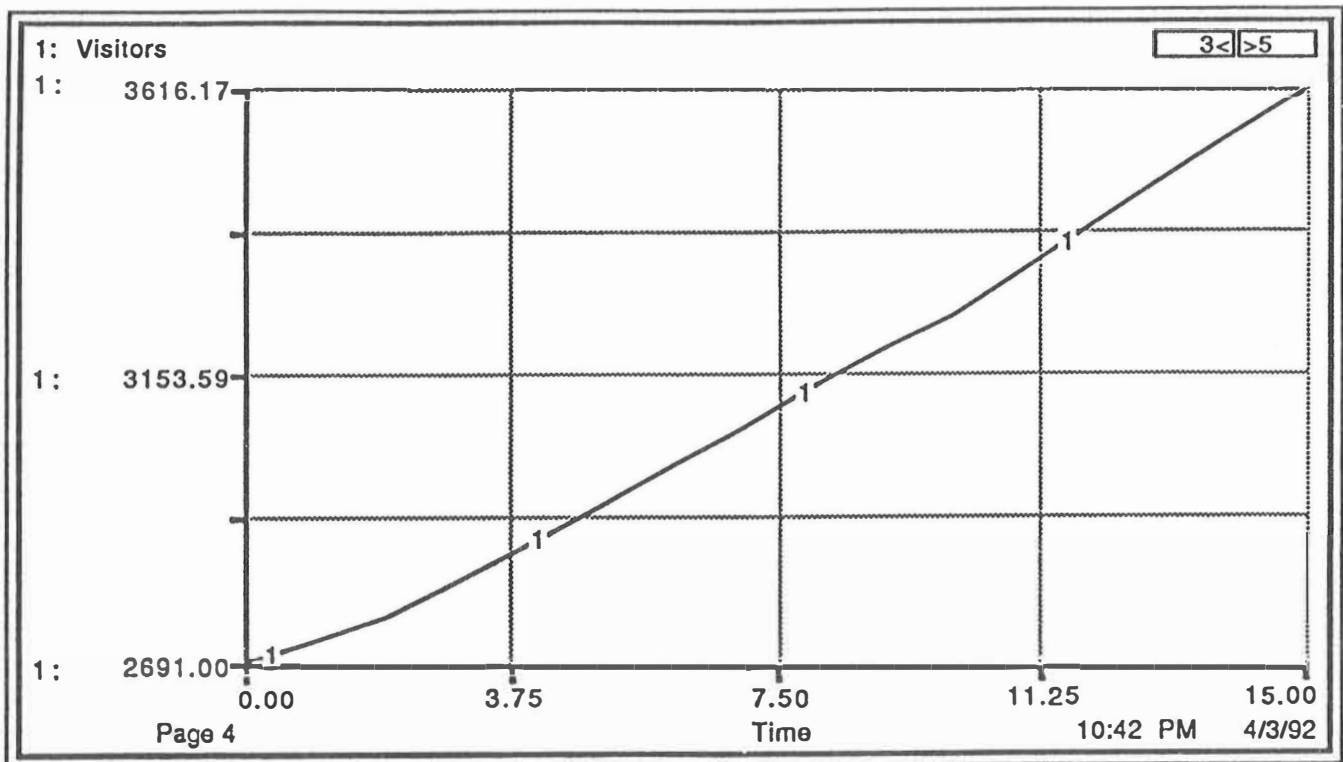


Figure 3. Result of simulation.

Literature Cited

Chen, K. C. and Talhelm, D. 1992. Draft of Community Options Model User Manual. Department of Park and Recreation Resources, Michigan State University.

Coyle, R. G. 1983. The technical elements of the system dynamics approach. *European Journal of Operational Research*. 14: 359-370.

Forrester, J. W. 1965. *Industrial Dynamics*. Cambridge, MA: Wright-Allen Press, Inc.

Legator, A. A., Jr., Forrester, J. W. & Leyneis, J. M. 1980. *System Dynamics*. New York, NY: Elsevier North-Holland, Inc.

Levine, R. L., Van Sell M., and Rubin, B. 1992. *System dynamics and the analysis of feedback processes in social and behavioral systems. Analysis of Dynamic Psychological System, Vol. 1: Basic Approaches to General System, Dynamical Systems, and Cybernetics*. New York, NY: Plenum Press.

Levine, R. L. and Fitzgerald, H. F. 1992. *Systems and systems analysis methods and applications. Analysis of Dynamic Psychological System, Vol. 2: Methods and Application*. New York, NY: Plenum Press.

Levine, R. L. and Weldon, L. 1992. *Sensitivity of parameters and loop structures. Analysis of Dynamic Psychological System, Vol. 2: Methods and Application*. New York, NY: Plenum Press.

Talhelm, D. R. 1989. *Do Communities Have Options? --- Fisheries/Tourism-based Economic Development: What Works?*. NCRI project, Dept. of Park and Recreation Resources, Michigan State University.

Talhelm, D. R., and Rebecca L. J. 1984. *The Role of the Great Lakes in Michigan's Economic Future: A Conceptual Framework*. Ann Arbor, MI: Michigan Sea Grant Program.

Wolstenholme, E. F. 1990. *System Enquiry: A System Dynamics Approach*. New York, NY: John Wiley & Sons.

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A GEOGRAPHIC INFORMATION SYSTEMS APPROACH TO ANALYSIS OF THE SPATIAL RELATIONSHIPS BETWEEN RECREATIONAL BOATING USES AND PERCEIVED IMPACTS.

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This paper describes a method of analyzing spatially distributed boater activity patterns and site specific attitudes using a geographic information system to manipulate and display the data. The results demonstrate the feasibility of this methodology. Recreation researchers and managers would be well served by incorporating GIS technology for the analysis and display of spatially and temporally distributed information.

Background

Maps are spatial representations of information. When that information can be characterized by its geographical location on a map it becomes a spatial pattern. Spatial patterns, like other forms of information, can be analyzed statistically. Many phenomena can be represented by points on a diagram and these graphic representations are called point pattern maps (Boots and Getis 1988). Point pattern maps can be studied to determine information about the processes that generated the pattern.

Point patterns can be described in a number of ways. These include measures of the compactness or dispersion of the points, their arrangement and their geographic location. For example do they have a tendency to clump or cluster in certain areas, more often than would be expected by random occurrences. Arrangement measurements describe the relative location and the association of the points to one another, while dispersion measurements focus on the density of the point groupings. Even when we do not know much about the processes that generated the pattern, we can gain information from analysis of point pattern maps. This may enable us to acquire some initial insights into the occurrences and possibly formulate hypotheses for testing.

Many types of information used in visitor carrying capacity and impact assessment systems, such as the Limits of Acceptable Change system (Stankey, Cole, Lucas, Peterson, and Frissell 1985) or the Visitor Impact Management planning framework (Graefe, Kuss and Vaske 1990), are positional in nature. Examples of the type of data which may be involved are soil type, slope, aspect, ground cover, overstory vegetation type and percent crown closure for environmental parameters (Hammitt and Cole 1987; Kuss, Graefe and Vaske 1990). Factors influencing the social component may involve size and location of viewsheds, amount of screening between sites, proximity to other sites or facilities, location of the site or facility (i.e., near a road, on an island, etc.), degree of crowding experienced and a variety of others (Shelby and Heberlein 1986; Manning 1986).

Maps have traditionally been used as the means of displaying, analyzing, storing, and managing these types of geographic or positional information. They are rapidly being replaced by geographic information systems in an automated or computerized framework, as a means of spatial data storage and management. A geographic information system, or GIS, is a computer-oriented information system for the capture, editing, storage, retrieval, management, update, analysis, output and display of digital spatial (and non-spatial) data for use in a decision-making, management, or planning process framework. This concept is an adaptation and combination of the more general theories of management information systems (MIS) developed by the business community in the 1960's and the computer aided design and drafting from engineering applications (Burrough 1987).

The GIS has proven to be a valuable tool for the assessment, management and analysis of natural resources through its ability to handle both positional and descriptive attribute information. Locational analyses, resource planning and management, and change detection all involve interrelating several types of spatially distributed resource information (Heit and Shortreid 1991).

While useful, making maps with a GIS is seldom an end in itself. The greatest benefits from these systems are obtained through modeling and problem solving aimed at managing natural and man-made resources. Any information that can be represented on a map can be stored, managed and analyzed with a GIS (Antenucci, Brown, Croswell, Kevany and Archer 1991).

Related Literature

The study of "recreation geography", the investigation of the spatial properties and distributions of recreation, is a science still in its infancy. Mitchell's (1969) earlier observation that this area lacks generalizations and basic theories is still for the most part true today. There have been few studies of the spatial aspects of recreation activities.

Stankey (1973) in his paper on visitors' perceptions of carrying capacity included a very interesting spatial analysis of crowding. He created an index of crowding (IC) as a ratio between total number of complaints of reported crowding (TC) to the total number of visitors sampled who visited the area (TV), $IC = TC/TV$. To display this information he plotted the index of crowding on a map of the area and constructed isolines. These lines had values representing the percentage of users reporting crowding. By this method he determined the areal extent of crowding at various points.

In a study of spatial behavior in recreational boating, Lentnek, Van Doren and Trail (1969) found that boaters that participated in the same activities traveled similar distances and tended to cluster at the same lakes. There was a natural logarithmic distribution of frequencies exhibited by the distance decay function by activity specialization. From these observations they concluded that trip purpose and trip length are related, and that there is a spatial structure to boating activity specialization. If this structure exists between lakes, there is no reason to believe that it doesn't exist between different areas of a single body of water.

In a more recent spatial analysis of recreational boating behavior, Jaakson (1989) examined the potential for user conflict on a heavily used lake in Ottawa, Canada. In this study the positions of boats were recorded onto a form designed as an 867 cell data matrix at fixed time intervals. From this data the density per cell was calculated as well as the diversity of boat types and their rated incompatibility. This data was analyzed to determine the potential for conflict due to crowding or incompatible uses.

Purpose

The purposes of this paper were to map and examine the spatial distribution of sites reported as most and least enjoyable by recreational boaters on Berlin Lake located in Mahoning, Portage and Stark Counties, Ohio and on Delaware's Inland Bays

located in southern Delaware. Additionally, in the Inland Bays study, the reported locations of areas avoided and places where they participated in selected on-water recreational activities were examined and analyzed for a clumping or clustering pattern indicative of increased densities. Areas of potential inter-activity conflict sites were also identified by overlaying point pattern maps of the various activities. Finally, the reported boating routes were analyzed to determine areas of potential crowding and overlaid on activity maps to identify potential user conflict.

The sites were analyzed through measures of dispersion and arrangement to determine if the location of the reported points exhibited positive autocorrelation indicated by a clumped spatial distribution. These clusters were then analyzed to determine if they were significantly different from a pattern of complete spatial randomness and a dispersed or negatively autocorrelated spatial pattern. A dispersed pattern would be indicated by the points appearing spread out and somewhat regular with a maximum distance between all points. A pattern of this type would indicate that the activities represented by the points have a tendency to repel each other.

The overall aim was to explore the possibility of identifying controlling factors of the individual clusters and possible environmental and locational parameters that might influence the development of these patterns. This was accomplished through cross tabulation of the point pattern maps and the base maps to identify if there were significant numbers of co-occurrences between the two maps. Ultimately, it is hoped that it will be possible to predict which sites are likely to be considered by users as enjoyable. This ability to predict users' opinions will enable managers to make more informed decisions and to maximize user satisfaction.

Study Sites

Berlin Lake

The first study site examined was Berlin Lake, a U.S. Army Corps of Engineers managed lake built in the 1940's. The location of the study site is Eastern Ohio, near Youngstown, on the Mahoning River about 35 miles upstream from Warren, Ohio. The reservoir has a surface area of approximately 3,590 acres and a perimeter of approximately 70 miles of shoreline. The lake is 18.6 miles long with a maximum depth of 76 feet (U.S. Army Corps of Engineers n.d.). The main stated purposes of the dam are flood control, low flow augmentation, pollution abatement, recreation, conservation and enhancement of fish and wildlife habitat. The public recreation facilities include picnic areas, campgrounds, swimming areas, launch ramps and other recreation areas. Additionally, there are commercial recreation facilities operated through concession agreements which include a marina, bait shop and store (U.S. Army Corps of Engineers n.d.). There are many private and boat club docks located around the lake. These are permitted by the Corps to adjacent land owners and area boat clubs. Use levels on the reservoir are high throughout the summer boating season, especially on weekends. On busy weekends it is not unusual for parking lots to be over-flowing and long lines to be found at the boat ramps (Graefe, Drogin, Cottrell and Titre 1990).

Delaware Inland Bays

The second study area is located in the Inland Bays area of southeastern Delaware, and includes all of Rehoboth, Indian River, Little Assawoman Bays and their tributaries. The Inland Bays are relatively shallow, five to eight feet, and have an average surface area of approximately 15 square miles. The bays are encased by a barrier island complex to the east and fringing marshes on the north, south and west. The area is approximately 50 miles southeast of Dover, Delaware and 20 miles north of Ocean City, Maryland. To the east, located along the Atlantic Ocean are the beach front communities of Rehoboth Beach, Dewey Beach and Bethany Beach, as well as a number of smaller resort communities. The area is a major visitor destination for both consumptive and non-consumptive recreational users (Delaware Department of Natural Resources and Environmental Control 1988).

Boating access to the Inland Bays is provided by an extensive network of facilities surrounding the bays. These facilities include about 75 marinas which provide nearly 6,100 boat slips, 63 boat ramps (8 public and the remaining privately operated ramps), and approximately 325 private docks (Delaware Department of Natural Resources and Environmental Control 1989). Recreational uses of the Inland Bays system examined in this study included small craft sailing and power boating, wind surfing or sailboarding, water skiing, swimming, sunbathing, sightseeing, fishing, crabbing, clamming and jet skiing. On a weekend day during the summer, boats are present over a large percentage of bay waters. Public opinion appears to be that the bays are too crowded and that more marinas will generate more boat traffic, degrade water quality and negatively impact natural resources (Battelle Memorial Institute 1989). This analysis was part of a larger project to develop resource and visitor impact management plans for the Inland Bays (Falk, Graefe, Drogin, Confer and Chandler 1992).

Methodology

Data were collected through exit interviews with boaters at major access points in the two study areas. As part of the interview boaters were asked to mark on a map of the area places they enjoyed most and least, those they avoided and where they participated in a variety of boating related activities. The site data from the questionnaire maps was manually digitized, analyzed and displayed using IDRISI, a grid-based geographical analysis software package (Eastman 1992a; Eastman 1992b). Each map was positioned and attached to the digitizing table. A unique identifier (questionnaire ID number), a site code and desirability or activity code were entered from the keyboard, and then the (X,Y) coordinates were digitized using Tosca digitizing module (Jones 1992).

The first study was an exploratory spatial analysis of data collected previously by Graefe, Drogin, Cottrell and Titre (1990) for a boating capacity evaluation of Berlin Lake. Boaters in that study were asked to mark on maps of the lake the locations that they enjoyed most and least during their boat trips. A sample of 105 questionnaire maps were randomly selected, yielding 229 most/least enjoyable point sites, approximately two points per map. Also, the lake area, roads, streams, public use and access areas were digitized from the base map to compare with most/least enjoyed site clusters.

For the Delaware Inland Bays study area, 422 on-site interviews were completed, with 318 completing the map section properly. In this case, boaters again identified places they enjoyed most and least, as well as areas they avoided. They were then asked why they liked, disliked or avoided these locations. The inclusion of areas that were avoided was an attempt to identify and document boater displacement. Additionally, they were asked to indicate where they engaged in various boating activities and the boating route they followed. Also, the responses to other survey questions were stored as non-spatial attribute entities, and linked to the spatial data by means of the unique identifier through dBase IV and an IDRISI linking program, which acted as a relational database management system. Finally, as part of this study, on-water boat and activity counts were completed to estimate relative density levels. These counts, on the various sections of the bays were used to validate the boater self-reports.

From these maps, point pattern maps of the reported satisfaction, displacement and activity sites were created, along with line maps of the reported boating routes. A total of 785 points were digitized, an average of slightly more than two points per map. The line route maps were coded by day, and overlaid with the activity maps to create potential user conflict maps. The bay water area (Rehoboth, Indian River and Little Assawoman Bays), coastline, DE-MD state line, major roads, streams, public use and access areas were also digitized from the base map to cross-tabulate with the clusters and to provide a geographic reference. Additionally, combined spatial and aspatial queries were used to identify reasons for desirability and displacement responses. For example, in a given area what

were the most often mentioned reasons for not enjoying or avoiding the area.

Limitations

There were many limitations to the Berlin Lake study, due to its exploratory nature. Additionally, the data were not collected with a GIS approach to spatial analysis in mind so many assumptions had to be made. For example, it was assumed that the specific site location reported was located at the centroid of the mark made on the map. The scale of the map also influenced the accuracy and precision of the point locations.

In both studies the number of sites identified by questionnaire respondents varied from none to eight. This range of site reports allowed some of the respondents to bias or weight the results. Therefore, for example in the Berlin Lake study, even though the sample size was 105, it may not be representative of the population. For the purposes of this study this was not critical, but should be considered in future studies of this kind. In the Inland Bays study an effort was made to control the number of responses per boater, but some variation in the number of responses per map still exists.

In the Delaware Inland Bays study, many of the problems were overcome by standardizing the mapping survey procedures. However, a problem was encountered when using photocopied maps for the survey. In the photocopying process the maps became slightly distorted differentially. This distortion led to a mismatch between maps of up to one-eighth inch. Due to this problem it is suggested that the maps be professionally printed if greater accuracy is desired. Additionally, as in the Berlin Lake study, the size and scale of the maps probably affected the

accuracy of the data. Finally, all of the respondents did not mark locations for each of the possible desirability variables and activity locations. Some respondents indicated they enjoyed the entire bay and did not avoid any of it. Others participated in activities that were not limited to a fixed point or small area, for example jet skiing or water skiing. In future studies these types of mobile activities should be treated and stored as lines and polygons or areas, rather than points.

Results and Discussion

Berlin Lake

The results of the exploratory study on Berlin Lake were promising in spite of the many limitations. The reported most/least enjoyable point sites did exhibit significant clustering. These clusters, however, did not appear to be correlated to any access points, roads or streams. The location of the centers of the clusters were mostly in the center of the lake. The geographical location of the plotted data for Berlin Lake did not exhibit any predictable arrangement other than the random clusters. The clusters were not highly correlated to any of the mapped data, such as access, roads or railroads. These clusters were significantly different from a pattern of complete spatial randomness and positively autocorrelated or clumped.

It is notable that overall, the least enjoyable sites appear more tightly clustered than the most enjoyable sites (Figure 1). This is contrary to what might be expected given that there are almost twice as many most enjoyable sites reported. There were 145 most enjoyable sites identified, while there were only 84 least enjoyable sites identified in the randomly selected sample of surveys.

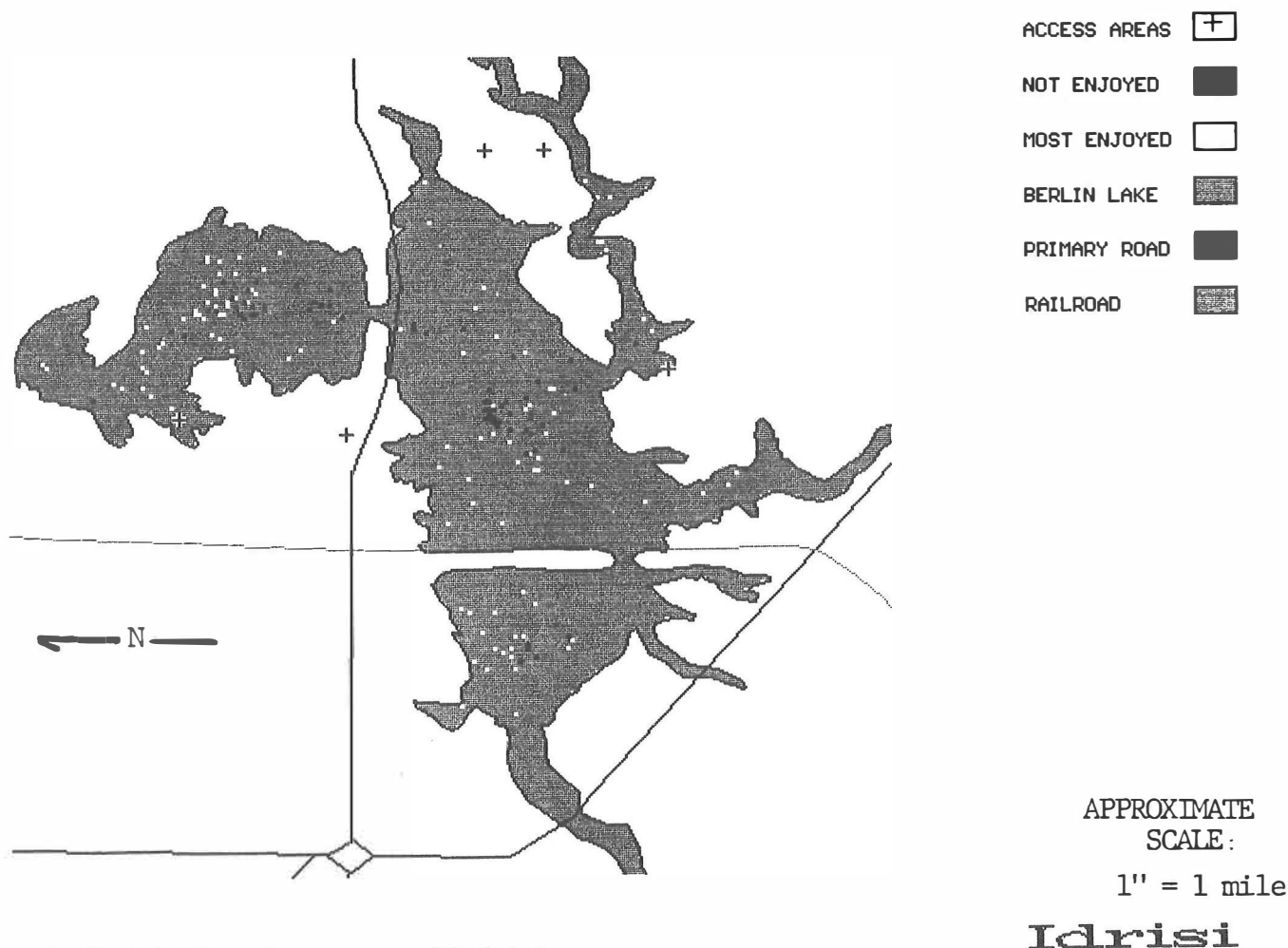


Figure 1. Site desirability point pattern map of Berlin Lake.

From these results it can be inferred that spatial clustering of points reported as most and least enjoyable by boaters occurred in the survey data. The causes of this clustering are probably related to measurable factors. However, there may be many factors, including both physical and social parameters, and these effects may act to cancel each other out. This would further complicate the process of identifying these factors.

Delaware Inland Bays

The results from the Inland Bays study exhibited more predictable and interpretable patterns. There were a total of 382 points mapped in the desirability section of the survey. These included points reported as most enjoyed, least enjoyed and sites avoided. In addition there were a total of 403 activity sites located on the maps. The activities include sailing, powerboating, sailboarding, clamming, sunbathing/sightseeing, fishing, crabbing, swimming and other, which includes jetskiing. The most common activity reported was fishing followed by crabbing, power boating and clamming. The rest of the activities collectively accounted for less than fifteen percent of all the reported activity sites.

All of the reported points were distributed throughout Indian River and Rehoboth Bays with slightly higher point densities in the area of the Indian River Inlet to the ocean. This may suggest that users are dispersing themselves throughout the bays and thereby avoiding conflict and reducing densities. It also indicates that nearly all of the bay system is used by someone. The point pattern of activity sites also showed an overall high diversity of use occurring throughout the bay system. An enlargement of the Indian River Inlet area revealed more clearly the general trend of increased point density in this area. This increased density was most apparent in and around the inlet. This interpretation is consistent with that observed during the on-water survey of boating use, which was part of the overall study.

A map of a random sample of reported routes was also generated to identify trends in boating use (Figure 2). A sample was used to represent the entire data set of reported routes due to the cluttered appearance and uninterpretable maps produced when all the routes were displayed. From this map the areas of highest use were where the two bays connect and the inlet to the ocean. It is also evident that narrow or constricted areas of the bays and the dredged channels appear most crowded.

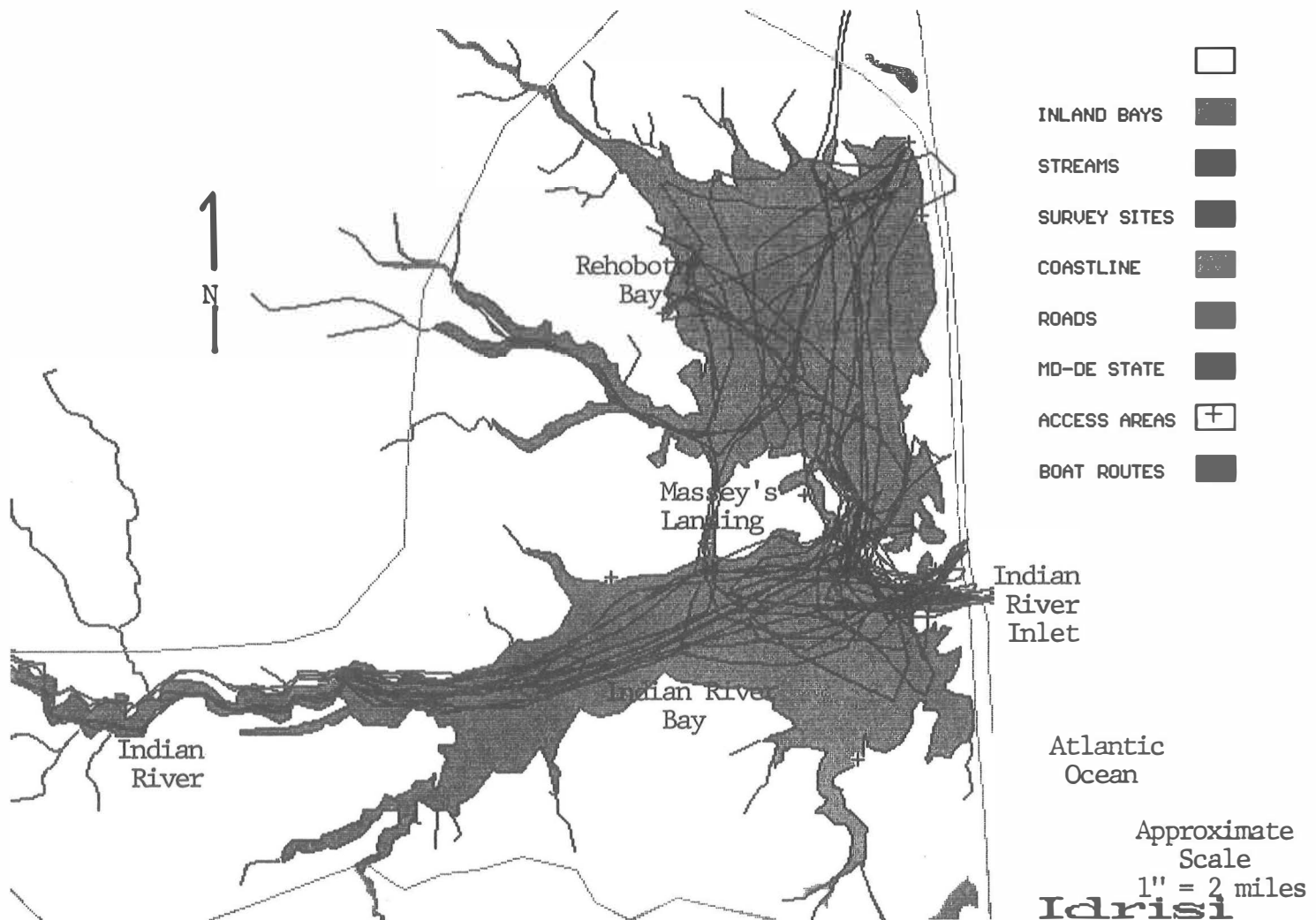


Figure 2. Reported boating routes trend map of Delaware Inland Bays.

The geographical location of the plotted data did exhibit a somewhat predictable arrangement. It is notable that overall and like the Berlin Lake data, the least enjoyed sites and the avoided sites appear more tightly clustered than the most enjoyed zones. Clustered points or those that display a clumping pattern indicate there is some agreement among users

on the desirability of an area. The most enjoyed areas displayed on the site desirability point pattern map (Figure 3) display a much lower rate of clustering with a more dispersed point distribution. Again this was contrary to what might be expected given that there were more than 1.5 times as many reported enjoyable sites.

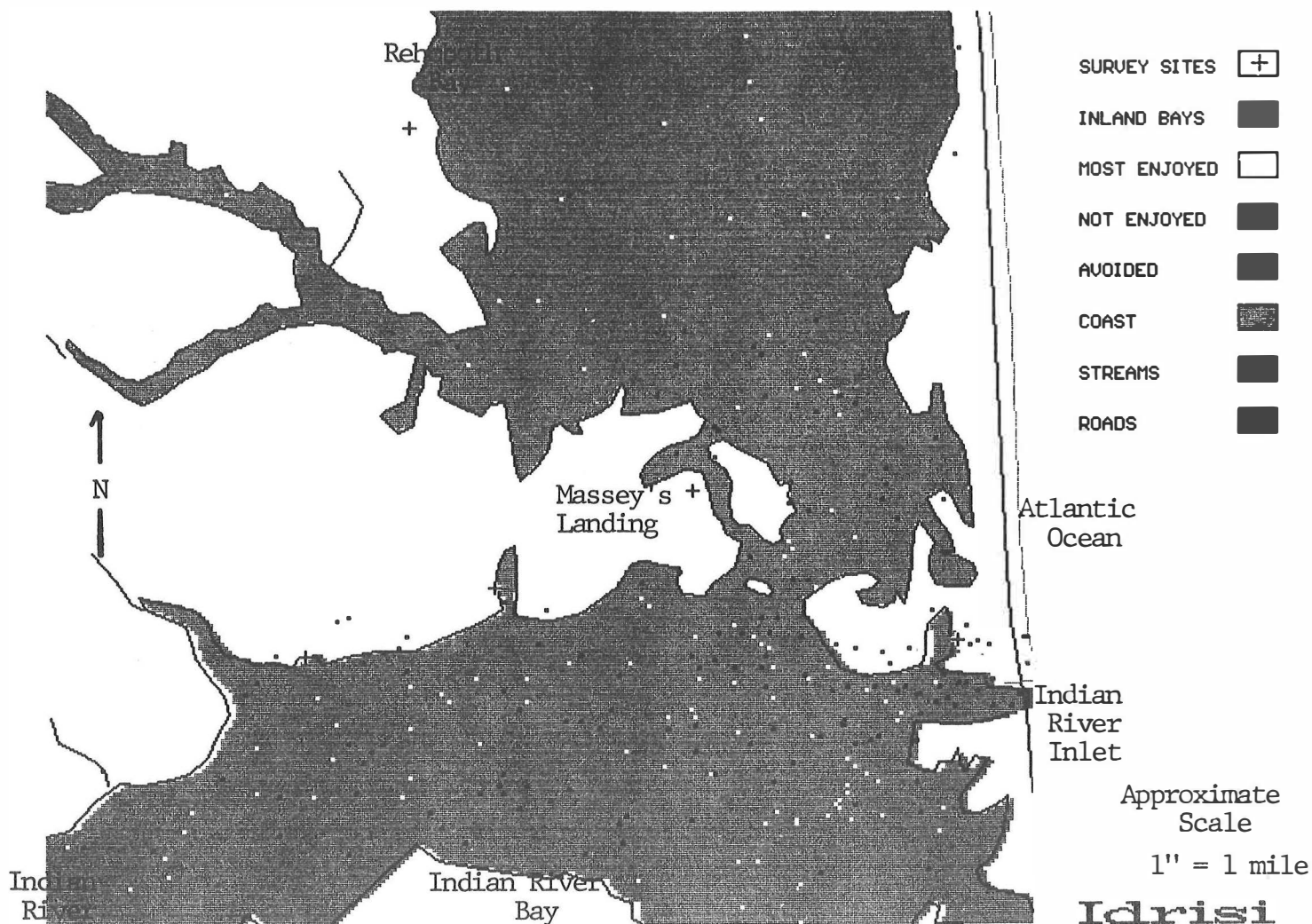


Figure 3. Site desirability point pattern map of Delaware Inland Bays.

This may suggest that factors people find as most enjoyable are varied and therefore somewhat disperse. Also, most of the bays were reported as most enjoyable by someone, suggesting that overall, people find all sections of the bays enjoyable. The minor clustering that was evident at locations throughout the bays was due to people participating in the same activities and finding the areas enjoyable for similar reasons. This may be a function of water depth or some other positional environmental factors that could be identified and included in the spatial database for future research projects.

The areas most commonly reported as least enjoyed or avoided shown in the desirability point pattern map (Figure 3) included the area surrounding the inlet and the water area connecting the two bays. These areas did exhibit significant clustering which suggests many people find the same areas least enjoyable and that many people also avoided these same areas. This was somewhat predictable given the potentially conflicting and heavy usage this area receives. In Rehoboth Bay there was a weak cluster located just north of Massey's Landing, the connection to Indian River Bay. Again, based on the reasons given by the respondents, this was due to increased traffic passing through the confined area of the dredged channel there. The balance of Rehoboth Bay exhibits no significant clusters, and in fact the points are significantly dispersed.

In this study the most often reported reason for enjoying locations was the high quality of the fishing experience. This

was followed by a perceived lack of crowding or low use densities at these sites. Other frequently mentioned reasons for enjoying the areas included good crabbing and clamming, as well as favorable water or weather conditions. Crowding or too many boats/people were the most often reported reasons for the low desirability of areas, followed by unpleasant water or weather conditions. Other reasons included perceived conflicts with jet skiers, lack of fish, crabs or clams and reckless or unsafe boating practices. Reported reasons for avoiding an area included shallow water or sandbars, as well as crowded conditions. Also mentioned were water conditions other than depth (e.g., waves, poor water quality or dirty water), unsafe, reckless or inconsiderate boaters and jet skiers. It is important to note that these points, unlike all of the others examined, do not represent locations used by recreational boaters. They are in fact, locations from which these users were absent by choice. These areas represent a displacement of users to another place, activity or time.

The distribution of selected on-water activities and areas of potential inter-activity user conflict also revealed some significant positive autocorrelation. From the number of points on the map of the areas where users reported fishing it is evident that fishing is the most commonly reported activity in the inland bays. This finding is in agreement with the results of the questionnaire analysis and the on-water counts. Besides being the most common activity, fishing also appears to be the most strongly clustered. The primary area of fishing is Indian

River Bay east to the Inlet and out to the ocean. These results were not surprising and are further validated by the on-water

counts. This area is shown enlarged with reported boating routes included in Figure 4.

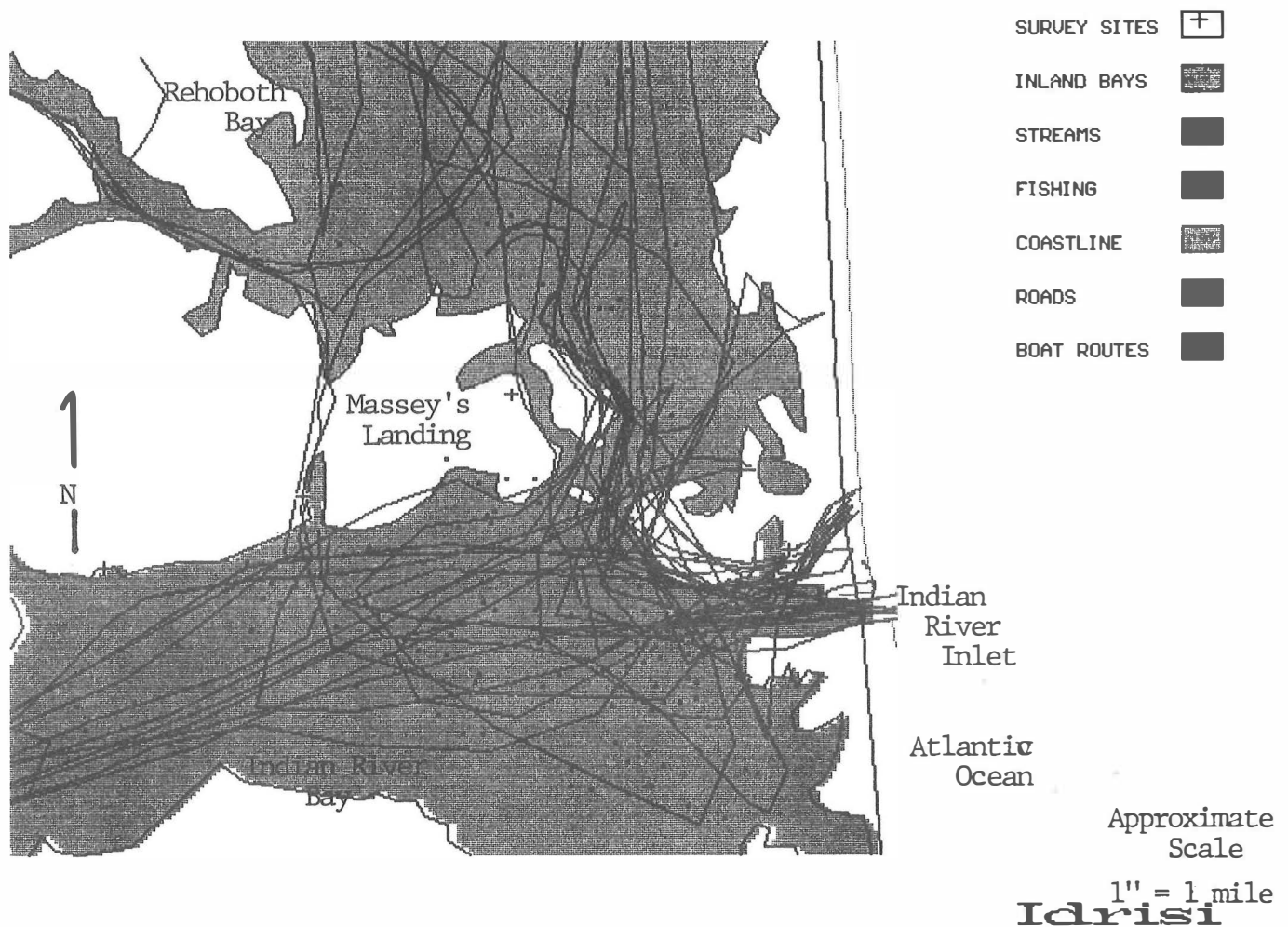


Figure 4. Map of reported fishing sites with boating routes.

When the routes were overlaid on the fishing activity map, areas of potential user conflict between fishermen and power boaters could be identified. These two activities seem to have the highest potential for inter-user conflict. Their primary areas of usage overlap almost completely. Additionally, the type of usage differs with fishermen reporting primarily anchored or drift fishing, while powerboating by definition is mobile. The main area of potential conflict appears to be the area from Indian River Inlet to Massey's Landing. Additionally, it appears that most of the major boating channels also tend to be the best fishing spots. It seems that areas not utilized by boaters are also not used by fishermen to any great extent.

The second most popular activity participated in by boaters on the inland bays identified through the mapping, the questionnaires and the on-water counts is crabbing. The commonly reported areas where crabbing occurred were the points where Indian River, and other tributaries flow into Indian River Bay (Figure 5). There was a second concentration of crabbing in the northwest corner of Rehoboth Bay at the areas where its tributaries enter the bay. This is not surprising, due to the occurrence of water conditions favorable (i.e. water chemistry, salinity, bottom conditions, etc.) for crabs at these areas.

With the routes overlaid an identification of areas of potential user conflict between crabbers and powerboaters was performed. By examining this map it appears that overall there is insufficient evidence of any important inter-activity user conflict zones (Figure 5). This may be due to the fact that most crabbing is done in shallow water and the tributaries, whereas, power boating is limited to the deeper sections and channels. The sites on Indian River Bay where Indian River enters do exhibit the possibility for conflict due to the narrow, confined nature of the bay at those points. However, this may be distorted somewhat in that the displayed boating routes may have been the crabbers themselves.

Clamming was the third most popular activity identified. The primary areas of clamming usage include the east shore of Rehoboth Bay, with the highest concentration just east of the connection at Massey's Landing. Additionally, a few areas in Indian River Bay along the north shore and just south of the inlet on the east shore were identified (Figure 5). These areas are fairly shallow and are therefore accessible to clambers.

By examining the map of clamming sites with the boating routes overlaid it was apparent that the primary areas of clamming activity are not the primary boating routes. There is one notable exception in the area to the east and south of Massey's Landing (Figure 5). However, from this data, there is

not enough evidence to indicate that clamming and power boating are a major source of user conflicts. However, due to the type of potential conflict and safety issues, (i.e. unprotected

clammers with just heads and shoulders above water in an area with power boaters) these two activities should be monitored.

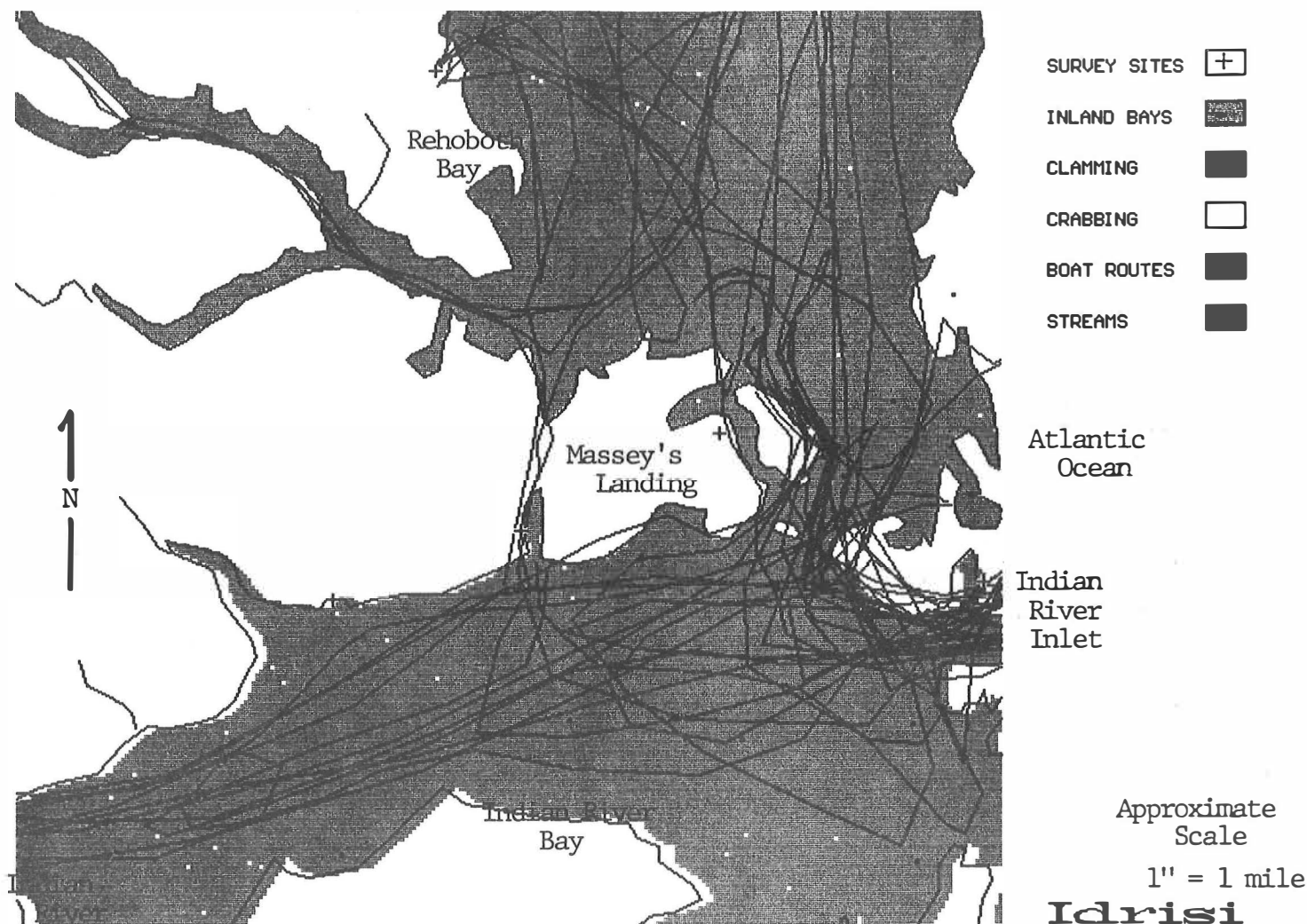


Figure 5. Map of reported crabbing and clamming sites with boating routes.

The dispersed distribution and low density of participants in other activities such as sailing, sailboarding, sightseeing/sunbathing, water skiing, swimming and jet skiing, should not be interpreted as having no conflict potential. On the contrary, these activities by their nature do exhibit a potential for inter-activity conflict and increased safety concerns. For example, swimmers, sailboarders and water skiers all spend some time, unprotected in the water where they could come in conflict with power boaters. Therefore, these activities should be monitored for changes in use levels and activity site locations.

Summary

In summary, based on the results of these spatial analyses of boating distributions and patterns, it is feasible to include a geographic component in recreation research. Point pattern analysis and spatial cross tabulation statistical techniques for the analysis of survey responses appears practical based on the results of these two studies. This observation can be justified through examination of the point pattern maps created from the survey data.

These types of analyses can be accomplished cost effectively through the integration of geographic information systems technology. Additionally, the ability to display this data in a

map format adds a dimension that allows researchers and managers to gain further insights into users' behavior.

Future studies could be designed with this type of analysis in mind, allowing for a more thorough and complete testing of the analytical and statistical procedures. From these studies, hypotheses could be formulated and tested to further refine these procedures. The possible applications of GIS and spatial analysis techniques to a wide variety of resource and visitor management and research are as varied as they are exciting.

Literature Cited

Antenucci, J.C.; Brown, K.; Croswell K.L.; Kevany, M.J.; Archer, H. 1991. Geographic Information Systems: A Guide to the Technology. New York: Van Nostrand Reinhold. 301p.

Boots, B.N.; Getis, A. 1988. Point Pattern Analysis. Scientific Geography Series: Vol. 8. Newbury Park, CA: Sage Publishing. 93p.

Battelle Memorial Institute. 1989. Water-use activity impact reports for Delaware's Inland Bays water-use plan and assessment of marina impacts. Report prepared for the U.S. Environmental Protection Agency and Delaware Department of Natural Resources and Environmental Control.

- Burrough, P.A. 1987. Principles of Geographic Information Systems for Land Resources Assessment. Monographs on Soil and Resources Survey No. 12. New York: Oxford University Press. 194p.
- Delaware Department of Natural Resources and Environmental Control. 1988. Proposal to develop an Estuarine Conservation and Management Plan for Delaware's Inland Bays. Submitted by Governor Michael Castle to Lee Thomas, Administrator, U.S. Environmental Protection Agency.
- Delaware Department of Natural Resources and Environmental Control. 1989. Unpublished boating facilities statistics estimated in 1989 by Division of Water Resources staff.
- Eastman, R.E. 1992a. IDRISI: A Grid-Based Geographic Analysis System - Users' Manual (ver 4.0). Worcester, MA: Graduate School of Geography, Clark University. 178p.
- Eastman, R.E. 1992b. IDRISI: A Grid-Based Geographic Analysis System - Technical Reference (ver 4.0). Worcester, MA: Graduate School of Geography, Clark University. 202p.
- Falk, J.; Graefe, A.R.; Drogin, E.B.; Confer, J.J.; Chandler, L.A. 1992. Recreational boating on Delaware's Inland Bays: Implications for social and environmental carrying capacity. Unpublished report: Submitted to Delaware Department of Natural Resources and Environmental Control. 160p.
- Graefe, A.R.; Drogin, E.B.; Cottrell, S.; Titre, J. 1990. A boating capacity evaluation of Berlin Lake. Unpublished report: Submitted to U.S. Army Corps of Engineers.
- Graefe, A.R.; Kuss, F.R.; Vaske, J.J. 1990. Visitor Impact Management: The Planning Framework. Vol 2. Washington, D.C.: National Parks and Conservation Association. 105 pp.
- Graefe, A.R.; Vaske, J.J.; Kuss, F.R. 1984. Social carrying capacity: An integration and synthesis of twenty years of research. *Leisure Sciences*. 6(4):395-431.
- Hammitt, W.E.; Cole, D.N. 1987. *Wildland Recreation: Ecology and Management*. New York: John Wiley & Sons. 341p.
- Heit M.; Shortreid, A. 1991. *GIS Applications in Natural Resources*. Fort Collins, CO: GIS World, Inc. 381p.
- Jaakson, R. 1989. Recreation boating spatial patterns: Theory and management. *Leisure Sciences*. 11(2):85-98.
- Jones, J. 1992. TOSCA - Reference Guide. (ver. 1.0) Worcester, MA: Clark University, Graduate School of Geography. 42p.
- Kuss, F.R.; Graefe, A.R.; Vaske, J.J. 1990. Visitor Impact Management: A Review of Research. Vol 1. Washington, DC: National Parks and Conservation Association. 256 pp.
- Lentnek, B.; Van Doren, C.S.; Trail, J.R. 1969. Spatial behavior in recreational boating. *Journal of Leisure Research*. 1(2):103-124.
- Manning, R.E. 1986. *Studies in Outdoor Recreation: A Review and Synthesis of the Social Science Literature in Outdoor Recreation*. Corvallis, OR: Oregon State University Press. 166p.
- Mitchell, L.S. 1969. Recreational geography: Evolution and research needs. *Professional Geographer*. 21:117-119.
- Shelby, B.; Heberlein, T.A. 1986. *Carrying Capacity in Recreational Settings*. Corvallis, OR: Oregon State University Press. 164p.
- Stankey, G.H. 1973. Visitor perception of wilderness recreation carrying capacity. Res. Pap. INT-142. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 61p.
- Stankey, G.H.; Cole, D.N.; Lucas, R.C.; Peterson, M.E.; Frissell, S.S. 1985. The limits of acceptable change (LAC) system for wilderness planning. Gen. Tech. Rep. INT-176. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 37p.
- United States Army Corps of Engineers. no date. Map and public use guide for Berlin Lake, Ohio. Pittsburgh, PA: U.S. Army Corps of Engineers.
- Wagar, J.A. 1964. The carrying capacity of wildlands for recreation. Forest Science Monograph No. 7. Washington, DC: Society of American Foresters. 24p.

AN ARRIVAL RATE DEPENDENT MODEL FOR ESTIMATING PARK ATTENDANCE

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Vehicle occupancy levels and arrival rates for state parks were used to model the estimated attendance within individual recreation areas. Previous studies show that occupancy levels may not hold constant as attendance levels increase. An exponential model was developed that reflected the rise in occupancy levels as the vehicle arrival rate increased. The model was tested for consistency between two parks and among the various sites in each park.

Introduction

The measurement of visitation is central to the management of parks. Estimates of visitation are needed when planning facilities, administering the various units of a park system and researching the characteristics of the users. Visitation serves as a measure of the service that parks produce.

Background

Traffic counters are often employed to estimate the number of people entering a recreation area. The occupancy rate used to expand vehicle counts into visitor counts is a crucial component of this process. The Pennsylvania Bureau of State Parks has used occupancy rates ranging from 2.5 to 4.0 persons per vehicle, based upon various in-house studies. It is not unreasonable to expect these rates to vary with changes in fuel prices, automobile sizes and recreation trends. Therefore, it is important to check these figures periodically. A study of occupancy was conducted by Penn State for the Bureau at Presque Isle State Park in 1987 (Strauss and Lord, 1987). At this time it was observed that the occupancy was averaging 2.18 people per car. At the same time it was noticed that the hourly average ranged from a low of 1.52 people per car to a high of 2.56 people per car. Upon further examination, it was noticed that the higher occupancy rates occurred during the busiest periods. Lower occupancy rates occurred during the less crowded periods, such as early mornings or weekdays. An exponential model was developed to reflect this tendency.

The Presque Isle study dealt with an exceptionally large park that is somewhat atypical of the other units in Pennsylvania's park system. Furthermore, this park's single entrance meant that its entire usage could be measured with one traffic counter. Most state parks contain several entrances and often have several distinct activity areas.

Objectives

In a continuation of the above study, the Bureau collected data at two parks in York County Pennsylvania during 1990 to further evaluate the effects of crowding and occupancy upon visitation. The parks differed in their size and the types of activities offered. Unlike Presque Isle each has several entrances. The data from these parks was used to test the

occupancy model for consistency between the parks, as well as between the different areas in each park.

Gifford Pinchot State Park was developed in the late 1950's and contains 2,338 acres, including a 340 acre lake. The park offers camping and beach swimming, but does not have a marina. Only electric motors are allowed on the lake. There are seven parking areas available to the public. There are no large towns in the immediate vicinity of this park.

Codorus State Park is slightly more modern and somewhat more developed than Pinchot. The park was constructed during the late 1960's as part of the park system's second major expansion, "Project 70". The 3,302 acre park is oriented around a 1,275 acre impoundment. It has a marina, a campground and a swimming pool. The lake has a 10 horsepower limit. There are 17 different parking areas in this park. It is also located near Hanover PA, a town of 15,000 people.

Park interns were hired to collect data on vehicle occupancies at each park. Over 1400 hours of observations were collected at the different sites in each park during the course of 19 sample days. Samples were collected on six weekdays, 10 weekend days and two holidays. At Codorus, several entrances were aggregated, resulting in estimates for seven sites at that park. One of the Pinchot entrances was dropped from the study due to lack of significant use.

Vehicle occupancies were observed for one hour periods during random times of the day. The intern would station himself at an observation point that allowed a view of each vehicles occupants as they passed over the traffic counter. Additional visitor information not pertaining directly to this paper was collected through exit interviews.

Modeling Visitation as a Function of Arrival Rates

Scatter plots of the hourly observations revealed a connection between the average number of people per vehicle (occupancy) and the number of vehicles per hour (arrival rate). Site six at Gifford Pinchot serves as an example of a low use site (Figure 1, next page). Codorus's site four contrasts as a high use site (Figure 2, next page). Notice that when the arrival rate was high, the occupancy level was in the range of two to three people per car. During the periods of low use, the average occupancy rate usually dropped to less than two.

Linear correlations of the relationship between the number of people per vehicle and the number of vehicles per hour demonstrated the strength of this relationship at the different sites (Table 1, next page). The sole negative correlation at site four of Gifford Pinchot was reflected in the coefficients estimated for that site.

If the occupancy rate is assumed to vary with the arrival rate, then the following general model suggest itself:

$$\text{People/Vehicle} = a (\text{Vehicles/Hour})^{b-1}. \quad (1)$$

Since the objective of this study was to estimate visitation, the following form of the model was deemed more appropriate to the task:

$$\text{People/Hour} = a (\text{Vehicles/Hour})^b. \quad (2)$$

The exponential coefficient, b , determines the degree to which occupancy changes with the arrival rate. The scalar coefficient, a , alone does not reveal the occupancy rate. The occupancy rate must be calculated for a specific arrival rate using equation 1.

In order to test the significance of the coefficients at the different sites in each park, a log-log transformation of the model was developed (3).

$$\ln(\text{People/Hour}) = \ln(a) + b \ln(\text{Vehicles/Hour}). \quad (3)$$

This linearization allowed the addition of indicator variables for each site.

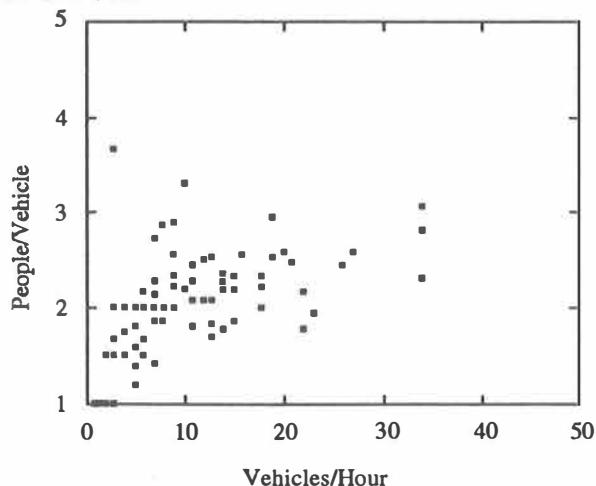


Figure 1. Plot of occupancy versus arrival rate at site six, Gifford Pinchot State Park.

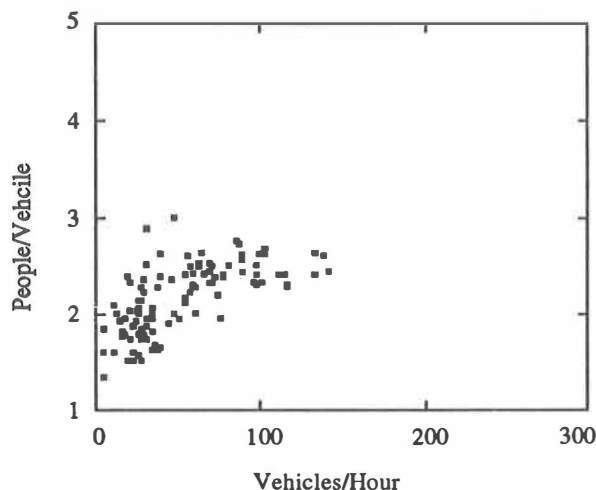


Figure 2. Plot of occupancy versus arrival rate at site four, Codorus State Park.

Table 1. Linear Correlation between people/vehicle and vehicles/hour at each site.

Gifford Pinchot	Correlation	Codorus	Correlation
Site 1	.518	Site 1	.378
2	.472	2	.064
3	.263	3	.296
4	-.021	4	.647
5	.419	5	.130
6	.557	6	.339
		7	.088

Results

The models for each park were significantly different and therefore estimated separately.

In Codorus State Park, the exponential term showed no significant variation between sites. Site was significant enough to require different multiplicative terms. The seven

models estimated for Codorus are shown in Table 2. An R-square of 0.948 was obtained from the regression on the transformed variables. While the exponential term does not vary, the scale term ranged from 1.339 to 1.647. The average number of vehicles per hour observed at the sites is listed on the table along with the occupancy rate predicted at this arrival rate. The predicted occupancy rate for double the average arrival rate and for half the average arrival rate is given. Since the exponential portion of the models was consistent over all sites, the degree of non linearity for each site was the same. That is to say a proportional increase in any site's arrival rate has the identical effect on its occupancy rate.

A general trend can be observed where the sites with the highest average arrival rates had the highest occupancy levels. Overall the average occupancy levels varied from 1.64 people per vehicle to 2.72 people per vehicle.

The sites proved to be significant for both the scale and the exponential terms of the model at Gifford Pinchot. Table 3, shows the model terms for this park. An R-square of 0.973 was obtained from the regression on the transformed variables. The exponent varies from a high of 1.249 to a low of 0.985, with the latter value providing essentially a linear model. The scalar term ranged from 1.165 to 2.408. The average occupancy levels ranged from 1.87 to 2.43, and again showed a tendency to vary with the average arrival rate. Notice that the largest exponents do not necessarily correspond with the highest occupancy levels. What they do correspond with is the sensitivity of the occupancy rate to changes in the arrival rate. For example, at site four, the occupancy rate for this fairly busy site only varied from 2.26 to 2.31, over a range of arrivals of half the average to twice the average. At site 2, the occupancy varied from 2.18 to 2.54, under similar arrival rates.

Discussion

There are several good reasons to be concerned with the occupancy rate being used to estimate attendance at recreational areas. Accurate visitation figures are useful to both managers and researchers. Some of these needs could be served adequately by good total visitation information, such as an average occupancy rate would supply. Indeed, the R-square of a simple linear model of visitation would not fall far below the ones found here. With the limited capacity of most passenger vehicles and considering that a driver is always present, the variation in occupancy will be held to a minimum. Given this bound, it should not be surprising that the number of vehicles arriving is a good predictor of visitation. However, a model using occupancy as a function of the arrival rate raises some interesting possibilities.

The design of park facilities, must reflect accurate estimates of use in order to provide efficient service. For example sewage treatment facilities are designed with specific rates of flow in mind. A large over- or under-estimate of use could result in not only inefficiency but the failure of the system. These design decisions affect existing as well as planned parks. Since the recreational patterns of visitors change over time, as a park rehabilitates its facilities, accurate estimates of current visitation patterns are needed.

The administration of any public system involves a competition for resources with other public agencies and projects. Attendance is at least a partial measure of the recreational service being produced. Reliable estimates supported by sound empirical evidence, will provide the most accurate picture of the park system's output.

In the ever increasing event that a fee system is to be established in a park system, the accuracy of the visitation estimates may be crucial. This would be especially true if the revenues from the fees would be retained by the park system and their annual appropriation reduced by the anticipated revenues.

Researchers also make use of visitation estimates. Many user surveys determine average characteristics from a sample of visitors. When these figures are expanded into totals, their reliability is only as good as the total population figures. Marketing studies and economic impact studies are good examples of this application.

A model of visitation, as developed here, does more than just address these needs. For the most part, good average occupancy rates would do just fine. This model, however, gets at the concepts of crowding and capacity. Both occupancy and arrival rates are closely tied to crowding. Further development of the model may provide insights into this behavioral phenomenon.

Table 2. Model coefficients and predicted occupancy rates for Codorus State Park.

Site	Scalar Term	Exponential Term	Average Arrival Rate (Car/Hour)	Occupancy at Average Arrival Rate (Peo/Car)	Occupancy at Twice Average Arrival Rate (Peo/Car)	Occupancy at Half Average Arrival Rate (Peo/Car)
1	1.395	1.124	11.0	1.88	2.05	1.72
2	1.499	1.124	11.5	2.03	2.21	1.86
3	1.361	1.124	35.2	2.12	2.31	1.94
4	1.339	1.124	5.1	1.64	1.79	1.50
5	1.567	1.124	53.9	2.57	2.80	2.36
6	1.647	1.124	57.3	2.72	2.97	2.50
7	1.505	1.124	18.3	2.16	2.35	1.98

Table 3. Model coefficients and predicted occupancy rates for Gifford Pinchot State Park.

Site	Scalar Term	Exponential Term	Average Arrival Rate (Car/Hour)	Occupancy at Average Arrival Rate (Peo/Car)	Occupancy at Twice Average Arrival Rate (Peo/Car)	Occupancy at Half Average Arrival Rate (Peo/Car)
1	1.262	1.175	19.1	2.11	2.39	1.87
2	1.605	1.112	30.6	2.35	2.54	2.18
3	1.496	1.113	7.1	1.87	2.02	1.73
4	2.408	0.985	35.6	2.28	2.26	2.31
5	1.551	1.110	58.5	2.43	2.62	2.25
6	1.165	1.249	10.0	2.07	2.46	1.74

The visitation models were re-arranged into the form of Equation 1, thereby permitting them to be overlaid on the scatter plots of occupancy versus arrival rates. The two sites

(Figs 1 & 2) are reproduced in Figs 3 & 4 with the estimated model superimposed.

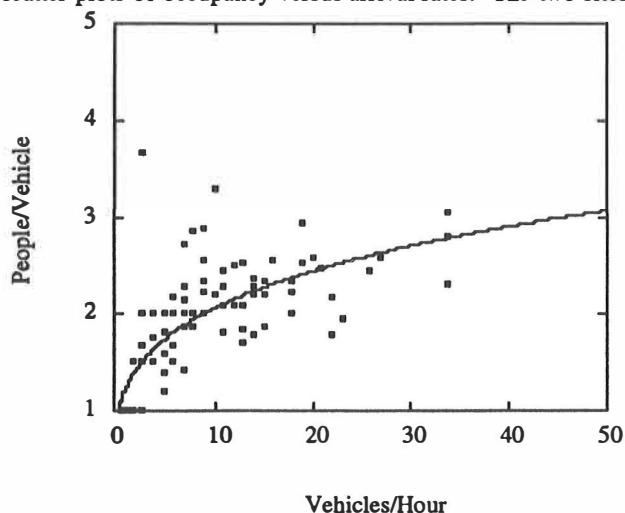


Figure 3. The estimated model for occupancy as a function of arrival rate overlaid on the scatter of the data from site six, Gifford Pinchot State Park.

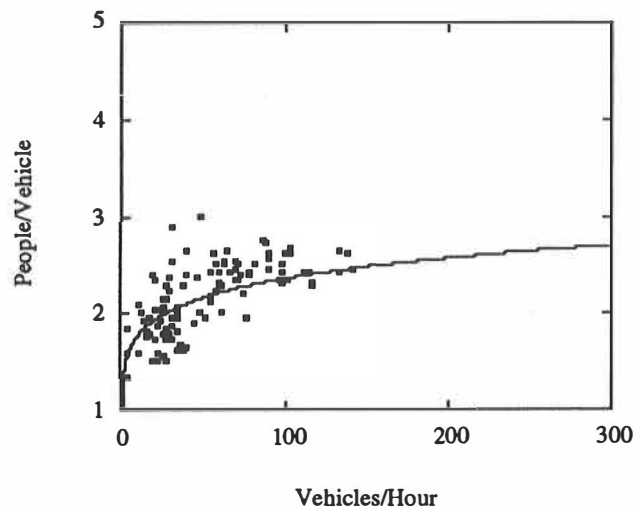


Figure 4. The estimated model for occupancy as a function of arrival rate overlaid on the scatter of the data from site four, Codorus State Park.

A Continuing Study

In an effort to learn more about this phenomenon, the Bureau of State Parks and the School of Forest Resources have initiated an expanded study of visitation measurement. Twenty-two recreation areas in nine parks of various sizes throughout the state are being studied. These areas represent a cross section of activity opportunities, ranging from single purpose areas to large multi activity complexes. Exit interviews will be incorporated into the study to determine the activity profile of the visitors.

A measure of capacity will be incorporated into the model. Measures of the surrounding population will also be tested. The types of activities offered will be tested for their effect on the models coefficients. The intent of these embellishments is to develop a general model for estimating visitation.

Literature Cited

Strauss, Charles H. and Bruce E. Lord. 1987. A traffic counter-based attendance model for Presque Isle State Park: Technical Report #5 submitted to the Pennsylvania Department of Environmental Resources. State College, PA: The Pennsylvania State University.

SEASONAL SCENIC VALUE AND FOREST STRUCTURE IN NORTHEASTERN HARDWOOD STANDS ¹

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This paper reviews the findings of past research relating scenic value to structural characteristics of forests. Data from 23 northeastern forest sites are used to describe the relationship of seasonal scenic value to six structural attributes: time since harvest, crown closure, understory layer, herbaceous ground cover, large trees, and slash or downed wood. The relationships are inconclusive, but indicate that there are seasonal differences, and some relationships are not linear. Sample sizes for future studies are suggested.

Introduction

Private owners control approximately 85 percent of the forest land in the New England and New York. Of this percent, a major portion are non-industrial woodlot owners (Harper 1990). They are often less concerned with the income from timber harvest than they are with the potential loss of amenity values. With this in mind, it has become even more important that foresters be able to make decisions within traditional forest management strategies that maximize retention of scenic resources after harvest. The Northeast Forest Experiment Station of the U.S. Forest Service has recognized this situation and begun developing a computerized aid to help these landowners determine appropriate management systems and silvicultural treatments for their land (Marquis 1991).

Since the early 1970's a great deal of attention has been paid to the way people perceive landscape scenery, particularly forest resources (Arthur & Boster 1976; Ribe 1989). In spite of this, notably little attention has been paid to the relationship between scenic value and forest management in the Northeast. Although scenic quality has traditionally been thought of as the desirable secondary result of forest management, it is only recently that foresters have recognized scenic value as a primary goal of forest management (Marquis 1991).

Literature Review

The management of forest visual quality would be greatly facilitated if the structural characteristics now used by foresters to manage forests also were predictors of scenic value. These characteristics include forest age, spatial distribution, vertical forest structure, canopy openings, species composition, large tree dominance, herbaceous ground cover, and downed wood or residual slash. Table 1 summarizes which structural variables were investigated by 24 previously published reports.

Age Structure

Palmer (1990) found that the scenic value of northern hardwoods was low immediately after a harvest, increased in value as the site 'greened up', and began to decrease in value as

Table 1. Studies of the effect of structural characteristics on forest scenic value.

Study citation	Forest type	Age structure	Spatial distribution	Vertical structure	Canopy openings	Species composition	Large tree dominance	Herbaceous ground cover	Downed wood
Arthur 1977	Ponderosa	•	•	•	•	•	•	•	
Benson 1974									•
Benson & Ulrich 1981	Lodge pole								•
Brown & Daniel 1984	Ponderosa	•	•	•	•	•	•	•	
Brown & Daniel 1986	Ponderosa	•	•	•	•	•	•	•	
Brush 1978	Eastern	•	•	•	•	•	•	•	
Brush & Palmer 1979	Eastern	•	•	•	•	•	•	•	
Buyhoff et al. 1986	Loblolly	•							
Cook 1972	Mixed					•			
Daniel & Boster 1976	Western	•					•	•	•
Daniel & Schroeder 1979	Ponderosa						•	•	•
Echelberger 1979	Eastern		•						•
Herzog 1984	General					•			
Hull & Buyhoff 1986	Loblolly	•					•		
Kellomaki & Sav. 1984	Coniferous					•			
Klukas & Duncan 1967	Min. mixed						•	•	
Palmer 1990	N. hardwood	•							
Patey & Evans 1979	General								•
Radar 1971	General								•
Ribe 1989	General	•	•	•	•	•	•	•	•
Schroeder & Daniel 1981	Western						•	•	•
Schweitzer et al. 1976	Fir & larch						•		•
Vodak et al. 1985	General						•		•
Yeiser & Shilling 1978									•

regeneration began to obstruct the view. The scenic value of the site began to increase again as the regeneration foliage began to thin at eye level. In the West, Brown and Daniel (1984) found that mature even-aged ponderosa pine stands were preferred to uneven-aged stands which were preferred to young even-aged stands. In addition, Hull and Buyhoff (1986) showed that the scenic value of even-aged loblolly pine stands increased with age.

Other researchers have also found that younger forests are perceived to be less attractive than older forests because they have high stem density (Brush 1978, 1979; Daniel & Boster 1976; Hull & Buyhoff 1986). Low stem density can also decrease scenic value, an idea important in relation to clearcuts. Buyhoff et al. (1986) determined that 1150 1 to 5 inch stems per acre is the "scenically optimal number" with more or fewer stems decreasing scenic value. This determination is probably influenced by the relationship of basal area or stem size. In contrast to Buyhoff, Arthur (1977) reports that increasing stem density was positively related to scenic value, but Ribe (1989) speculates that this may be because her photographs included clearcuts. People did not necessarily prefer stands of high density, but clearcuts, with densities of zero, were perceived as unattractive.

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Spatial Distribution

The way trees are arranged within a forest stand--their spatial distribution--may also contribute to the way people perceive forest landscapes. Sporadic dense clumps of trees within generally open ponderosa pine stands was found to be more preferred by Arthur (1977), but less preferred in studies by Brown and Daniel (1984, 1986). Ribe (1989) speculates that the relationship of clumping to scenic attractiveness may be weak because of other factors intruding on the forest scene that influence perception. For example, clumping distributions that help define meadow openings may improve scenic value (Brush 1978, 1979). In effect, these clumping distributions create a point of visual convergence which contributes to a condition of vista enframing (Forest Service, 1973). Echelberger (1979) states that regardless of situation, forest openings and the distance to which one's view can penetrate the forest are positively correlated with scenic value.

Vertical Structure

Brown & Daniel (1984) found no specific relationship between scenic value and vertical forest structure--the number of canopy layers from lowest to highest. However, when researchers focused on the presence of a seedling or shrub understory, they did find relationship--albeit mixed--to scenic value. Brown and Daniel (1984) further report that the combination of grasses, forbs, and shrubs had the highest impact on scenic value within test sites. Brush (1978) reports that since the presence of an understory reduces the potential for visual penetration into northeastern forests, it decreases scenic value. In a later publication, Brush (1979) reports that a varied understory in a red pine stand increases aesthetic perception.

Canopy Openings

According to Ribe (1989), "the presence of canopy openings in eastern US forests has been found to have a weak but positive influence upon scenic preference." Brown and Daniel (1984) attribute increases in vegetative ground cover in western United States forests to such canopy openings. In addition, Arthur (1977) reports that breaks in the canopy layer contribute to increasing crown prominence in ponderosa pine. However, Ribe (1989) speculates that canopy openings, in addition to allowing desirable vegetative ground cover to become established, may encourage the growth of saplings, thereby reducing potential visual penetration and subsequent scenic value. Research articles often do not consider the relationship between canopy openings and scenic value reduction because the relationship between scenic value and tree density or basal area is more easily measured. There has been no effort to separate the scenic value influences of canopy openings and tree density.

Species Composition

Although a variety of empirical studies on the relationship of species composition to scenic value have been conducted, the results may be influenced by the particular landscape and cultural context in which they occurred. Cook (1972) reports that a mix of species can increase scenic value in a given setting. Aspens, oaks, junipers, and firs have a beneficial aesthetic effect when included within a ponderosa pine stand, although aspens are most highly preferred (Schroeder & Daniel 1981). Kellomaki and Savolainen (1984) observed that white barked birches mixed into coniferous stands have the same kind of effect on perception of forest scenery. Similarly, mixing at least 10 percent of other species into a ponderosa pine forest as reported by Daniel and Schroeder (1979) tends to increase scenic value.

Ribe (1989: 62) critically evaluates these results by suggesting that they are "influenced by cultural, regional, contextual, and subjective expectations." For example, Brush (1979) reports that Massachusetts woodlot owners demonstrated a preference for hemlock, birch or mature open pine stands, rather than for mixed hardwoods, red cedar or younger unthinned pine forests. In contrast, Minnesota residents rate red pine most preferable, white pine moderately

preferable, and paper birch least preferable (Klukas & Duncan 1967).

Large Tree Dominance

A wide variety of research shows that mature and old growth forests of all types have higher scenic value (Brown & Daniel 1984, Brown & Daniel 1986, Brush 1978, Brush 1979, Klukas & Duncan 1967, Schroeder & Daniel 1981, Schweitzer et al. 1976, Herzog 1984). Hull and Buyhoff (1986) report that the presence of large trees is even more important within forest stands that have relatively few trees per acre. In this situation, tree size is most commonly estimated using standing volume and diameter at breast height (Arthur 1977, Brown & Daniel 1984, Daniel & Boster 1976, Daniel & Schroeder 1979, Schroeder & Daniel 1981, Vodak et al. 1985), but it has also been estimated using overall tree height or the distance from the ground plane to the top of the canopy (Klukas & Duncan 1967).

Although it is generally accepted that the presence of large trees within a given forest setting enhances scenic value, no research concerning the aesthetic relationship of varying numbers of large trees within different kinds of forest settings has been reported. As Ribe (1989: 62) notes that "mature forests may also tend to exhibit reinforcing scenic attributes, such as lower tree densities and understories." This question warrants more attention, since it could significantly influence management decisions.

Herbaceous Ground Cover

Arthur (1977) and Radar (1971) report that a herbaceous ground cover, including grasses, ferns, forbs, or seedlings, contributes positively to forest scenic value and is preferred to a shrub and sapling understory. This relationship has been observed in forest situations in which bare or disturbed soil conditions are compared to conditions with herbaceous ground covers (Brush 1978, Brush 1979, Echelberger 1979, Schroeder & Daniel 1981). Brown and Daniel (1984, 1986), and Daniel and Schroeder (1979) further report that vegetative ground cover is a primary contributor to scenic value. In addition, Daniel and Boster (1976), and Patey and Evans (1979) state that landscapes managed for grazing purposes and having an open park-like appearance receive positive scenic value ratings and indicate a preference for taller more irregular herbaceous vegetation. Overgrazing or scarification should be avoided, as it may have potential negative impact on perception of forest landscapes.

Downed Wood and Slash Residuals

Scenic value may be decreased by the presence of natural downed wood (Benson & Ulrich 1981). However, its presence is more acceptable than slash, which is perceived as evidence of mechanical disruption (Schroeder & Daniel 1981). Daniel and Boster (1976), and Ribe (1989) report that the reduction in scenic value from slash may be related to perceptions of landscape damage. The treatment of slash and other ground debris is the most important visual mitigation technique employed during timber harvests. It is therefore appropriate to consider routine logging, removal, or chipping and respreading of downed wood in highly visible areas. Burning slash piles on site is not acceptable, since the charred remains also detract from scenic value (Benson 1974, Benson & Ullrich 1981, Schweitzer et al. 1976, Yeiser & Shilling 1978).

In humid eastern United States microclimates, regeneration of ground vegetation is faster, reducing the potential negative impact of slash (Ribe 1989) and in general slash height contributes to negative landscape perception (Vodak et al. 1985). In these forests, logging tall slash near to the ground in anticipation of relatively swift revegetation may be the most effective visual mitigation technique. However, this approach is not recommended for arid western United States forests, where ground covers and forest regeneration are not as fast growing, thus leaving slash open to view for an extended period. In these areas, slash should either be removed from the

harvest site or be chipped and respread to reduce scenic value impacts. Brown and Daniel (1984, 1986) support removal of slash as an appropriate visual mitigation measure for ponderosa pine forests where slash volume was determined to be a primary cause of low scenic value.

Methods

Forest Scenes

Twenty-three views from within six northern hardwood sites are used for this study. The sites were level, without noticeable clumping or unusual species mixtures. They ranged from one to thirteen years since a partial harvest for firewood that left a residual basal area for the stand of approximately 70 square feet per acre. A permanent marker was established at each view point to allow it to be photographed during each season of the year. Photographs were taken on overcast days to minimize highly contrasting shadows. A single-lens reflex camera with a 35mm lens and Kodachrome film was used. The conditions represented by the four seasons are full-leaf summer, partial fall color, snow covered winter, and leafless spring.

Scenic Value Ratings

A ten point rating scale was used to measure scenic value. Between 84 and 171 college juniors majoring in landscape architecture or environmental studies evaluated the 23 scenes four times during the academic year. Of these, 36 students were identifiable as having evaluated all the scenes in all four evaluation sessions.

In an earlier study, Palmer (1990) found that scenic value varied significantly both by season of the photograph, as well as season of the judgment. Therefore, the 23 scenes from a particular season were evaluated only during the season in which they were photographed. Raw scores are used in the analysis in keeping with Schroeder's (1984) finding that "simple mean ratings produced results almost identical to more complicated scaling methods."

Forest Structure Measurements

The site data were measured during the summer within the 64 degree wedge 30 meters deep that corresponded to the photographed view. The following six measurements are used in this study.

1. **Time** refers to the number of years since the site was harvested.
2. **Crown closure** used a 2 inch vertical sighting tube at the apex and every 5 meters along the side and center lines of the site area. It is the percent hits of vegetation belonging to crown stems.
3. **Ground cover** used the vertical sighting tube at the same points to measure hits of ground vegetation.
4. **Understory** is a count of all stems with less than 4 inch dbh and 1 meter high. It only extends out 10 meters from the viewpoint.
5. **Downed wood** is a count of all stems crossed by the 30 meter side and center transects. It refers only to dead wood visible above the litter layer, whether natural or residual slash.
6. **Large tree** is a frequency count of all stems in large saw logs size class (18 to 24 inches dbh).

Analysis

The relationship between scenic value and these six structural variables is investigated using regression analysis. Palmer's (1990) investigation of the relationship of time since harvest and scenic value found that a third degree or cubic polynomial described a curve that could easily be related to forest growth and fit well with the empirical data. Therefore, both simple linear and cubic regressions will be used here. The best-fit third order polynomial curve for each analysis is plotted with the data in figure 1. The analysis is conducted using JMP 2.0 software on a Macintosh Ix computer (SAS 1989).

In evaluating the following results, the reader should be aware that the sites are not randomly sampled, nor do they form a balanced design. In addition, the sample is somewhat small, a topic that will be considered in the discussion section.

Results

Forest Scenic Value as a Function of Time Since Harvest

The results of linear and cubic regression analyses predicting scenic value over four seasons as a function of years since harvest is shown in table 2. The beta coefficient for the summer, fall and spring linear results are small and not significantly different from zero. However, the results for winter are very significant and account for 53 percent of the variation in scenic value. They indicate that for every year the forest ages scenic value decreases .13 points.

The beta coefficients for the cubic regressions are not significantly different from zero. However, the overall models for the fall and winter cubic regressions are significant and explain 36 and 54 percent respectively of the variation in scenic value. Fall scenic value appears to decline until 8 or 9 years since harvest, and then begins to improve. Winter scenic value sees a steady decline throughout the 13 years since harvest covered by these sites.

Table 2. Influence of years since harvest on forest scenic value.

	Summer	Fall	Winter	Spring
Linear:				
R ²	0.03	0.00	0.53	0.08
Intercept	6.37***	5.80***	7.73***	5.42***
beta(x)	-0.02 ^{n.s.}	0.00 ^{n.s.}	-0.13***	0.04 ^{n.s.}
Overall-F	0.64 ^{n.s.}	0.01 ^{n.s.}	23.3***	1.79 ^{n.s.}
Cubic:				
R ²	0.10	0.36	0.54	0.15
Intercept	7.12***	6.57***	7.37***	6.00***
beta(x)	-0.63 ^{n.s.}	-0.15 ^{n.s.}	0.09 ^{n.s.}	-0.26 ^{n.s.}
beta(x ²)	0.10 ^{n.s.}	-0.02 ^{n.s.}	-0.03 ^{n.s.}	0.03 ^{n.s.}
beta(x ³)	-0.00 ^{n.s.}	0.00 ^{n.s.}	0.00 ^{n.s.}	-0.00 ^{n.s.}
Overall-F	0.71 ^{n.s.}	3.49*	7.32**	1.09 ^{n.s.}

Significance: *** ≤ .001, ** ≤ .01, * ≤ .05, and ^{n.s.} ≥ .05

Forest Scenic Value as a Function of Crown Closure

The results of the regression analyses showing the relationship of crown closure on scenic value are given in table 3. Only the fall linear analysis is significant, accounting for 34 percent of the variation in scenic value. A 10 percent increase in crown closure is associated with a .3 increase in scenic value.

Fall is also the only significant cubic regression analysis, explaining 39 percent of the variation in scenic value. The best-fit curve in Figure 1 indicates that values of crown closure below approximately 50 percent have rapidly decreasing scenic value.

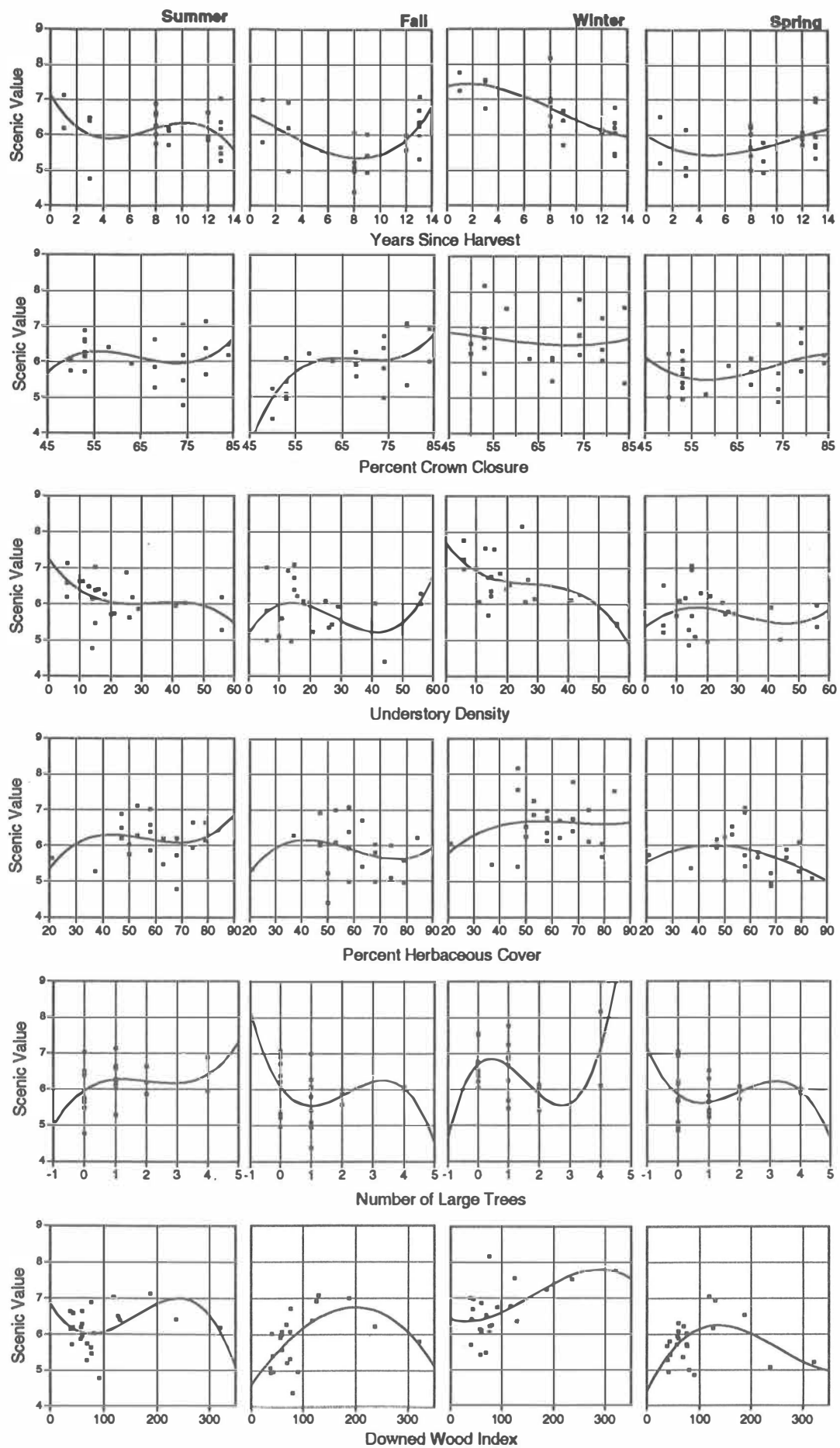


Figure 1. Plots with a best-fit cubic curve showing the relationship of scenic value during four seasons to six measures of forest structure.

Table 3. Influence of crown closure on forest scenic value.

	Summer	Fall	Winter	Spring
Linear:				
R ²	0.00	0.34	0.01	0.12
Intercept	6.26***	3.57***	7.04***	4.65***
beta(x)	-0.00 ^{n.s.}	0.03**	-0.01 ^{n.s.}	0.02 ^{n.s.}
Overall-F	0.02 ^{n.s.}	10.60**	0.26 ^{n.s.}	2.88 ^{n.s.}
Cubic:				
R ²	0.09	0.39	0.02	0.15
Intercept	-28.7 ^{n.s.}	-57.94 ^{n.s.}	4.85 ^{n.s.}	27.91 ^{n.s.}
beta(x)	1.68 ^{n.s.}	2.82 ^{n.s.}	0.14 ^{n.s.}	-0.99 ^{n.s.}
beta(x ²)	-0.03 ^{n.s.}	-0.04 ^{n.s.}	-0.00 ^{n.s.}	0.01 ^{n.s.}
beta(x ³)	0.00 ^{n.s.}	0.00 ^{n.s.}	0.00 ^{n.s.}	-0.00
Overall-F	0.59 ^{n.s.}	4.11*	0.14 ^{n.s.}	1.13 ^{n.s.}

Significance: *** ≤ .001, ** ≤ .01, * ≤ .05, and ^{n.s.} ≥ .05

Forest Scenic Value as a Function of an Understory Layer

Table 4 shows the linear and cubic relationship of the density of an understory shrub and sapling layer with scenic value. Only the winter linear analysis is statistically significant, explaining 34 percent of the variation in scenic value. However, the summer analysis, with an r-squared of .14, would be significant if alpha were relaxed to the .10 level. In all seasons, scenic value decreases as the density of the understory layer increases.

Winter is also the only significant season in the cubic regression analysis. Scenic value decreases quite rapidly as the understory becomes established, at moderate densities it has only a small negative effect, and at higher densities it again decreases scenic value rapidly. This relationship accounts for 38 percent of the variation in scenic value. While a similar shape, though not as pronounced and not statistically significant, the r-squared for the summer cubic curve is .20.

Table 4. Influence of an understory layer on forest scenic value.

	Summer	Fall	Winter	Spring
Linear:				
R ²	0.14	0.01	0.34	0.02
Intercept	6.47***	5.94***	7.24***	5.91***
beta(x)	-0.01 ^{n.s.}	-0.00 ^{n.s.}	-0.03**	-0.01 ^{n.s.}
Overall-F	3.28 ^{n.s.}	0.17 ^{n.s.}	10.98**	0.45 ^{n.s.}
Cubic:				
R ²	0.20	0.11	0.38	0.05
Intercept	7.26***	5.15***	7.72***	5.36***
beta(x)	-0.12	0.14 ^{n.s.}	-0.11 ^{n.s.}	0.07 ^{n.s.}
beta(x ²)	0.00	-0.01 ^{n.s.}	0.00 ^{n.s.}	-0.00 ^{n.s.}
beta(x ³)	-0.00	0.00 ^{n.s.}	-0.00 ^{n.s.}	0.00 ^{n.s.}
Overall-F	1.55 ^{n.s.}	0.81 ^{n.s.}	3.88*	0.32 ^{n.s.}

Significance: *** ≤ .001, ** ≤ .01, * ≤ .05, and ^{n.s.} ≥ .05

Forest Scenic Value as a Function of Herbaceous Ground Cover

The results of the regression analyses describing the relationship of percent herbaceous groundcover to forest scenic value are given in table 5. None of these analyses is even close to being considered statistically significant. While the variability in groundcover among the sites is good, it appears to be nearly random in relation to scenic value.

Table 5. Influence of herbaceous ground cover on forest scenic value.

	Summer	Fall	Winter	Spring
Linear:				
R ²	0.02	0.01	0.02	0.06
Intercept	5.86***	6.17***	6.24***	6.37***
beta(x)	0.01 ^{n.s.}	-0.01 ^{n.s.}	0.01 ^{n.s.}	-0.01 ^{n.s.}
Overall-F	0.36 ^{n.s.}	0.26 ^{n.s.}	0.35 ^{n.s.}	1.34 ^{n.s.}
Cubic:				
R ²	0.11	0.09	0.06	0.15
Intercept	1.90 ^{n.s.}	1.87 ^{n.s.}	3.86 ^{n.s.}	4.36 ^{n.s.}
beta(x)	0.26 ^{n.s.}	0.25 ^{n.s.}	0.13 ^{n.s.}	0.08 ^{n.s.}
beta(x ²)	-0.00 ^{n.s.}	-0.00 ^{n.s.}	0.00 ^{n.s.}	-0.00 ^{n.s.}
beta(x ³)	0.00 ^{n.s.}	0.00 ^{n.s.}	0.00 ^{n.s.}	0.00 ^{n.s.}
Overall-F	0.75 ^{n.s.}	0.62 ^{n.s.}	0.39 ^{n.s.}	1.08 ^{n.s.}

Significance: *** ≤ .001, ** ≤ .01, * ≤ .05, and ^{n.s.} ≥ .05

Forest Scenic Value as a Function of Large Tree Presence

Table 6 lists the regression analyses predicting seasonal scenic value from the number of trees with diameters at breast height between 18 and 24 inches in the scene. While this is one of the more commonly cited relationships, no relationship is found in these data. Including trees with DBH above 12 inches does not improve the results noticeably. It may be that the trees on these sites are simply too small and among too many other small trees to create the necessary scenic effect.

Table 6. Influence of large tree presence on forest scenic value.

	Summer	Fall	Winter	Spring
Linear:				
R ²	0.06	0.00	0.00	0.00
Intercept	6.04***	5.88***	6.60***	5.75***
beta(x)	0.12 ^{n.s.}	-0.04 ^{n.s.}	0.01 ^{n.s.}	0.03 ^{n.s.}
Overall-F	1.29 ^{n.s.}	0.08 ^{n.s.}	0.00 ^{n.s.}	0.06 ^{n.s.}
Cubic:				
R ²	0.09	0.12	0.20	0.05
Intercept	5.97***	6.10***	6.69***	5.85***
beta(x)	0.60 ^{n.s.}	-1.20 ^{n.s.}	0.79 ^{n.s.}	-0.67 ^{n.s.}
beta(x ²)	-0.34 ^{n.s.}	0.77 ^{n.s.}	-1.03 ^{n.s.}	0.53 ^{n.s.}
beta(x ³)	0.06 ^{n.s.}	-0.12 ^{n.s.}	0.22 ^{n.s.}	-0.09 ^{n.s.}
Overall-F	0.59 ^{n.s.}	0.89 ^{n.s.}	1.59 ^{n.s.}	0.33 ^{n.s.}

Significance: *** ≤ .001, ** ≤ .01, * ≤ .05, and ^{n.s.} ≥ .05

Forest Scenic Value as a Function of Downed Wood

The results of the regression analyses relating the amount of downed wood or residual slash to seasonal scenic value are shown in table 7. Only the winter results are significant among the linear analyses, and the relationship is unexpectedly positive. This may be because under snow-cover slash produces wonderful sculptural forms and shadow patterns.

While the cubic regressions all have encouraging r-squared values, only the fall analysis is significant. A moderate amount of slash appears to increase scenic value in the fall, perhaps by increasing visual variety, but beyond that low level it has a negative value. A similar pattern is seen in the spring, while summer has a more equivocal pattern.

Table 7. Influence of downed wood on forest scenic value.

	Summer	Fall	Winter	Spring
Linear:				
R ²	0.05	0.13	0.31	0.00
Intercept	5.99***	5.50***	6.07***	5.78***
beta(x)	0.00 ^{n.s.}	0.00 ^{n.s.}	0.01**	-0.00 ^{n.s.}
Overall-F	1.09 ^{n.s.}	3.07 ^{n.s.}	9.31**	0.00 ^{n.s.}
Cubic:				
R ²	0.18	0.35	0.32	0.27
Intercept	6.87***	4.60***	6.41***	4.39***
beta(x)	-0.02 ^{n.s.}	0.02 ^{n.s.}	-0.00 ^{n.s.}	0.03 ^{n.s.}
beta(x ²)	0.00 ^{n.s.}	-0.00 ^{n.s.}	0.00 ^{n.s.}	-0.00 ^{n.s.}
beta(x ³)	-0.00 ^{n.s.}	-0.00 ^{n.s.}	-0.00 ^{n.s.}	0.00 ^{n.s.}
Overall-F	1.40 ^{n.s.}	3.42*	2.96 ^{n.s.}	2.31 ^{n.s.}

Significance: *** ≤ .001, ** ≤ .01, * ≤ .05, and ^{n.s.} ≥ .05

Forest Scenic Value as a Function of Structural Characteristics

The results of the linear regression analyses shown in table 8 predict seasonal scenic value from the six structural characteristics: time since harvest, crown closure, understory layer, herbaceous ground cover, large trees, and slash or downed wood. The results indicate a moderate level of explanation, particularly for winter, which is the only statistically significant model. The presence of an understory layer has a negative effect that is significant in the summer, winter and spring models. The presence of large trees has a positive effect that is significant in the summer and winter models. These results are in the expected direction. However, ground cover has a negative effect that is significant in the winter model. This is not an expected result. The other beta-terms are not significantly different from zero.

Table 8. Linear regression predicting seasonal scenic value from six structural characteristics.

	Summer	Fall	Winter	Spring
R ²	0.36	0.40	0.77	0.41
Overall-F	1.52 ^{n.s.}	1.78 ^{n.s.}	8.05***	1.88 ^{n.s.}
Terms:				
Intercept	6.78***	3.52*	9.17***	5.49***
Time	0.03 ^{n.s.}	0.05 ^{n.s.}	-0.06 ^{n.s.}	0.08 ^{n.s.}
Understory	-0.02*	-0.01 ^{n.s.}	-0.03**	-0.02*
Crown closure	-0.01 ^{n.s.}	0.03 ^{n.s.}	-0.02 ^{n.s.}	0.01 ^{n.s.}
Large tree	0.24*	0.07 ^{n.s.}	0.21*	0.15 ^{n.s.}
Ground cover	-0.01 ^{n.s.}	-0.00 ^{n.s.}	-0.02*	-0.01 ^{n.s.}
Downed wood	0.00 ^{n.s.}	0.00 ^{n.s.}	0.00 ^{n.s.}	0.00 ^{n.s.}

Significance: *** ≤ .001, ** ≤ .01, * ≤ .05, and ^{n.s.} ≥ .05

Discussion

The results reported here offer some encouragement that forest scenic value can be predicted using traditional measurements of the forest's structure. However, the more lasting contributions of this study are the demonstration that the relationship varies among the seasons, that the relationship may not be linear, and that more sites must be used in future studies to demonstrate these relationships.

Seasonal Variation

As previously shown by Palmer (1990) and Buyhoff (1979), this study demonstrates that the scenic value of a particular site varies through the seasons. Past studies have focused on the value of summer scenes, which this study suggests are the most difficult to predict from traditional forest structural attributes. This may be because foresters are normally not interested in the pattern, color, density or other features of foliage which dominates the summer scene. In addition, the effect of foliage

varies greatly from spot to spot within a stand, while the structural variables of interest to foresters can be expected to be more consistent. It may be that the predominance of scenic use may occur during the summer and therefore this is a limitation that must be accepted. However, the correlation among the four seasons is somewhat modest (Pearson correlations range between .08 and .57). Where use during other seasons is important, such as for a ski resort area, it is clear that they must be represented to obtain an accurate analysis.

Shape of the Relationship

More consideration must be given to exploring relationships other than simple linear ones. In this study, a third order polynomial offered much greater descriptive power than the linear relationship between scenic value and time since harvest, percent ground cover, the number of large trees present, and the amount of downed wood or slash residue. Such non-linear relationships may have clear and easily explained causes, such as the relationship between scenic value and time since harvest described by Palmer (1990). It is hoped that other investigators will continue to search for such relationships and their causes.

Necessary Number of Sites

The primary weakness of this study comes from the use of too few sites to demonstrate significant relationships. Power analysis tells us the probability that an analysis will yield significant results. It is based on sample size, the size of the effect in the model, the standard deviation of the model's residual error, and the alpha significance level. Using estimates based on the data used in this study, an estimate of the sample sizes needed for the linear regressions presented above to be significant at the .05 level were calculated in JMP (SAS 1989) and are presented in table 9. It is recommended that future studies consider sample sizes of between 50 and 100 in order to provide more powerful analyses.

Table 9. Minimum sample size needed to predict a significant linear relation between forest scenic value and structural characteristics.

	Summer	Fall	Winter	Spring
Time	146	6,131	7	52
Understory	29	517	11	200
Crown closure	3,753	11	345	33
Large tree	71	1,122	22,945	1,433
Ground cover	246	340	251	68
Downed wood	83	31	12	→ ∞
Overall model	37	32	12	31

Note: Based on an alpha of .05 and data from 23 sites.

Literature Cited

- Arthur, L. M.; Boster, R. S. 1977. Predicting scenic beauty of forest environments: some empirical tests. *Forest Science*. 23: 151-159.
- Arthur, L. M.; Boster, R. S. 1976. Measuring scenic beauty: a selected annotated bibliography. Gen. Tech. Rep. RM-25. Fort Collins, CO: USDA, Forest Service, Rocky Mountain Forest and Range Experiment Station. 34. p.
- Arthur, L. M.; Daniel, T.C.; Boster, R. S. 1977. Scenic assessment: an overview. *Landscape Planning*. 4:109-129.
- Benson, R. E. 1974. Lodgepole pine logging residues: management alternatives. Res. Pap. INT-160. Ogden, UT: USDA Forest Service, Intermountain Forest and Range Experiment Station. 28 p.
- Benson, R. E.; Ullrich, J.R. 1981. Visual impacts of forest management activities: findings on public preferences. Res. Pap. INT-262. Ogden, UT: USDA Forest Service, Intermountain Forest and Range Experiment Station. 14 p.

- Brown, T. C.; Daniel, T. C. 1984. Modeling forest scenic beauty: concepts and application to ponderosa pine. Res. Pap. RM-256. Fort Collins, CO: USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. 35 p.
- Brown, T. C.; Daniel, T.C. 1986. Predicting scenic beauty of timber stands. *Forest Science*. 32: 471-487.
- Brush, R. O. 1978. Forests can be managed for esthetics: a study of forest land owners in Massachusetts. In: *The National Urban Forestry Conference*; 1978 November 13-16, Washington, DC. ESF Pub. 80-003. Syracuse, NY: State University of New York, College of Environmental Science and Forestry. pp. 349-360.
- Brush, R. O. 1979. The attractiveness of woodlands: perceptions of forest landowners in Massachusetts. *Forest Science*. 25: 495-506.
- Brush, R. O.; Palmer, J.F. 1979. Measuring the impact of urbanization on scenic quality: land use changes in the northeast. In: *Our National Landscape*; 1979 April, 23-25; Incline Village, NV. Gen. Tech. Rep. PSW-35. Berkeley, CA: USDA Forest Service, Pacific Southwest Forest and Range Experiment Station. pp. 358-364.
- Buyhoff, G. J.; Hull, R.B.; Lien, J.N.; Cordell, H.K. 1986. Prediction of scenic quality for southern pine stands. *Forest Science*. 32: 769-778.
- Buyhoff, G. J.; Wellman, J.D. 1979. Seasonality bias in landscape preference research. *Leisure Sciences*. 2: 181-190.
- Cook, W. L., Jr. 1972. An evaluation of the aesthetic quality of forest trees. *Journal of Leisure Research*. 4: 293-302.
- Daniel, T.C.; Boster, R.S. 1976. Measuring landscape aesthetics: the scenic beauty estimation method. Research Paper No. RM-167. Fort Collins, CO: USDA Forest Service, Rocky Mountain Forest and Range Experiment Station.
- Daniel, T. C.; Schroeder, H. 1979. Scenic beauty estimation model: Predicting perceived beauty of forest landscapes. In: *Our National Landscape*; 1979 April, 23-25; Incline Village, NV. Gen. Tech. Rep. PSW-35. Berkeley, CA: USDA Forest Service, Pacific Southwest Forest and Range Experiment Station. pp. 514-523.
- Echelberger, H. E. 1979. The semantic differential in landscape research. In: *Our National Landscape*; 1979 April, 23-25; Incline Village, NV. Gen. Tech. Rep. PSW-35. Berkeley, CA: USDA Forest Service, Pacific Southwest Forest and Range Experiment Station. pp. 524-531.
- Forest Service. 1973. National Forest Landscape Management, volume 1. Agricultural Handbook Number 434. Washington, DC: US Government Printing Office.
- Harper, S.C.; Falk, L.L.; Rankin, E.W. 1990. Northern Forest Lands Study of New England and New York. Rutland, VT: USDA Forest Service, Northeast Experiment Station. 206 p.
- Herzog, T. R. 1984. A cognitive analysis of preference for field-and-forest environments. *Landscape Research*. 9: 10-16.
- Hull, R. B.; Buyhoff, G. J. 1986. The scenic beauty temporal distribution method: an attempt to make scenic beauty assessments compatible with forest planning efforts. *Forest Science*. 32: 271-286.
- Hull, R.B.; Buyhoff, G.J.; Cordell, H.K. 1987. Psychophysical models: an example with scenic beauty perceptions of roadside pine forests. *Landscape Journal*. 6: 113-122.
- Kellomaki, S.; Savolainen, R. 1984. The scenic value of the forest landscape as assessed in the field and the laboratory. *Landscape Planning*. 11: 97-107.
- Klukas, R. W.; Duncan, D.P. 1967.. Vegetation preferences among Itaska Park visitors. *Journal of Forestry*. 65: 18-21.
- Marquis, D.A. 1991. Current specifications: NE Decision Model. Warren, PA: USDA Forest Service, Northeastern Forest Experiment Station. 101 p.
- Palmer, J.F. 1984. The influence of season and time since harvest on forest aesthetics. [USDA Cooperative State Research Service, McIntire-Stennis Cooperative Forestry Research Program No. C400/C100-1078]. Syracuse, NY: SUNY College of Environmental Science and Forestry.
- Palmer, J.F. 1990. Aesthetics of the northern hardwood forest: influence of season and time since harvest. In: *Proceedings of the 1990 Northeastern Recreation Researchers Symposium*. Gen. Tech. Rep. NE-145. Radnor, PA: USDA Forest Service, Northeastern Forest Experiment Station. pp. 185-190.
- Patey, R. C.; Evans, R.M. 1979. Identification of scenically preferred forest landscapes. In: *Our National Landscape*; 1979 April, 23-25; Incline Village, NV. Gen. Tech. Rep. PSW-35. Berkeley, CA: USDA Forest Service, Pacific Southwest Forest and Range Experiment Station. pp. 532-538.
- Radar, T. D. 1971. A study of suburban forests: suburban forest landowners and aesthetic values. [Unpublished PhD dissertation.] Ithaca, NY: Cornell University.
- Ribe, R. G. 1989.. The aesthetics of forestry: What has empirical preference research taught us? *Environmental Management*. 13: 55-74.
- SAS Institute. 1989. JMP User's Guide: Version 2 of JMP. Cary, NC: SAS Institute. 584 p.
- Schroeder, H.; Daniel, T. C. 1981. Progress in predicting the perceived scenic beauty of forest landscapes. *Forest Science*. 27: 71-80.
- Schweitzer, D.L.; Ullrich, J.R.; Benson, R.E. 1976. Esthetic evaluation of timber harvesting in the Northern Rockies-- a progress report. Res. Note INT-203. Ogden, UT: USDA, Forest Service, Intermountain Forest and Range Experiment Station. 11 p.
- Vodak, M.C.; Roberts, P.L.; Wellman, J.D.; Buyhoff, G.J. 1985. Scenic impacts of eastern hardwood management. *Forest Science*. 31: 289-301.
- Yeiser, J. L.; Shilling, C.L. 1978. Student responses to selected terms and scenes in natural resource management. *Journal of Forestry*. 76: 497-498.

***WILDLIFE and FISHERIES
MANAGEMENT***

ECOLOGICAL AND SOCIAL SUPPORT

FOR A CONTROLLED DEER HUNT

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This paper summarizes 7 years (1985 - 1991) of ecological and social research on a deer management program designed to reduce a controversial, over-populated white-tailed deer herd. The objectives of the controlled hunt were to eliminate starvation by increasing the body condition of deer, mitigate vegetation over-browsing, and reduce the human risk of Lyme disease. Ecological objectives were met as the herd was reduced from approximately 350 to 50 deer. Hunters supported the management program despite the number of rules and regulations. Controlled, limited hunting may be a viable management technique for deer over-population problems.

Introduction

The increasing presence of white-tail deer (*Odocoileus virginianus*) in many areas of the northeast is posing significant challenges to wildlife managers. Both ecological and social considerations compound the problem (Decker and Connelly 1990). First, fragmentation of rural land ownership is reducing the amount of land available for deer. As deer populations exceed desired levels, deer starvation rates increase and vegetation destruction caused by deer browsing becomes problematic. Second, traditional management strategies such as recreational hunting for population reduction are often unacceptable to suburban residents. Third, growing anti-hunting sentiment is putting pressure on wildlife managers to justify the role of hunting within wildlife management programs. Finally, there is a need to understand the role of deer in transmitting Lyme disease to humans.

The Richard T. Crane Memorial Reservation and The Cornelius and Mine' Crane Wildlife Refuge in Ipswich and Essex Massachusetts, illustrate the types of problems associated with deer over-population. Both properties are owned and managed by The Trustees of Reservations (TTOR), a non-profit land conservation organization. Prior to 1985, deer hunting was prohibited.

By 1983 deer mortality due to starvation and vegetation destruction caused by over-browsing became apparent to TTOR property managers. A study at Crane (Moen 1984) estimated the deer population at 350 to 400 animals, and suggested the property could support 50 deer without destruction to

vegetation. The deer tick (*Ixodes dammini*) that carries the agent responsible for Lyme disease was first observed at the reservation in 1980. By 1985 Lyme disease had reached epidemic proportions in Ipswich, Massachusetts (Lastavica et al. 1989).

TTOR and the Massachusetts Division of Fisheries and Wildlife (MDFW) proposed and received necessary state and local approval to open the property to hunting during the fall of 1983. Protests from anti-hunters, however, who threatened to place themselves in the field on opening day, forced the cancellation of the 1983 hunt. A committee composed of professional wildlife biologists, veterinarians, public health officials, anti-hunting activists, and local citizens was assembled by TTOR to explore alternative deer reduction techniques (Ellingwood and Caturano 1988).

Controlled, limited hunting was identified as an effective and potentially acceptable deer reduction strategy. The goal of the hunt was to reduce the deer herd to ecological carrying capacity and achieve the following objectives: eliminate starvation by increasing the body condition of deer, reduce the destruction of vegetation by eliminating over-browsing, and reduce the threat of human risk of Lyme disease (Deblinger 1989). This paper briefly summarizes the findings from 7 years of ecological and social research on the controlled hunt at Crane.

Study Area and Methodology

The Crane properties are composed of a 1,400 acre barrier island and 5 drumlin islands surrounded by a 700 acre salt marsh estuary. The property lies between the mouths of the Ipswich and Essex rivers bordered to the east by the Atlantic ocean. Both ecological and social research methodologies were used to evaluate the effectiveness and acceptability of the controlled hunt.

Ecological Methodology

Deer censuses were conducted by helicopter during winter (Beasom 1979, DeYoung 1985) and by spotlighting prior to hunting each fall (Progulske and Duerre 1964, McCullough 1982). To maximize accuracy and maintain standards, helicopter counts were conducted during morning hours with less than 25% cloud cover when 100% of the ground was covered by at least 6 cm of snow. Pre-season, spotlighting counts occurred one hour after sunset during 4 - 5 evenings in October over a standardized drive route covering approximately 20% of the total acreage.

Necropsies were performed on each deer harvested. Body condition was assessed by measuring whole body weight, carcass weight and kidney fat (Finger et al. 1981, Van Vuran and Coblenz 1985). Deer age was determined using microscopic sections of incisors (Lockard 1972).

Vegetation damage was assessed by measuring browsing rates of each forage species during the spring each year. Twenty, 5 m diameter plots were randomly established throughout the property. Every twig of each species below 2 m in height was examined and determined to be browsed or unbrowsed. Percent browsing was calculated for each plant species.

Deer tick abundance and, hence, the threat of Lyme disease was assessed by identifying, removing, and counting the ticks on each deer harvested. Ticks were also removed from white-footed mice (*Peromyscus leucopus*) and counted to determine the effect of deer reduction on deer tick abundance (Deblinger et al. in prep.).

Social Methodology

To be eligible to participate in the hunt, individuals were required to be a resident of one of the 10 towns surrounding Ipswich and Essex, have 5 years of deer hunting experience, possess a valid deer hunting license and hunter safety certificate, attend a TTOR sponsored pre-hunt seminar, and pass a TTOR shooting proficiency test.

Restricting hunt participants to the neighboring towns produced a population of 200 prospective hunters, and provided a mechanism for building support from the local constituency. During the pre-hunt seminar, management objectives and hunting rules and regulations were discussed. Each participant was allowed 2 days of hunting, a maximum of 2 deer, and 2 antlerless permits. Hunting occurred between sunrise and 3 p.m. on the days TTOR assigned to the individual. Hunters were required to use shotguns with slugs. Field dressing was not permitted.

The shooting proficiency test identified the best marksmen, and determined who would participate in the actual hunt. Each hunter was allowed 5 shots in the shooting test and required to hit 3 targets from distances of 30, 40, and 50 yards. Distance of the hit from the bulls eye was measured and the scores ranked. Individuals with the highest scores participated in the hunt. The cut-off for participation was based on the quota of deer to be harvested. Approximately 40% of the pre-season deer population estimate was used as a harvest quota from 1985 through 1990. During 1991, a harvest rate of 25% was used.

Over the past 7 years, 109 different individuals have participated in the controlled hunt, with between 49 and 73 hunters during a given year. Twenty-four percent of these individuals hunted only 1 year at Crane, while 16% hunted all 7 years (average = 3.79 years).

Participation and success rates for each hunter have been collected since 1985. During 1991, all hunters ($n = 49$) also completed a brief on-site survey at the end of their day's hunt. The questionnaire examined the individual's beliefs about the effectiveness of the deer management program at Crane, the quality of the hunt, reactions to the rules and regulations, their concerns about Lyme disease, and background information on the respondent.

Results

Deer Census and Harvest

Helicopter counts conducted during the years prior to the hunt identified between 155 and 167 deer each year. Assuming a 50% error in the census (Beasom 1979), the deer population was estimated to exceed 350 animals. This estimate is consistent with the findings reported by Moen (1984). In the years following the first hunt, the population observed from the helicopter declined from 161 deer in 1985 to 45 in 1991 (Fig. 1). Average spotlighting counts ranged from 65.3 in 1985 to 22.6 in 1991. Deer harvest declined similarly from 156 in 1985 to 49 in 1990. During 1991, when the number of hunt days was reduced by half, 28 deer were harvested. Each of these indicators suggests the deer population is now at or near carrying capacity.

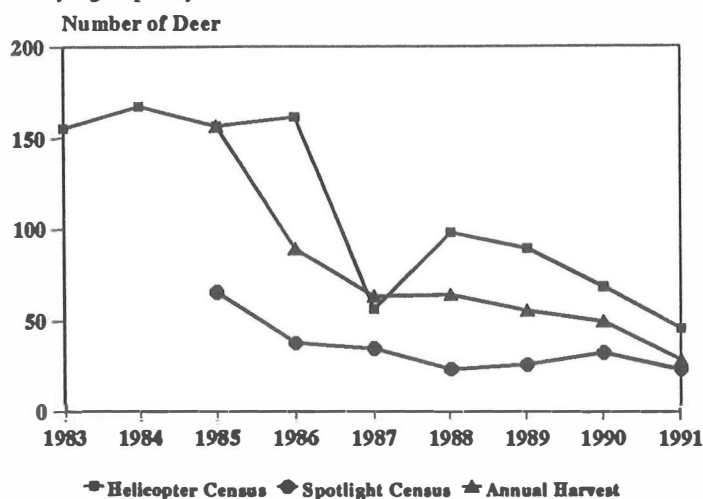


Figure 1. Deer census counts and harvest at the Crane Memorial Reservation and Crane Wildlife Refuge.

Body Condition

Deer body condition, as measured by whole body weight, improved for all deer sex/age classes. Weight increases were most pronounced among fawns, followed by yearlings and, finally, adults. Between 1985 and 1987, for example, the whole body weight of male fawns averaged 29 kg (Table 1). During the next 4 years, this average weight increased to between 34 and 37.6 kg. The weight increases were significant for male fawns ($p = 0.0043$) and female fawns ($p = 0.003$). While body weight increased for other sex/age classes, the increases were not significant.

Table 1. Whole body weight (kg) of deer harvested at the Crane Memorial Reservation and Crane Wildlife Refuge.

	1985	1986	1987	Year 1988	1989	1990	1991
Males							
Fawns	28.8	28.8	29.0	37.6	32.3	34.4	34.0
Yearlings	47.5	51.4	57.4	59.1	56.1	55.4	58.7
Adults	68.5	76.8	73.1	70.6	69.0	76.4	68.9
Females							
Fawns	25.5	30.0	30.0	33.6	35.6	31.2	30.5
Yearlings	49.2	45.0	47.4	51.9	50.0	52.8	54.7
Adults	55.0	55.9	55.9	56.4	55.6	57.1	55.0

Carcass weight (i.e., field dressed) increased significantly for female fawns ($p < 0.001$), male fawns ($p = 0.001$), and yearling males ($p = 0.04$). Male fawn field dressed weight, for example, increased from 20.2 kg in 1985 to 29.7 kg in 1988 (Table 2). Weight declines in male fawns were observed during the next 3 years, but were higher than the 1985 average. Female fawn dressed weight showed a somewhat similar pattern. For this age/sex class, average weights increased from 17.1 kg in 1985 to 26 kg in 1989, with small declines in 1990 and 1991. Among yearling males, weights ranged from 34.6 kg (1985) to 44.9 kg (1988). Carcass weight increased for other sex/age classes but were not significant.

Table 2. Carcass weight (kg) of deer harvested at the Crane Memorial Reservation and Crane Wildlife Refuge.

	1985	1986	1987	Year 1988	1989	1990	1991
Males							
Fawns	20.2	19.7	20.5	29.7	22.8	25.0	24.4
Yearlings	34.6	38.0	43.3	44.9	42.8	42.4	44.1
Adults	50.6	58.6	56.9	54.8	54.4	59.7	55.8
Females							
Fawns	17.1	21.6	20.8	24.5	26.0	22.6	22.0
Yearlings	35.6	31.5	34.4	38.4	38.4	39.4	40.7
Adults	38.5	39.5	39.9	42.0	41.2	41.5	39.6

Percent kidney fat increased significantly for female fawns ($p < 0.001$), male fawns ($p < 0.001$), yearling females ($p = 0.01$), and adult females ($p < 0.001$). For both male and female fawns, this difference was most pronounced between 1985 and 1988, when the percent kidney fat doubled (Table 3). Increases for

other sex/age classes were evident, but not significant. Taken together, these findings suggest the body condition of Crane deer population has improved over the past 7 years.

Table 3. Percent kidney (left) fat of deer harvested at the Crane Memorial Reservation and Crane Wildlife Refuge.

	Year						
	1985	1986	1987	1988	1989	1990	1991
Males							
Fawns	24.0	27.2	30.6	53.8	47.9	40.8	33.5
Yearlings	41.3	42.4	50.5	55.6	48.8	45.6	42.9
Adults	29.2	37.8	41.5	38.7	44.6	40.0	33.1
Females							
Fawns	26.0	29.2	35.0	51.4	50.6	43.1	45.8
Yearlings	40.7	41.4	53.3	58.0	57.0	47.1	51.2
Adults	44.9	44.9	46.6	56.2	56.8	55.0	36.6

Vegetation Condition

Vegetation condition also showed marked improvement. In 1986, every species sampled was browsed at least 59% and at most 94% (Table 4). Across the 9 plant species, an average of 84% were browsed. Such high browsing rates prohibited regeneration or seedling production. By 1990, browsing rates for each species of plant decreased significantly. Browsing on grey birch, for example, declined from 94% to 7%. The 1990 browsing rates ranged from 2% to 25%, with the exception of highbush cranberry (47%).

Table 4. Percent of different species browsed by white-tailed deer at the Crane Memorial Reservation.

	Year				
Species	1986	1987	1988	1989	1990
Bayberry	80	45	45	7	5
Beach Plum	--	--	62	7	7
Black Cherry	89	65	74	7	11
Blueberry	87	86	75	19	25
Highbush Cranberry	94	--	92	61	47
Buckthorn	81	65	62	6	12
Grey Birch	94	37	66	10	7
Honeysuckle	98	87	95	30	15
Privet	59	60	60	30	13
Red Maple	71	54	49	1	2

Lyme Disease

Although annual fluctuations were large, mean abundance of larval deer ticks declined from 20.8 per white-footed mouse (*Peromyscus leucopus*) prior to deer reduction to 10.3 ticks per mouse after deer reduction ($p < 0.001$) (Deblinger et al. in prep.). Similarly, nymphal deer ticks declined from 2.7 per mouse prior to deer reduction to 1.6 per mouse after intervention ($p = 0.04$). Total larval and nymphal tick populations decreased similarly. However, adult deer ticks feeding on adult, female white-tailed deer increased as deer density decreased (Deblinger et al. in prep.).

Hunter Beliefs About Controlled, Limited Hunting
Individuals surveyed during the 1991 hunt supported the deer management program. Nearly all of the respondents believed that reducing the size of the deer herd would improve the health

of the herd and reduce damage to vegetation (Table 5). Almost as many felt deer herd reductions would decrease the number of deer ticks (94%), and effectively control Lyme disease (90%). Only about a quarter (27%) worried about getting Lyme disease while hunting at Crane, and most felt the disease could be prevented with precautions (94%).

Table 5. Hunter beliefs about the Crane deer management program and Lyme disease.

Belief statement	Percent Agreeing
Reducing the size of the deer herd at Crane Beach should:	
improve the health of the herd	98
reduce the damage to vegetation	98
reduce the number of deer ticks	94
Deer hunting at Crane Beach is an effective way to control ticks which cause Lyme disease	90
I worry about getting Lyme disease when I hunt at Crane Beach	27
Contracting Lyme disease can be prevented by taking precautions	94

Almost all respondents believed the experience was worth the money they spent on it (Table 6). Compared to other public areas, hunting at Crane was viewed as more enjoyable (98%), a good substitute (86%), safer (96%), and equally as challenging (77%). Despite the number of rules and regulations, only 15% thought the hunt was too restrictive. Only about a tenth thought there were too many hunters to enjoy being in the field, and an even smaller number (6%) felt there was too much competition from other hunters. When asked to rate the overall quality of the day's hunt, 58% considered the experience excellent or perfect, 27% as good/very good, and only 15% as poor/fair.

Table 6. Hunter beliefs about deer hunting at the Crane Memorial Reservation and Crane Wildlife Refuge.

Belief statement	Percent Agreeing
Hunting at Crane Beach is well worth the money I spent on it	98
I enjoy hunting at Crane Beach more than at public hunting areas	98
Deer hunting at Crane Beach is a good substitute for deer hunting at public areas	86
It is safer to hunt at Crane Beach than at public areas	96
Deer hunting at Crane is less challenging than other areas	23
The Crane Beach hunt is too restrictive	15
There are too many hunters to enjoy being in the field	11
There is too much competition from other hunters	6

The positive ratings provided by the hunters can be partially explained by their success rates. During 1985, 94% of the hunters were successful. As would be expected with the reductions in deer herd size, these percentages declined over the next 6 years (Fig. 2). The success rates, however, were substantially higher than state-wide estimates. For example, 57% of the Crane hunters were successful in 1991; this compares to a success rate of 15% for other public hunting areas in Massachusetts.

Discussion

Deer over-population is controversial in many areas of the northeastern United States. As property owners or managers search for effective methods of deer population control, user groups, neighboring residents or anti-hunting activists create pressure against certain alternatives. In suburban locations, unsupervised, public hunting receives negative attention because residents fear that hunters cause safety problems for their families. Hunting, however, has traditionally been an effective management tool. Conversely, where Lyme disease occurs, public pressure to eliminate deer exists.

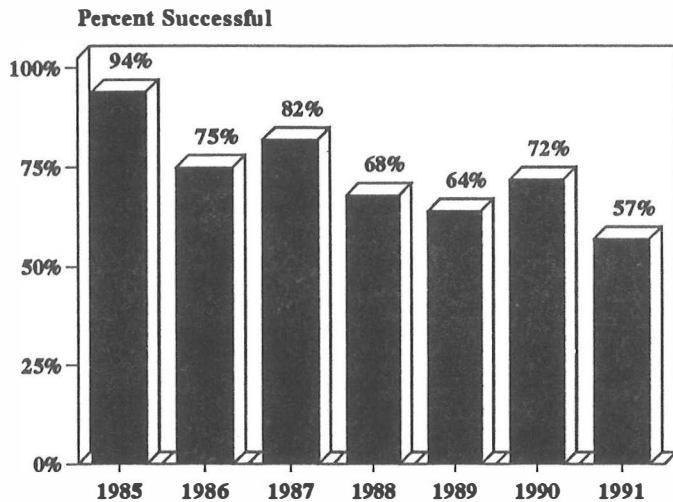


Figure 2. Hunter success rates at the Crane Memorial Reservation and Crane Wildlife Refuge.

This study was undertaken to solve a suburban deer over-population problem by using a controlled, limited hunting program. The combination of research (e.g., Moen 1984) and popular press articles which highlighted the severity of the problem, as well as the restrictive rules required of hunters, facilitated obtaining support by the local community.

Based on the 7 years of ecological research, the size of the deer herd was successfully reduced to the desired capacity tolerance of the area. The body condition of the deer has improved, winter starvation was eliminated, damage to plants mitigated, and the abundance of ticks which cause Lyme disease has decreased.

Findings from the 1991 hunter survey strongly suggest that the participants believe the hunt is an enjoyable, challenging, and safe experience. Despite the number of rules and regulations, few thought the hunt was too restrictive. Nearly all survey respondents believed the program was effective in reducing the size of the deer population, mitigating vegetation impacts, and controlling Lyme disease.

These results coupled with the lack of other viable options to control Lyme disease (Wilson and Deblinger in press), lead us to believe that controlled, limited hunting may provide the solution to other deer over-population conflicts in the northeast. Given the high success rates at Crane, however,

further research in other areas is necessary before the findings can be generalized.

Literature Cited

- Beasom, S. L. 1979. Precision in helicopter censusing of white-tailed deer. *Journal of Wildlife Management*. 43: 777-780.
- Deblinger, R. D. 1989. Crane Memorial Reservation and Crane Wildlife Refuge white-tailed deer management program. Annual Report. The Trustees of Reservations. 28 p.
- Deblinger, R. D.; Wilson, M. L.; Rimmer, D. W.; Spielman, A. in prep. Reduced abundance of deer ticks following incremental removal of deer. *Journal of Medical Entomology*. (submitted).
- Decker, D. J.; Connelly, N. A. 1990. The need for hunter education in deer management: Insights from New York. *Wildlife Society Bulletin*. 18: 447-452.
- DeYoung, C. A. 1985. Accuracy of helicopter surveys of deer in south Texas. *Wildlife Society Bulletin*. 13: 146-149.
- Ellingwood, M. R.; Caturano, S. L. 1988. An evaluation of deer management options. Connecticut Department of Environmental Protection. Publication No. DR-11, 12 p.
- Finger, S. E.; Brisbin, I. L.; Smith, M. H.; Urbston, D. F. 1981. Kidney fat as a predictor of body composition in white-tailed deer. *Journal of Wildlife Management*. 45: 964-968.
- Lastavica, C. C.; Wilson, M. L.; Berardi, V. P.; Spielman, A.; Deblinger, R. D. 1989. Rapid emergence of a focal epidemic of Lyme disease in coastal Massachusetts. *New England Journal of Medicine*. 320: 133-137.
- Lockard, G. R. 1972. Further studies of dental annuli for aging white-tailed deer. *Journal of Wildlife Management*. 36: 46-55.
- McCullough, D. R. 1982. Evaluation of night spotlighting as a deer study technique. *Journal of Wildlife Management*. 46: 963-973.
- Moen, A. M. 1984. Deer management at the Crane Memorial Reservation and Wildlife Refuge. Cornerbrook Press, Lansing, N.Y. 90 p.
- Progulske, R.; Duerre, D. C. 1964. Factors influencing spotlighting counts of deer. *Journal of Wildlife Management*. 28: 27-34.
- Van Vuran, D.; Coblenz, B. E. 1985. Kidney weight variation and the kidney fat index: an evaluation. *Journal of Wildlife Management*. 49: 177-179.
- Wilson, M. L.; Deblinger, R. D. In Press. Vector management to reduce the risk of Lyme disease [in] *Ecology and Environmental Management of Lyme Disease*, H. Ginsberg, ed., Rutgers University Press.



ECONOMICS

EASTERN WILDERNESS: EXTRAMARKET VALUES AND PUBLIC PREFERENCES FOR MANAGEMENT

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Eastern wilderness is a valuable resource for both wilderness users and nonusers alike, and both groups have substantial interest in its management. This study used contingent valuation techniques to examine the attitudes and values of the general public regarding eastern wilderness in Vermont. The results suggest that, while many nonusers have not formed perceptions about the activities and attributes associated with these scarce resources, they still have a considerable stake in the way such areas are managed.

A dearth of information exists on the public view of management preferences and value placed on eastern wilderness. Most socioeconomic studies of wilderness have focused on users and ignore the public as a whole, even though wilderness areas are common property resources and many people other than users have an interest in their management. Indeed, some studies have demonstrated that nonuser values can substantially outweigh user values (Glass et al. 1990, Hager et al. 1989). A broad spectrum of the public, both users and nonusers, have a range of views regarding the management of designated eastern wilderness areas.

Although much research has focused on those who actually use a resource during a given time period to determine the value of the resource, there are broader measures of value that are appropriate when dealing with common property resources (Weisbrod 1964, Krutilla 1967). Use values are appropriate when a resource is being used in the current timeframe or when individuals are willing to pay to retain the opportunity for future use (option values). However, other values reflect nonuser's concerns, including existence (willingness to pay to retain a resource even if no personal use is contemplated), bequest (concern that a resource be retained for succeeding generations), intrinsic (ethical concerns about the protection of a resource though no value to mankind is apparent), and altruistic (providing opportunities for contemporary members of society to benefit from a resource).

Aside from resource value questions, the motivations and views of the general public toward eastern wilderness area management are important considerations. Expectations and objectives for wilderness management, both by users and the interested public, are requisites for sound management. The eastern wilderness areas of northern New England in general, and Vermont in particular, encapsulate these issues.

There are six designated wilderness areas on the Green Mountain National Forest of Vermont totaling 59,598 acres; the best know is Lye Brook Wilderness Area (15,680 acres)

near Manchester, Vermont. By contrast to larger western wilderness areas, these wilderness areas are sufficiently small that day-use and short-term camping trips predominate. In this paper, we present the results of a study designed to determine the values placed upon eastern wilderness by the general public, as well as the public's attitudes about specific management issues.

Methods

Data for this study were collected by the use of a mail survey to heads of households residing within a 75-mile radius of Lye Brook Wilderness Area in southwest Vermont. The study was divided into two consecutive zones: zero to 25, and 26 to 75 miles. During January of 1990, zone-specific questionnaires were mailed to 1,000 randomly selected individuals in each zone. A second questionnaire was mailed to nonrespondents 2 weeks after the initial mailing. The usable responses from the near and distant zones were 35 and 27 percent, respectively. A field follow-up of nonrespondents was not conducted.

Individuals residing within each zone were sent similar questionnaires containing a brief statement on the purpose of the study; a brief description of the two Congressional Acts creating eastern and western wilderness designations; and a series of questions on knowledge, use attitudes, perceptions, and values of eastern wilderness. The two questionnaires were structurally identical except for the valuation questions which were wilderness specific. The inner zone questionnaire requested value information on Lye Brook Wilderness Area specifically, whereas the outer zone questionnaire focused on eastern wilderness in general. The "value" sections of the questionnaire consisted of: (1) a dichotomous choice question, (2) an open-ended contingent value question, (3) a checklist of reasons that a respondent could use to explain a zero willingness-to-pay response, and (4) a question that asked respondents to allocate their maximum willingness to pay among five use and nonuse motivational categories.

Results

Only a small percentage of the respondents (8 percent within the 25-mile radius of Lye Brook, and 4 percent in the 26- to 75-mile range) was aware of the existence of six designated wilderness areas in the Green Mountain National Forest (Table 1). Within the inner zone, Lye Brook was the best known wilderness area, whereas Breadloaf was most familiar in the outer zone of the study area. For the respondents from the inner zone, 27 percent had visited Lye Brook as compared to 10 percent from the outer zone. However, respondents from the outer zone were more likely to have visited any wilderness east of the Mississippi (55 percent) than respondents in the inner zone (39 percent).

Table 1. Percentage of public awareness of Green Mountain National Forest designated wilderness areas by respondents within 25 miles and 25 to 75 miles of Lye Brook Wilderness Area.

Green Mountain wilderness areas	Awareness of respondents living within 25-mile radius (n=285)		Awareness of respondents living within 25- 75-mile radius (n=219)	
	Number	Percent	Number	Percent
All 6 wilderness areas	24	8.4	9	4.1
Lye Brook	92	32.3	20	9.1
Bristol Cliffs	18	6.3	13	5.9
Breadloaf	40	14.0	29	13.2
George D. Aiken	61	21.4	21	9.6
Peru Peak	51	17.9	18	8.2
Big Branch	29	10.2	6	2.7

Regardless of the zonal origin, the responses for a number of questions pertaining to views and perceptions toward eastern wilderness were lumped into two categories: those who have and have not visited eastern wilderness. As might reasonably be expected, a higher percentage of respondents who had not visited any eastern wilderness areas indicated "no opinion" to a series of questions pertaining to wilderness characteristics (Table 2). Greatest agreement from both groups pertained to the statements that eastern wilderness "have great plant and animal diversity," and "are not very well known." A majority of respondents who had visited eastern wilderness agreed that eastern wilderness areas "are small," "especially valuable

because they are located close to large population centers," "are very accessible," and "need good protection because many people use them." Those respondents who had not visited eastern wilderness areas did not agree with these statements, largely due to the high number indicating no opinion. Greatest disagreement among the respondents who had visited eastern wilderness pertained to the statements that eastern wilderness areas "are not very scenic," "are not remote, wild, or large enough to be considered wilderness areas," and "offer few recreational opportunities."

Table 2. Views and perceptions about designated eastern wilderness areas, by visitors and non-visitors.

Statement pertaining to eastern wilderness areas	Visitors				Non-visitors			
	Respondents	Agree	Disagree	No opinion	Respondents	Agree	Disagree	No opinion
	Number	Percent			Number	Percent		
Are small	306	51.3	17.6	31.0	172	30.2	5.8	64.0
Are especially valuable because they are located close to large population centers	307	68.4	12.7	18.9	171	48.5	8.8	42.7
Are visited by many people	304	45.4	17.4	37.2	172	21.5	14.5	64.0
Are not very scenic	306	9.5	74.8	14.4	169	5.9	49.1	45.0
Have great plant and animal diversity	309	76.7	5.1	18.1	170	46.5	4.8	41.7
Are not remote, wild, or large enough to be considered wilderness areas	304	10.9	64.1	25.0	169	5.4	40.8	53.8
Are very accessible	304	63.5	11.2	25.3	170	30.6	8.2	61.2
Offer few recreation opportunities	300	18.4	54.4	27.3	169	8.3	26.6	65.1
Are not very well known	308	72.7	12.6	14.6	167	73.1	4.2	22.7
Are in good condition	308	42.5	12.3	45.1	167	13.2	4.2	82.6
Need good protection because many people use them	307	64.5	9.4	26.1	171	33.9	8.8	57.3
Are not real wilderness areas because people have altered them	300	14.7	49.6	35.7	169	6.5	20.1	73.4

Both visitors and non-visitors usually agreed on the kinds of activities that should be permitted on designated eastern wilderness areas (Table 3). A notable exception was the "harvest of dead or diseased trees"--65 percent of those who had visited eastern wilderness areas felt this practice was acceptable, but only 16 percent of the non-visitors agreed. It is noteworthy that only 1 of 10 from either group supported "commercial harvest of trees" on wilderness areas. Other activities considered acceptable by 60 percent or more of all respondents were "camping," "fishing," "constructing trails," and "control all forest fires." Less than one-fourth of the respondents felt that forest fires from natural causes should be allowed to burn. Besides the aforementioned "commercial

harvest of trees," other activities that received very little support were "mining/prospecting" (which not one respondent found acceptable), "all-terrain vehicle use," and "providing toilet facilities." While "fishing" received wide support as an acceptable activity, "hunting" and "trapping" were less acceptable. Overall, 45 percent of the respondents indicated that hunting was an acceptable activity, but it was favored by a higher percentage of those who had visited eastern wilderness areas than by those who had not. Likewise, trapping, which was supported by 19 percent overall, had nearly twice as much support among those who had visited eastern wilderness areas. "Mountain biking" was found acceptable by slightly less than one-quarter of each group.

Table 3. Views of respondents on activities that should be permitted on designated eastern wilderness areas.

Activity	Respondents who have visited eastern wilderness areas (n=324)		Respondents who have not visited eastern wilderness areas (n=185)		All respondents (n=518)	
	Number	Percent	Number	Percent	Number	Percent
Constructing trails	201	62.0	110	59.5	314	60.6
All-terrain vehicle use	14	4.3	13	7.0	28	5.4
Control all forest fires	194	59.9	113	61.1	312	60.2
Providing toilet facilities	13	4.0	6	3.2	19	3.7
Mining/prospecting	0	0	0	0	0	0
Mountain biking	77	23.8	44	23.8	122	23.6
Allowing forest fires from natural causes to burn	83	25.6	39	21.1	124	23.9
Hunting	160	49.4	71	38.4	235	45.4
Fishing	251	77.5	121	65.4	376	72.6
Camping	271	83.6	134	72.4	411	79.3
Building camp fires	158	48.8	65	35.1	225	43.4
Trapping	73	22.5	22	11.9	96	18.5
Commercial harvest of trees	31	11.1	17	9.2	53	10.2
Harvest of dead/diseased trees	212	65.4	30	16.2	347	67.0

A ranking of the reasons why people visit eastern wilderness areas provides some interesting insights (Table 4). Highest ranking reasons given were "see beautiful scenery," "see abundant wildlife," and "learn more about nature." Motivations often associated with wilderness experience such as "experience the danger of isolation," "test survival skills," and "visit a primitive area" ranked at the bottom. "Meet other wilderness users" also ranked low. Designated wilderness is a highly restrictive resource use in which opportunities for many commercial ventures are prohibited statutorily. Most conventional measures of economic efficiency are not designed to consider the public-oriented values associated with designated wilderness areas. In order to measure the extramarket values related to Lye Brook and eastern wilderness in general, the contingent valuation approach was implemented. The results of this analysis are reported elsewhere (Gilbert et al. [in press]), but warrant consideration here.

In total, 53 percent of the respondents were willing to make a donation to support eastern wilderness. More specifically, 51.6 percent of the respondents within a 25-mile radius indicated that they would make a donation for the management and protection of Lye Brook. For the outer zone (26 to 75 miles), 55.5 percent revealed a willingness to pay for the protection and management of eastern wilderness in general.

For all respondents, the annual median Logit values were \$9.04 for Lye Brook and \$10.12 for eastern wilderness. Respondents who had visited an eastern wilderness were willing to pay \$9.71 as compared to \$8.64 for those who had never visited an eastern wilderness area. For eastern wilderness, the differences were more marked: \$14.28 for those who had visited to \$6.40 for those who had not.

Table 4. Mean rank of reasons for visiting eastern wilderness areas by all survey respondents.

Rank	Reason	Mean Rank ^a
1	See beautiful scenery	5.06
2	See abundant wildlife	6.11
3	Learn more about nature	6.67
4	Experience tranquility	7.01
5	See rare wildlife	7.11
6	Get exercise	7.44
7	Be isolated from urbanized areas	7.62
8	Share the experience with someone	8.35
9	Gain new experiences	8.56
10	Take pictures or paint	9.00
11	Be alone	9.28
12	Fish in pristine waters	9.85
13	Find excitement	11.94
14	Gain self-confidence	12.09
15	Hunt a primitive area	13.23
16	Meet other wilderness areas	13.38
17	Test survival skills	13.67
18	Experience the danger of isolation	14.62

^a/ The mean rank was derived from a Friedman Two-Way Anova. It ranks on a scale of 1 to 18 and determines if the responses are significantly different. (See Hollander and Wolfe 1973).

The Tobit mean willingness to pay was \$6.70 for Lye Brook and \$7.10 for eastern wilderness. (For more complete definitions of Logit and Tobit see Gilbert A. et al. Valuation of eastern wilderness: extramarket measures of public support. Paper presented May, 1991, Society of American Foresters meeting, Jackson, WY).

The motivations underlying the willingness to pay for the protection and management of wilderness areas indicate that nonuse values (existence, bequest, and altruistic values) outweigh use values including both current use and option values (Table 5). Nonuse values accounted for more than two-thirds of the total willingness to pay. Among the nonuse values, bequest values accounted for 29 percent of the total value followed by existence value (21 percent) and altruistic value (19 percent). For use values, option value accounted for a higher percentage than current use values.

The reasons why respondents would not commit themselves to a payment for the protection and management of eastern wilderness offer some interesting insights. While only 2 percent felt wilderness protection was a waste of resources, one-quarter indicated that they "do not use or benefit" and another 19 percent felt that "only persons who actually use eastern wilderness areas should pay." Eight percent thought eastern wilderness areas would continue to exist even if they did not pay. However, one-quarter of the respondents indicated that eastern wilderness areas are part of the U.S. wilderness system and should be financed through the regular system of taxes. One-fifth simply could not afford any contribution at the time.

Views of respondents toward paying for wilderness protection and management were in agreement between visitors and non-visitors of eastern wilderness areas (Table 6). By far, the highest number (47 percent) favored federal taxes as a source of funding. Only two other sources were favored by as many as one-fifth of the respondents: user fees (27 percent) and a federal lottery (23 percent).

Table 5. Motivations underlying the willingness to pay for the protection and management of designated eastern wilderness areas.

Wilderness Motivations	Lye Brook respondents		Eastern Wilderness respondents	
	No.	%	No.	%
So I can actually visit it this year or next (use value)	103	13.1	87	15.8
To keep the opportunity optional to visit an eastern wilderness area in the future (option value)	147	16.9	122	16.9
Just for the pleasure of knowing eastern wilderness areas exist even if you have no plans to use it personally (existence value)	149	20.1	133	21.2
To protect eastern wilderness for future generations (bequest value)	178	29.6	146	29.0
To save eastern wilderness so that others can use them (altruistic value)	162	20.3	125	17.1

Table 6. Views of respondents toward source of funding used to pay for wilderness protection and management by visitors and non-visitors.

Source of funds favored	Visitors		Non-visitors		All respondents	
	Number	Percent	Number	Percent	Number	Percent
Federal taxes	237	46.6	112	47.2	358	46.8
Voluntary contributions state/federal income tax forms	194	15.8	88	17.8	291	16.3
A federal lottery	96	22.1	39	26.7	137	23.1
User fees	204	24.7	112	30.6	322	26.5
Public donations to wilderness fund	201	16.8	107	19.6	314	18.2
Special sales tax on hiking equipment	93	10.8	41	11.3	137	10.7
Special sales tax on hunting and fishing equipment	101	11.4	47	15.7	151	12.8

Discussion

Because a follow-up of nonrespondents was not conducted, the survey results must be interpreted cautiously. Further, the valuation of eastern wilderness was based on the contingent valuation technique which is subject to measurement and interpretative limitations (Stevens et al. 1991). Nonetheless, the results provide some useful insights with respect to public preferences for the management of eastern wilderness and the value that is placed on it.

Another consideration is the spatial limitations of the study. Households at a maximum distance of 75 miles from Lye Brook were randomly selected to be mailed a questionnaire. People beyond this range are likely to be aware of designated wilderness on the Green Mountain National Forest or have an interest in it, but the relative frequency can be expected to diminish proportionately as the distance away from wilderness areas increases. For example, respondents within a 25-mile radius of Lye Brook were two times more aware of all six Green Mountain National Forest designated wilderness areas than the respondents in the 25- to 75-mile radius. Likewise, Lye Brook was much more familiar to those in the inner zone than the outer zone. Nonetheless, when the huge population outside of the study area is considered, there may be considerably more people in total that have an interest in these designated wilderness areas outside of a 75-mile radius. This could affect the measurement of extramarket values in that substantial support by measure of willingness to pay may have been omitted because of the spatial limitations of the study area.

Interpreting the views and perceptions of respondents who have and have not visited eastern wilderness is difficult because of the high percentage of respondents expressing no opinion, especially among the non-visitors. However, it is understandable that those who had not seen the areas in question may have difficulty formulating an opinion relating to specific attributes. Among those who expressed views and perceptions, there was considerable agreement between those who have and have not visited eastern wilderness. While agreeing that eastern wilderness areas were small and not well known, the respondents visualized many positive characteristics and sharply disagreed that those areas were not of sufficient size, remote, or wild enough to be considered wilderness.

With respect to the activities that should be permitted on designated wilderness areas, visitors and non-visitors generally agreed. Activities that received virtually no support were mining/prospecting, providing toilet facilities, and the use of all-terrain vehicles. While the harvesting of dead or diseased trees was deemed acceptable by about two-thirds of the respondents, the commercial harvest of trees received little support. Uses receiving the strongest support were camping and fishing. It is noteworthy that hunting and trapping each received less than 50 percent support even though neither of these activities is generally considered to be a threat to the wilderness character. This may reflect the general societal attitude about these activities rather than specific opinions about their legitimacy within wilderness.

In ranking the reasons as to why people visit eastern wilderness areas, reasons related to aesthetics were ranked highest while those associated with personal achievement tended to be ranked low. However, mean scores may be deceptive, as individuals have divergent motivations for visiting wilderness areas. A primary benefit of the wilderness environment may be its unstructured nature that provides an opportunity for people to satisfy divergent wants.

While more than one-half of the respondents were willing to make a commitment to pay to maintain and protect eastern wilderness, the remainder suggested a myriad of reasons for not paying. Only 2 percent indicated eastern wilderness areas were a waste of resources.

Even if expanded conservatively to the total number of households in the study area, the total willingness-to-pay estimates are convincing. With 53 percent of the respondents indicating a willingness to make a financial commitment for protection and management of eastern wilderness, a more conservative expansion represents a considerable number of households given the population of the study area. For Lye Brook alone (households within a 25-mile radius), the total annual willingness to pay was \$334,281 based on the Logit median. For the 26- to 75-mile zone, the estimated preservation value for eastern wilderness was \$5,718,430 with a use value of an additional \$1,073,055. These estimates were drawn from a limited range, and the potential for substantially larger values for the 19 million households in the Northeast is obvious.

The motivations underlying the willingness to pay for the maintenance and protection of eastern wilderness demonstrate the importance of bequest, existence, and altruistic values. These non-use values accounted for more than two-thirds of the total willingness to pay. Current use and option values accounted for the remainder.

It is clear that eastern wilderness areas have substantial value to people--value that extends well beyond the actual users of such areas to the population as a whole. While many non-users have not formed perceptions about the activities and attributes of these scarce resources, they still have a considerable stake in the way such areas are managed. Future research must clarify the nature and extent of such stakes so that they may be equitably incorporated into management practices.

Literature Cited

- Glass, R. J.; More, T. A.; Stevens, T. H. 1990. Public attitudes, politics, and extramarket values for reintroduced wildlife: examples from New England. In: Transactions 55th North American Wildlife natural resources conference. Washington, DC: Wildlife Management Institute: 548-557.
- Hager, T.; Stevens, T. H.; Wills, C. E. 1989. Economic benefits of salmon restoration in Massachusetts. Amherst, MA: Massachusetts Agricultural Experiment Station, University of Massachusetts. 34 p.
- Hollander, M.; Wolfe, D. 1973. Nonparametric statistical methods. New York: John Wiley and Sons: 138-184.
- Krutilla, J. V. 1967. Conservation reconsidered. *American Economic Review*. 57(4):777-786.
- Stevens, T.; Echeverria, J.; Glass, R. J.; Hager, T.; More, T. A. 1991. Measuring the existence values of wildlife: what do CVM estimates really show? *Land Economics*. 67(4):390-400.
- Weisbrod, B. 1964. Collective-consumption services of individual-consumption goods. *Quarterly Journal of Economics*. 78(3):471-477.

ECONOMICS AND DEMOGRAPHICS OF

NORTHEASTERN SPORT HUNTERS

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Over 800 hunters using the Delaware Water Gap National Recreation Area during the 1987-88 hunting seasons were interviewed to determine their demographic and expenditure profiles and related economic impact within the region. Hunters were predominantly white males, middle aged, middle income and employed in blue-collar trades. Total expenditures by this audience amounted to \$1.4 million. Input-output analysis of the \$133,000 spent within a five-county region surrounding the park showed a total sales impact of \$268,000.

Introduction and Objectives

One of the largest public hunting areas available to Pennsylvania and New Jersey residents is the Delaware Water Gap National Recreation Area (DWG-NRA). The park includes more than 70,000 acres of land along a 37 mile section of the Pennsylvania-New Jersey border. Boating, fishing and hiking are the primary summer-time activities, with hunting and other winter sports available during the remainder of the year. Total attendance among all activities for 1987 was 912,000 visitor days (USDI NPS 1988).

Hunters are a unique audience to the National Park Service (NPS) due to sport hunting being excluded from National Parks on the basis of their direct ecological impacts. The opportunity to evaluate this audience in a National Recreation Area was of particular interest to this agency. Accordingly, the National Park Service established a research grant with the Pennsylvania Cooperative Fish and Wildlife Research Unit for the general purpose of evaluating sport hunters using DWG-NRA. Our objectives were to:

- (1) determine total hunting use;
- (2) establish the demographic characteristics of hunters;
- (3) determine the expenditure patterns and economic impact of park-related hunting during the 1987-88 seasons.

Procedures

Sample Design and Survey Procedures

The 1987-1988 hunting audience was stratified into seven hunting seasons or combinations of seasons, identified as spring turkey, pheasant and rabbit, general small game (those hunting more than two species), fall turkey, bear, deer archery, and deer firearm. The division of the park into nearly equal Pennsylvania and New Jersey sections provided two sets of resident hunters and hunting seasons. In general, both states had similar types and timings for their seasons. However, since New Jersey did not offer either a fall turkey or bear season, there were 12 stratifications of the hunting public.

The sample design for survey procedures included the "opening day" of each season and the following Saturday, with random survey days selected from the remaining Saturdays and weekday periods (Sunday hunting was not permitted in either state). This provided 32 survey days in the sample design.

An interview questionnaire was developed based on previous research recommendations (Propst et al. 1985, Strauss and Lord 1988). The initial section of the instrument addressed the demographic profile of the user group. The second section of the instrument secured the current and planned costs of the individual's trip by type of expenditure and by place of purchase. Equipment costs were obtained for items purchased over the past year and used during the current hunting trip.

Over 98% of the hunters contacted were willing to participate in the interview process. Over 850 interviews were conducted, with 799 qualifying as complete data sets.

Attendance Estimates

The NPS ranger staff conducted a vehicle count on each sample day for the purpose of estimating total park attendance. Vehicle counts were made along established travel routes during early to mid-morning periods (7 to 10 AM) to secure maximum daily counts.

Vehicle counts were multiplied by the average vehicle occupancy level obtained from interviews to estimate the total attendance on survey dates. Daily attendances on sample days were subsequently used to interpolate probable attendances on non-survey dates, thereby providing a means for estimating total seasonal attendance. Interpolations were adjusted for (1) specific weather conditions, (2) weekend and weekday periods, and (3) the trend in attendance over any given season.

Data Analysis

Each of the 12 hunting audiences was analyzed in terms of hunting use, demographics, and expenditures. In general, averages were first established for each day's survey, followed by the development of seasonal averages that used daily attendances as the weighting factor. Total expenditures for any given season were based upon seasonal averages and total attendances.

Economic Model

The economic impacts of the hunting expenditures made within a five-county region surrounding DWG-NRA were modeled through the Impact Analysis for Planning (IMPLAN) System, developed by the USDA Forest Service. The IMPLAN model was originally designed to estimate the regional economic impacts of forest management plans for the National Forests (Alward et al. 1985). Version II, released in 1986, contained a number of improvements, with the model now providing more recreation-specific descriptions of trade and commerce.

Results and Discussion

Total Use

Total hunting within DWG-NRA during all 1987-88 seasons approached 47,400 activity days (Table 1). Nearly 72% was on the New Jersey side of the park, with 28% occurring on the Pennsylvania side. The most popular seasons in New Jersey were the deer firearm, involving 31% of the total, followed by deer archery (26%), and pheasant/rabbit (25%). General small game hunters represented another 15% of total use.

Table 1. Total seasonal use, average daily expenditures, and total seasonal expenditures by season for Delaware Water Gap National Recreation Area hunters, 1987-88.

State Hunting Seasons	Total Use (act. days)	Average Expenditure (\$/ad)	Total Expenditure (thousand\$)
Pennsylvania:			
Spring Turkey	802	15.95	12.8
Pheasant/rabbit	2,597	23.39	60.7
General small game	925	11.73	10.9
Fall turkey	453	15.64	7.0
Bear	622	44.35	27.6
Deer (archery)	1,276	18.70	23.9
Deer (firearm)	6,773	35.41	239.8
State total	13,448		382.7
New Jersey:			
Spring Turkey	1,124	32.90	37.0
Pheasant/rabbit	8,457	26.25	222.0
General small game	5,040	13.26	66.8
Deer (archery)	8,671	34.55	299.6
Deer (firearm)	10,642	39.51	420.4
State total	33,934		1,045.8
Park total	47,382		1,428.5

A similar division was found in Pennsylvania, where 64% of the use was tied to the big game seasons and 36% to the small game seasons. For Pennsylvania, the deer firearm season was the most popular, involving 50% of the total hunting audience. This was followed by pheasant/rabbit (19%), deer archery (9%), and general small game (7%).

For Pennsylvania, nearly half of the use was from the three counties adjacent to the park, with another 24% originating from the Philadelphia region. Of interest, with 18% of the Pennsylvania use involving non-resident hunters, 91% came from New Jersey. Average round trip travel distances for hunters on the Pennsylvania side was 116 miles.

Residents from eight counties in northeastern New Jersey, largely adjacent to Newark, provided 75% of the hunting use on the New Jersey side. Less than 7% of the New Jersey use was from non-resident hunters. However, on an absolute measure, this was about equal to the Pennsylvania non-resident use. Most of the non-resident use in New Jersey was devoted to deer hunting (98%), whereas in Pennsylvania, non-resident hunters divided their interests between small game and big

game seasons. The round trip travel distance for all hunters on the New Jersey side was 132 miles.

Demographics

Hunters on either side of the park could be characterized as young to middle-aged white males, high school educated, and having an average annual family income of \$31,000. About 70% of the hunting use in DWG-NRA was by residents from the urban and suburban counties near Newark, Philadelphia, and Allentown-Bethlehem.

Age. The age structure of hunters showed a strong entry of young hunters in the 10-19 year class, representing over 14% of the total audience (Table 2). The majority of use, about 55%, was from hunters in the 20-29 and 30-39 year classes. Declining participation was evident in the older age classes. Overall, age distributions for the DWG-NRA followed the general profile found in a recent national hunting survey (USDI FWS 1988).

Nearly 50% of the hunting use was by family groups, with much of this involving fathers and sons. Peer groups represented another 35% of total use and again represented certain traditional bonds of friendship. The hunting tradition among family and peer groups was also evident in their years of experience with DWG-NRA and overall positive attitude and allegiance toward this recreation area. Hunting experience with the park averaged 10 years among all hunters.

Hunting continues to be a male dominated activity. Overall, less than 3% of total participation was identified with female hunters. The highest proportion of female hunters was found in New Jersey's general small game (5.6%) and archery (3.6%) seasons and in Pennsylvania's deer firearm season (1.6%).

Table 2. Age class distributions of sport hunters using the Pennsylvania and New Jersey portions of Delaware Water Gap National Recreation Area, 1987-88.

Age Class (years)	Pennsylvania (% of total)	New Jersey (% of total)	All Hunters (% of total)
10-19	12.8	14.9	14.4
20-29	26.1	31.0	29.9
30-39	25.3	25.5	25.4
40-49	14.3	11.9	12.4
50-59	9.4	8.3	8.5
60-69	8.5	.3	6.0
>70	3.5	3.4	3.4
	100.00	100.0	100.0

Within the total audience of hunters, 93% were white, 3% black, and 4% from other non-white origins. Hunters in Pennsylvania had the smallest percentage of minority groups, representing just under 2% of the total. For New Jersey, minorities represented 8% of the total hunting population.

Income levels. The average annual family income for hunters in Pennsylvania was \$29,700 and in New Jersey \$33,000. The higher average for New Jersey was the result of 18% more hunters being in the \$30,000 - \$40,000 and \$50,000 - \$60,000 income ranges and 14% fewer in the under \$20,000 range.

In Pennsylvania, the lowest average annual incomes were recorded in the deer firearm (\$26,100), deer archery (\$29,000) and fall turkey (\$29,300) seasons. In New Jersey, the lowest average annual income levels were also recorded among deer firearm (\$31,000) and deer archery (\$32,000) hunters.

Employment. The general employment profile for hunters on either side of the park showed about 60% in blue-collar trades and slightly more than 20% in white-collar positions. In addition, 5% were students, 1% unemployed, and 14% retired. However, it should be noted that these distributions only relate to the persons actually interviewed during the survey. Some under-representation of students could have taken place due to a potential bias of interviewing senior members of hunting parties.

Education. Hunters from either side of the park had similar education profiles, with about 65% having either a high school or technical school education and about 25% having attended college or a professional school. Less than 8% had only a grade school education. The general proportion of hunters having high school or trade school education was nearly equal to the proportion of hunters involved in blue-collar employment. In like manner, the proportion having college or professional school education was consistent with the proportion of hunters holding white-collar positions.

Hunting Expenditures

A sizable difference in the expenditures per activity day (ad) was evident among the various hunting seasons, ranging from \$12/ad in the general small game season to \$44/ad in bear season (Table 1). Although the average expenditure per activity day showed a substantial variation among the individual seasons, the weighted average expenditures between the two states were within 10% of each other, averaging \$30.83/ad in New Jersey and \$28.42/ad in Pennsylvania. This compared well to the 1985 national average of \$30 per activity day (USDI FWS 1988).

Total expenditures from all hunting audiences using DWG-NRA during the 1987-88 seasons totaled \$1.4 million (Table 1). As might be expected, the distribution of expenditures paralleled attendance, with 73% of the total from New Jersey and 27% from Pennsylvania. For Pennsylvania, 76% of the total was from the three big game seasons and 24% from the four small game seasons. A smaller percentage of the New Jersey total (69%) was from their two big game seasons.

The distribution of expenditures among all hunters showed 43% in equipment, 16% in transportation, 14% in food costs, 13% in license fees, 12% in expendable activity costs, and 3% in lodging. Over 80% of all hunting expenditures were made near the participants' home area. Only 11% was spent near DWG-NRA, 4% in transit, and 5% elsewhere in the U.S.

Economic Impact

A five-county region surrounding the DWG-NRA was used for purposes of economic impact analysis. This included Pike, Monroe, and Northampton in Pennsylvania and Sussex and Warren in New Jersey. Only the expenditures made within this region by non-residents were considered for impact analysis. As such, the focus was on money attracted to the region by DWG-NRA sport hunting. For the 1987-88 hunting seasons, this was limited to \$133,000. Although this recreation area drew a large portion of hunters from outside the region (81%), most of their hunting expenditures were made in their home areas (81%).

The \$133,000 in direct sales to the region was entered to the IMPLAN model on the basis of the particular economic sectors receiving these expenditures. As a result of these direct sales, the IMPLAN model identified the indirect effect of the inter-industry trade generated by the direct sales and the induced effect of the added household consumption originating from the employment supported by direct and indirect sales. These secondary impacts amounted to \$135,200, for a total sales impact of \$268,200. Since the cumulation of total sales across various sectors can introduce a certain double count, value added provided a better measure of the net economic gain to the region. This totaled \$137,300, with 29% occurring in the service sector, 23% in wholesale and retail trade, 21% in

the financial sector, and 11% in manufacturing. Overall, 63% of the value added went to employee income (\$73,400) in support of 6.5 annual jobs within the region.

Conclusions

The Delaware Water Gap National Recreation Area provides a major land area and a diversity of seasons for Pennsylvania and New Jersey hunters. As might be expected, this opportunity has not gone unnoticed within this populated region. Over 47,000 days of usage were estimated for all 1987-88 hunting seasons. Although hunting is often characterized as a sport pursued by an older segment of our population, the DWG-NRA study showed a strong entry of young hunters. Furthermore, over 55% of the hunters were in their 20's and 30's.

The social attributes of hunting, often cited as a key motivating force (Kennedy 1974, More 1973), were also evident in the character and composition of the hunting groups. Over 50% of the usage was identified with family groups, with another 35% tied to close-knit peer groups. Father and son groups were particularly evident during the interview process. Hunting experience within the park averaged 10 years among all hunters, again lending support to the traditional ties among these groups and with this park.

Hunting within the DWG-NRA involved a total cash outlay of \$1.4 million by these participants. However, nearly 81% of these purchases were made outside the five-county region surrounding this park. Direct sales within the region to non-residents of the area were limited to \$113,000, with an additional \$155,000 generated as secondary impacts from the direct sales. One of the primary restraints to hunting expenditures within the region is the lack of Sunday hunting caused by state game laws. As such, most non residents to the region organized their weekend trips as one-day events, with the majority of their expenditures made outside the region.

Literature Cited

- Alward, G. S., H. C. Davis, K. A. Depotakis and E. M. Lofting. 1985. Regional non-survey input-output analysis with IMPLAN. Southern Regional Science Association Conference. Wash. D.C. May 9-10, 1985.
- Kennedy, J. J. 1974. Attitudes and behavior of deer hunters in a Maryland forest. *J. Wildland Management* 38:1-8.
- More, T. A. 1973. Attitudes of Massachusetts hunters. *Trans. N. Am. Wildland. Nat. Resource Conf.* 38:230-234.
- Propst, D. B., D. G. Gavrilis, H. K. Cordell and W. J. Hansen. 1985. Assessing the secondary economic impact of recreation and tourism: Work team recommendations. In: *Assessing the economic impacts of recreation and tourism. Southeastern Forest Experiment Station. USDA Forest Service. Asheville, North Carolina.* pp. 52-63.
- Strauss, C. H. and B. E. Lord. 1989. Structure and location of user expenditures originating from Pennsylvania State Parks. In: *Proceedings, 1988 Southeastern Recreation Research Conference. Vol. 10, pp. 82-97.*
- USDI Fish and Wildlife Service and U.S.D.C., Bureau of the Census. 1988. 1985 National Survey of Fishing, Hunting and Wildlife-associated Recreation. National Report, U.S. Government Printing Office, Washington, D.C. 167 pp.
- USDI National Park Service. 1988. National Park Statistical Abstract 1987. Statistical Office. USDI/NPS. Denver. 68 pp.

FUNDING SUPPORT AND RECREATION

QUALITY

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Support for increased levels of public financing of recreation opportunities was found to be low among a stratified random sample of Vermont residents. But that study implies that political support for public funding depends on mean opinion in the general population. Studies of political leadership suggest that elected officials are more likely to base their decisions on the views of a relatively tiny but influential segment of political participants than on general public opinion.

The authors of a paper published in the 1990 Proceedings of the Northeastern Recreation Research Symposium imply that representative samples of residents suggest the choices that state legislatures or the Congress will (or perhaps should) make in collecting and allocating public funds (Manning & Zwick 1990). While their data indicate a preference among resident adults for "no new taxes" of a general nature to support recreation, this does not mean that funding is not or would not be available if key political leaders supported new allocations. It is this writer's contention that while Manning and Zwick's finding represents popular democratic ideology, it misinterprets the actual political process guiding public decisions. Even conservative Republicans can be persuaded to support funding coalitions, if bureaucrats recognize their strategic importance and allocate extra benefits to their districts (Arnold, 1979, 141).

The authors based their findings on a cross section of Vermont's adult population, however, clarification is needed.

First of all, 16% of Vermont's adult population are not registered to vote and 42% of those registered did not turn out to vote in the last Vermont general election (Barone & Ujifusa 1991, 1258). Since legislators are known to be more responsive to actual voters from their own voting districts than to anyone else, the authors are not surveying the correct population. Their data are diluted by many non-voters and persons unlikely to vote, probably politically alienated and perhaps accounting for some of the low levels of significance (Dionne 1987, Gilmour & Lamb 1975).

Second, since 1952, repeated surveys have shown that from 60 to 71% of the actual voters have responded in National Election Studies surveys that government is too complicated to understand (Neuman 1986, Fig. 1.1). Indeed, effective political support has been shown by Neuman to be related more to the attitudes and behavior of a small (less than 5%) sophisticated political elite than to the views of cross sections of society.

Third, while pluralists such as Dahl (1963) hold that organized interest groups provide an effective means for individual participation in the political system, interest group membership is drawn disproportionately from middle and upper-class segments of the population. These groups are governed by small elites whose values do not always reflect the values of most members (Dye & Zeigler 1975). Dye & Zeigler also point out that most of the communication with decision makers is from other elite members rather than from the general population; also, these decision makers'

perceptions of general attitudes are likely to be affected by their own values, similar to other high status persons.

Furthermore, Neuman points out that for many issues the effective size of the politically sophisticated elite is most often less than his reported 5%. He observes that "for many political matters the effective size of this group could be...a fraction of 1% of the population..." . Neuman tells us, however, that this fraction can mobilize the larger half-attentive portion of the political electorate (1986, p.186), if they can raise the issue from obscurity to prominence. Only at that time will some knowledge of the data presented by Manning and Zwick become politically useful.

The hurdle of raising the issue from obscurity to prominence takes us back to the work of Dye & Zeigler (1975) again. If support for a political issue is not easily mobilized except by a small elite which controls what Neuman calls the political alarm bells, how is this group's concern to be aroused? Dye & Zeigler note "...elites are recruited disproportionately from the well-educated, prestigiously employed, older, affluent, urban, white, Anglo-Saxon, upper and upper-middle-class population of the nation" (p. 142). They share a consensus on fundamental values and the range of disagreement among them is relatively narrow, more related to ends than means. If, therefore, one is to stimulate the tiny but politically sophisticated leadership in regard to an issue such as recreation funding, successful research might most effectively be focused first on determining who the interested leaders are.

Further, in order to elicit their concern, research should seek knowledge about the types of recreational tastes and values most likely to stimulate this group's active involvement. Given the social status of these leaders, they are not likely to be stimulated by recreation values or quality issues limited strictly to the popular cultural tastes and values of lower status groups (West, 1981; Burdge, 1969). However, the more popular tastes and values (standardized and stereotyped to appeal to as many as possible; see Gans, 1974, 22) may well benefit indirectly from the actions of higher status political leaders or may well be added on to the funding program once these leaders begin their mobilization of support.

Sociologist Herbert Gans has pointed out that the more highly educated and affluent "establishment" are advocates of what he calls "high culture" (1974, 75-84) and are really concerned about the nature of the good life, particularly outside the work role. While Gans notes that high culture standards and ideas have diffused more widely throughout society, particularly in the upper middle class, popular culture is still very different from high culture.

Gans observes that the economic vitality of high culture depends on affluent people who are its customers and patrons. These high status persons help subsidize the magazines, museums, concerts and other institutions (such as nature conservation areas and landscape parks) which disseminate high culture.

Gans goes on to suggest that high culture and popular culture represent separate taste cultures or differing sets of shared aesthetic values, and these separate taste cultures have to do with values and products about which people have some choice. He includes leisure time values among these cultural differences. Therefore, if the culture specific concerns of these leadership groups are to be surveyed in regard to recreation funding, the leisure time values and tastes which concern these higher culture groups must be ascertained.

From this meager summary of Gans' and others thoughts, we can deduce that the potential activist political leadership, which might mobilize political support for new or re-allocated expenditures for recreation quality, may well have leisure and recreation tastes which differ from those of the majority of

Manning and Zwick's' representative sample. Thus if we are to motivate this leadership group to contribute time, money and energy to the task of mobilizing public support for and defense of Vermont's recreation quality budget, we not only will have to survey and identify this set of individuals, but we will need to identify the recreation values and tastes that motivate those individuals' real concerns.

This review of theory and literature suggests that potential political leaders of recreation funding increases will not strongly respond to tastes and leisure values primarily of concern to middle and lower class Vermonters. This may also be true of the values sought by the many out-of-state patrons reserving automobile campsites in Vermont State Parks. Our researchers concerned about funding increases will probably have to design a survey that, as Neuman puts it, will oversample the activist group in the elite leadership stratum. Only then will our researchers understand and be able to supply information actually useful for improving effective political support for high quality recreation opportunities.

Once the leadership group is activated and convinced that an issue is worthy of their time and interest, then that group may assure sufficient support to gain at least part of the budgetary increases required for a perceived public recreation problem.

A note of caution: research of this nature may require primarily non-governmental or private funding, as publicly funded community power studies are often the subject of criticism by partisan political leaders. Nevertheless, if citizens or researchers are really concerned about recreation quality issues, it is argued that this political science-based approach will produce more effective actual results than representative surveys of the general population.

Neuman's conclusion is worth repeating: "The essence of politics lies in the subtle interactions between the elite stratum and the mass public" (1986, 187). If funding research can be narrowed in the fashion suggested by this paper, the supportive leadership groups consequently identified might well be expected to influence both favorable legislative support and tradeoffs. These groups may also persuade a majority of registered voters to support either new taxes or a re-allocation of funds from "non-essential" uses.

Literature Cited

- Arnold, R. Douglas. 1979. *Congress and the Bureaucracy: A Theory of Influence*. New Haven, CT: Yale University Press.
- Barone, Michael and Grant Ujifusa. 1991. *The Almanac of American Politics*, 1992, Washington D.C.: National Journal.
- Burdge, Rabel J. 1969. Levels of occupational prestige and leisure activity. *Journal of Leisure Research*. 1 (Summer): 262-274.
- Dahl, Robert. 1963. *Modern Political Analysis*. Englewood Cliffs, NJ: Prentice-Hall.
- Dionne, E.J. Jr. 1987. Survey of electorate finds weak political parties and conflicts over change. *New York Times*. October 1, 1987, D27.
- Dye, Thomas R. and L. H. Zeigler. 1975. *The Irony of Democracy* (3rd Ed). North Scituate, MA: Duxbury Press.
- Gans, Herbert J. 1974. *Popular Culture and High Culture*. New York, NY: Basic Books.
- Gilmour, Robert S. and R. B. Lamb. 1975. *Political Alienation in Contemporary America*. New York, NY: St. Martin's Press.
- Manning, Robert E. and Rodney Zwick. 1990. The relationship between quality of recreation opportunities and support for recreation funding. In: *Proceedings of the 1990 NorthEastern Recreation Research Symposium*. Radnor, PA: Northeastern Forest Experiment Station General Technical Report No. NE-145.
- Neuman, W. Russel. 1986. *The Paradox of Mass Politics: Knowledge and Opinion in the American Electorate*. Cambridge, MA: Harvard University Press.
- West, Patrick. 1981. Perceived crowding and attitudes toward limiting use in backcountry recreation areas," *Leisure Sciences*. 4(4): 419-425.

PSYCHOLOGY and LEISURE

THE RELATIONSHIP BETWEEN LEISURE ACTIVITIES AND NEED SATISFACTION:

A PRELIMINARY INVESTIGATION

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Logistic regression was used to identify the best predictors of need satisfaction for males and females based on leisure activity preference, age, and social class. The development of such profiles can enable the leisure professional to design services and programs which better match the needs of their clients.

Introduction

As the amount of leisure time has increased during the later half of the twentieth century, researchers have investigated the numerous ways in which individuals have chosen to spend this time. One approach taken by these investigators has been to analyze the relationship between leisure activities and the satisfaction of various psychological, physiological, and social needs. Indeed, psychologists such as Murray (1938) and Maslow (1943) have long postulated that all behavior is a function of needs, and much of their work has provided the theoretical foundations for many of these studies. However, as many researchers have discovered, the relationship between leisure activities and human needs is extremely complex (Tinsley, Barrett & Kass, 1977; London, Crandall, & Fitzgibbons, 1977; Tinsley & Kass, 1978, 1979; Iso-Ahola & Allen, 1982; Allen, 1982). It is not sufficient for example to merely identify a set of needs and to pair them with a particular activity, for as Crandall (1980) argues it is quite conceivable that different activities can be done for different reasons by the same people at different times, and even then the same activity can be done for different reasons by different people at the same time. Moreover, even though many studies have demonstrated a close relationship exists between human needs and leisure preferences, the cause and effect question remains unsolved, as Howard (1976) asks, what comes first, liking a particular activity, or choosing it because it satisfies certain needs?

In spite of the complexity of the relationship between leisure activities and need satisfaction however, studies conducted over the last twenty years have made significant contributions to our understanding of the phenomenon; insight which Tinsley, Barrett, and Kass (1977) argue is imperative in a society where life satisfaction is increasingly dependent upon the profitable use of leisure time. Researchers have found support for the idea that needs are leisure activity specific, that is certain needs are related to certain activities (Tinsley, Barrett, & Kass, 1977; Tinsley & Kass, 1978). They have also found that needs and activities cluster in groups suggesting there is an underlying commonality among them, so that as Iso-Ahola (1980) suggests, people do not walk around with a list of 45 needs in their heads, rather leisure needs tend to cluster together in people's thinking. Regarding the clustering of leisure activities, (London, Crandall, & Fitzgibbons, 1977) this can begin to explain why different activities can satisfy the same

needs for different people; and it also has implications for the substitutability of activities (Ritchie, 1975).

Thus, a wealth of evidence suggests that a close relationship exists between leisure activities and need satisfaction. However, findings regarding gender differences, the influence of social class, and age on the leisure activity and need satisfaction relationship have been contradictory and many researchers have supported Havighurst's (1957) contention that choice of leisure activities is more closely related to needs than to demographic variables such as age, gender, and social class. In spite of this, Beard and Ragheb (1980) recognize the importance of answering such questions as:

"What is the relationship between age and satisfaction derived from leisure activities for each of the 'need areas'? Do the type of needs filled by leisure activities vary for male and female participants? How does income and education level relate to leisure satisfaction?" (p31).

They suggest that it is only after we have addressed these questions that we can begin to truly understand the relationship between leisure activities and need satisfaction. Indeed, in reviewing the literature on women and leisure, research indicates that the constraints on the leisure experienced by women are quite distinct from those experienced by most men (Henderson et al 1989). Moreover, Deem (1982) found a strong relationship exists between women's educational level, employment, family, public life, and leisure. For example, women who have not had formal educational opportunities may not be aware of the wide range of leisure activities that exist, or they may lack the confidence to participate. The same may be true for men. Certainly, with regards to vacation choices Graburn (1983) found that individuals with lower education levels lacked the "cultural self confidence" to travel far from home, even when they were not constrained by finances.

Age, or stage in the life course may also be related to leisure activities and need satisfaction. Indeed, Osgood and Howe (1984) note that little is known about the changing motivations for, and the meaning of leisure across the life course. They ask, do the same activities have different meanings for different individuals, or even the same individual at different stages in the life course? Certainly, Iso-Ahola (1980;1981) supports the idea that leisure needs have both stable and dynamic characteristics, and as a result he contends that leisure activity patterns change continuously over the life course as the individual feels the need to experience novelty and change.

Purpose of the Study

Therefore, given that the literature indicates there is a relationship between leisure activities and need satisfaction, but at the same time the influence of gender, social class and age remain unclear, the purpose of this study was investigate the nature of this relationship, specifically to develop multiple regression models which would elucidate the relationship among leisure activities, need satisfaction, gender, social class and levels of life satisfaction.

Data Collection

The data for this study were collected by a research team consisting of trained graduate students in the spring 1985. A systematic random sample of Connecticut residents was drawn from the telephone directories of different parts of the State. Every nth name was selected and a random point of entry was employed. The interviews were conducted at different times of the day in order to increase the heterogeneity of the sample in terms of occupational status. Each of the interviewers used standardized interviewing procedures which included a screening question asking the subject if he/she were aged over 18.

The resulting sample consists of 639 Connecticut residents; 294 males and 345 females aged between 18 and 66 plus years, with a mean age of 37 years. 47.8% of the sample are employed full time and 14.7% are students.

Instrument

The questionnaire used in this study was designed by Yiannakis. Subjects were first asked to indicate how many times per month they participated in a range (34 items) of leisure activities, which included walking for pleasure, going to bars, and playing racquet sports. Subjects were then asked to indicate the degree to which 19 human needs were satisfied for them, and to rate their overall life satisfaction. The demographic questions pertained to age, family's total annual income, occupational status, highest level of education completed by the interviewee, and gender.

Data Analysis

The data were analyzed in two stages. Principal components analysis with quartimax rotation was employed to identify the constructs underlying the leisure activities scale and the needs scale. The leisure activities loaded on eight factors accounting for 51.2% of the variance. The need scale resulted in a five factor solution accounting for 50.4% of the total variance. All of the items which loaded .5 or above were subsequently used to label each of the appropriate factors.

Logistic regression which is the method most suited for use with non-linear data and nominal and ordinal levels of measurement was employed to identify the variables which best predict the correct classification of individuals who expressed either satisfaction or dissatisfaction with each of the need clusters. Each need cluster was dichotomized into high and low satisfaction based on frequency distributions for the individual needs constituting each particular cluster. The leisure activity factors were recoded into high and low participation rates; income and education levels used as indicators of social class were also dichotomized into high and low. Age and life satisfaction were dummy coded so that each level was treated as a separate variable in the regression analyses. Separate analyses were run for males and females. Each need cluster was entered in the analysis as a dependent variable and the eight activity factors, age, income, education, and life satisfaction were used as independent variables.

Results

- A. Security Needs Cluster:**
Financial security
Safety and personal security
Need for home and/or family

Variables Predicting Satisfaction of the Security Needs Cluster for Males

1. They take part in Family Oriented Activities, such as playing with the dog, cat, or other pet and spending time with their families.
2. They do not participate in Young Social Recreational Activities such as going to bars, bowling or pool, playing football, basketball, or baseball, and attending sports events.
3. They are highly satisfied with life in general.

This model correctly classifies males who report satisfaction with the security needs cluster 79.64%

Variables predicting Satisfaction of the Security Needs Cluster for Females

1. Females also participate in Family Based Activities.
2. They do not engage in Mature Social Recreational Activities such as playing cards, bingo, or similar games, or spending time with friends and relatives.
3. These women come from families where the annual income is over \$31,000.
4. Like the males, the females also report that they are highly satisfied with life in general. This model correctly classifies females who report satisfaction with the security needs cluster 91.74%

B. The Individuation Needs Cluster did not appear to be related to leisure activities for either males or females.

- C. Love and Affection Needs Cluster:**
Companionship needs
Need for love and affection
Sexual Needs

Variables Predicting Satisfaction of the Love and Affection Needs Cluster for Females

1. These females also take part in family based activities.
2. Their total family annual income is also over \$31,000.
3. They report that they highly satisfied with their lives.
4. These women are aged under 66 years old.

This model correctly classifies females who report satisfaction with the love and affection needs cluster 79.70%

No model is available for males.

- D. Physical Well Being Needs Cluster:**
Need to feel good about your body
Need for health and well being
Exercise needs

Variables Predicting Satisfaction of Physical Well Being Needs Cluster for Males

1. These men participate in Fitness Activities including running, aerobics, cycling, racquet sports, skiing, and weight training.
2. They do not take part in Entertainment Activities such as window shopping, dining out, attending movies, plays, and concerts.
3. But, they do take part in Passive Entertainment Activities such as watching television and listening to the radio.
4. These group is not aged between 26 and 33 years old.
5. They also report that they are extremely satisfied with their lives in general.

This model correctly classifies males who report satisfaction with the physical well being needs cluster 99.1%

Variables Predicting Satisfaction of Physical Well Being Needs Cluster for Females

1. These females also take part in activities associated with the Fitness Factor.
2. They also report that they are extremely satisfied with their lives in general.

This model correctly classifies females who report that their physical well being needs are satisfied 92.77%

- E. Yuppie Needs Cluster:**
Need for variety, excitement, and stimulation
Need to feel competent, accomplished, or successful.

Variables Predicting Satisfaction of the Yuppie Needs Cluster for Females

1. These women take part in Entertainment Activities such as window shopping, dining out, and attending movies, plays and concerts.
2. They also participate in Thrill (Seeking) Activities such as sky diving, hang gliding and the martial arts.
3. These women report that they are either highly satisfied with their lives in general or dissatisfied.

This model correctly classifies females who report satisfaction with the Yuppie Needs cluster 85.24%

No model is available for males.

Discussion

Contrary to the findings of previous researchers, the results of this study indicate that age, gender, and social class do in fact influence the relationship between leisure activities and need satisfaction. The existence of different regression models for males and females indicates that gender is an influential variable, thereby supporting the contention of Henderson et al (1989) that men and women experience leisure differently. For example, with regards to satisfaction of the physical well being need cluster, even though men and women both indicate that they participate in fitness activities, men also show an interest in passive entertainment activities such as watching TV and listening to the radio, whereas, women do not. This difference may be explained by the findings of Deem (1982) and Henderson et al (1989) that women experience time constraints on their leisure due to family obligations, and therefore may not regard watching TV as a need satisfying leisure activity.

With regard to age differences and the relationship between leisure activities and need satisfaction, the love and affection need cluster indicates that females under the age of 66 years are satisfied with this particular need cluster. This finding lends support to Romsa, Bondy, & Blenman's (1985) contention that the need for love and association appears to rise above all other needs as retirement progresses, and therefore, we may speculate that this need is not satisfied for women in our sample over 66 years old.

Pertaining to social class differences, educational level did not appear to be influential in the relationship between leisure activities and need satisfaction for our sample. However, total annual family income did affect the leisure activity/need satisfaction relationship for females for two of our need clusters. Females in families with incomes over \$31,000 were identified as being satisfied with their needs for love and affection and security.

Implications

First, these results have implications for leisure counseling. By identifying those characteristics which are associated with high levels of need satisfaction the counselor can recommend leisure activities to those individuals experiencing deficits regarding one or more of the need clusters.

Second, the profiles identified for each need cluster could be used by the leisure industry to more effectively target sub-populations within the leisure market. By recognizing the characteristics of individuals who report that they are satisfied with respect to particular need clusters, segments of the leisure industry can design their services, programs, etc., so as to enhance the probability that needs will be satisfied. This in turn, will increase the likelihood that individuals will become regular participants resulting in improved profitability for leisure industry and an enhanced quality of life for its clientele.

Literature Cited

- Allen, L. 1982. The relationship between Murray's needs and leisure interests. *Journal of Leisure Research*. 14: 63-76.
- Beard, J. & Ragheb, M. 1980. Measuring leisure satisfaction. *Journal of Leisure Research*. 12: 20-33.
- Crandall, R. 1980. Motivations for leisure. *Journal of Leisure Research*. 12: 45-54.
- Deem, R. 1982. Women, leisure and inequality. *Leisure Studies*. 1: 29-46.
- Graburn, N. 1983. The anthropology of tourism. *Annals of Tourism Research*. 10: 9-33.
- Havighurst, R. 1957. The leisure activities of the middle-aged. *American Journal of Sociology*. 63: 152-162.
- Henderson, K., Bialeschki, M., Shaw, S. & Freysinger, V. 1989. *A Leisure of One's Own: A Feminist Perspective on Women's Leisure*. State College, PA: Venture Publishing.
- Henderson, K. 1990. The meaning of leisure for women: An integrative review of the research. *Journal of Leisure Research*. 22: 228-243.
- Howard, D. 1976. Multivariate relationships between leisure activities and personality. *Research Quarterly*. 47: 226-237.
- Iso-Ahola, S. 1980. *The Social Psychology of Leisure and Recreation*. Dubuque, Iowa: Wm. C Brown Publishing Co.
- Iso-Ahola, S. & Allen, J. 1982. The dynamics of leisure motivation: The effects of outcome on leisure needs. *Research Quarterly for Exercise and Sport*. 53: 141-149.
- London, M., Crandall, R. & Fitzgibbons, D. 1977. The psychological structure of leisure: Activities, needs and people. *Journal of Leisure Research*. 9: 252- 263.
- Maslow, A. 1943. A theory of human motivation. *Psychological Review*. 50: 370- 396.
- Murray, H. 1938. *Exploration and Personality*. New York: Oxford University Press.
- Osgood, N. & Howe, C. 1984. Psychological aspects of leisure: A life cycle developmental perspective. *Society and Leisure*. 7: 175-195.
- Ritchie, J. 1975. On the derivation of leisure activity types: A perceptual mapping approach. *Journal of Leisure Research*. 7: 128-140.
- Romsa, G., Bondy, P. & Blenman, M. 1985. Modeling retirees' life satisfaction levels: The role of recreational, life cycle and socio-environmental elements. *Journal of Leisure Research*. 17: 29-39.
- Tinsley, H., Barrett, T. & Kass, R. 1977. Leisure activities and need satisfaction. *Journal of Leisure Research*. 9: 110-120.
- Tinsley, H. & Kass, R. 1978. Leisure activities and need satisfaction: A replication and extension. *Journal of Leisure Research*. 10: 191-202.
- Tinsley, H. & Kass, R. 1979. The latent structure of the need satisfying properties of leisure activities. *Journal of Leisure Research*. 11: 278-291.

DEFINING APPROPRIATE RECREATION USES FOR A PUBLICLY MANAGED RIVER RECREATION ENVIRONMENT *

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This paper examines the question of defining appropriate recreational use for two segments of the Delaware River managed by the USDI National Park Service. In-depth, tape-recorded dialogues were conducted with 204 recreation users of these segments to determine what forms of experience they desire. Content analysis of these dialogues resulted in the construction of user experience profiles for each study participant. Through cluster analysis of these profiles, it was concluded that four basic constituency groups existed. Differences between the groups are explored, with the goal of illuminating issues surrounding the problem of determining appropriate use.

Introduction

During the formative years of outdoor recreation research, Elwood Shafer (1969) wrote a seminal article entitled *The Average Camper -- Who Doesn't Exist*. It was an article that captured the attention of managers and researchers alike. In that era, managers were frantic in their initiatives to develop recreation facilities and services that could keep pace with the burgeoning demand for outdoor recreation. In the rush to provide new opportunities to accommodate the volumes of new recreationists coming to the outdoors, relatively little thought was given to the notion that not all people wanted the same things. In fact, there seemed to be little consideration to the possibility that all the development taking place in the backcountry was in fact destroying the very nature of the experience that many people wanted (Schreyer and Knopf 1984).

Shafer's article articulated what has come to be known as a basic truth in outdoor recreation: that the needs of outdoor recreationists are diverse, and failure to recognize that diversity results in management systems that do not serve recreation needs. The article established a tone that has been the focus of outdoor recreation research ever since. The driving force of research has been to identify and measure diversity, and the search has been on to find meaningful ways to distinguish among outdoor recreationists with different kinds of interests.

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The diversity concept has been explored using a variety of variables such as length of stay (Roggenbuck 1975), commercial versus private trips (Schreyer and Nielsen 1978), method of travel (Shelby 1980), environmental disposition (Hendee, Catton, Marlow and Brockman 1968), experience level (Williams, Schreyer and Knopf 1990) and trip motivations (Brown and Haas 1980). But perhaps the most fruitful approach to conceptualizing diversity has been to focus on the character of experience that recreationists desire while in pursuit of their outdoor activities (Driver 1976).

Much of the "experience-based" research has centered on the development of questionnaires capable of measuring the psychological and social outcomes that people extract from the outdoor experience. These questionnaires have been used to develop inventories of orientation to outcomes such as escape, social contact, exploration, achievement, spiritual fulfillment, arousal and status enhancement. Responses to these inventories have been used as a basis for partitioning people into groups with different goals, and therefore with different management requirements. For example, Bowley (1979) found that trail hikers in the Allegheny National Forest could be partitioned into five groups based on differences in desired outcome profiles -- and that these groups had clear differences in crowding perception, satisfaction level, and degree of support for specific management practices. Such experience-based segmentation research has been prolific throughout the past two decades, and has been the source of much insight for resource managers yearning to identify the distinguishing features of each constituency group they must serve (Knopf 1983).

This paper reports the results of such an experience-based segmentation project -- conducted as part of a larger effort to determine appropriate recreation uses for river corridors under the jurisdiction of the Mid-Atlantic Region of the National Park Service (Lime, Anderson, Knopf, Schomaker and Schreyer 1985).

The scope for this particular project focuses on the Delaware River resource, in the corridor that partitions Pennsylvania from New York and New Jersey. Two National Park Service jurisdictional units are included in the project -- the Upper Delaware Scenic and Recreational River and the Delaware Water Gap National Recreation Area. While the river stretches in these two areas have been serving local recreationists for years, the mix of people migrating from more distant, heavily urbanized areas has been steadily increasing in recent years. The questions facing management of these resources are similar to those facing managers of any outdoor recreation resource:

- resource?
- desired recreation experience?
- Of the different forms of recreation experience that are desired, which are most appropriate for the resource being managed?

These questions are the driving force for this paper. The first two questions are largely empirical or scientific questions. They can be answered independent of management mission or policy initiatives. Appropriately, this paper will provide answers to them in the context of the two Delaware River environments incorporated into the study.

The last question, however, is largely a question that must be answered from the context of a managerial vision or institutional mandate. Its very nature precludes an answer from any agent other than the management community itself. But while the research community cannot provide the answer, it can -- as it reveals answers to the first two questions -- identify alternatives to the status quo. In effect, the research community can help by illuminating the alternative answers that could exist for the third question. It can also help by pointing to the consequences surrounding the alternate ways of answering that question. It is in this spirit that the paper proceeds. It strives

for an empirical determination of answers to the first two questions, so that managers will be better equipped to answer the third.

Study Methodology

In 1986, the Mid-Atlantic region of the National Park Service commissioned an intensive state-of-science review on what is known about the problem of defining the nature of humans' experience. The goal was to use insight from that review to create a comprehensive, innovative methodology for defining and measuring the desired experiences of river recreationists (Lime, Anderson, Knopf, Schomaker and Schreyer 1985).

During the process, over 500 references in the fields of psychology, environmental psychology, social psychology, recreation, sociology, marketing and philosophy that pertained to the measurement of human experience were reviewed. In addition, in-depth personal interviews were conducted with seventeen nationally renowned experts throughout these fields to gain a sense of cutting-edge theoretical and methodological perspective that could have bearing on the problem of measuring the river recreation experience.

From these efforts, a new theoretical model useful for defining the character and diversity of river recreation experiences was created. This model, and the methodology for measuring recreation experience that flows from it, are described in Mid-Atlantic Region Report 26, *The Experiential Aspects of Recreation -- A Review of Relevant Literature and Suggestions for Future Research* (Berger and Schreyer 1986).

The Berger and Schreyer (1986) approach was intended for use in National Park Service settings, and it was implemented in this study. Its basic features are summarized here, but the reader is directed to the original source for detail.

The primary feature of the methodology involves use of in-depth, tape-recorded dialogues with study participants -- a technique relatively novel to outdoor recreation research but time-tested and productive in numerous other fields of inquiry. The dialogues are intended to last as long as a half-hour -- with the interviewer interactively exploring such themes as highlights of the experience, low points of the visit, motives for participating, sources of satisfaction, emotional responses to the experience, images of ideal activity, and feelings about the role of management. The technique is renowned in other disciplines for its ability to deliver rich data on the nature of desired experiences.

A second feature of the methodology is a mechanism for analyzing the tape-recorded dialogues in a way that summarizes their content in a managerially useful form. Berger and Schreyer's state-of-science review led to the identification of thirty-five dimensions that have been used throughout many disciplines to distinguish among people with different kinds of desired experience. These dimensions were incorporated into a rating form, so that a person listening to the tapes could rate the relative presence of each particular dimension in a conversation.

The tape-recorded dialogues that serve as the foundation for this particular study were conducted during the summer of 1986. The recordings were made with 80 visitors to the Upper Delaware Scenic and Recreational River and 124 visitors to the Delaware Water Gap National Recreation Area. Study participants were river recreationists just completing participation in one of three activities: canoeing, rafting or angling. Participants were purposively sampled to approximate the summer population of people engaging in these activities across the two resources, but budget restrictions precluded strict adoption of a statistically-driven sample plan. Following the tape-recorded interviews, participants completed a three-page questionnaire. That instrument gathered background information relating to such variables as state of residence, ethnicity, occupation, education, group size, group composition, past recreational

experience, perceived skill level, and trip motives. Such information was gathered so that correlates of the user experience profiles could be explored.

Five judges listened to each tape-recorded interview, and rated it on each of the thirty-five user experience measurement scales. Ratings passing the test of inter-judge reliability (Graefe, Schreyer, Williams and Knopf 1992) were used to compute an average for each measurement scale for each participant. These average ratings were added to the data base and used as a basis for quantifying desired experiences.

To identify (a) the number of user experience constituencies in the sample (question 1) and (b) the distinguishing features of these constituencies (question 2), a four-stage process was employed. Since the process is elaborate and comprehensively described elsewhere (Graefe, Schreyer, Williams and Knopf 1992), the four stages are only briefly summarized here.

The first stage called for combining the thirty-five individual experience measurement scales into a smaller, more manageable set of broader experience scales or dimensions. The goal was to create a more limited number of scales that could measure the broadest dimensions of variation in desired experience for the particular population of river recreationists at hand. Cluster analysis methodology was used to identify these broad dimensions and the particular measurement scales that could be combined to create them.

The second stage provided for the creation of experience profiles across these new scales for each study participant. The third stage called for additional cluster analyses to partition study participants into groups of individuals holding similar experience profiles. The goal was to identify the number of river constituency groups that could be characterized as holding substantially the same portfolio of desired experience.

The fourth and final stage included a process for identifying variables from the written questionnaire that were statistically linked to constituency group membership. In this way, not only the number but also the distinguishing background characteristics of constituency groups could be identified.

Study Results

Constituency Groups

Cluster analysis of responses to the thirty-five experience measurement scales showed that the underlying dimensionality of response for the study population could be captured by combining the thirty-five measures into nine scales. Details on the conceptual and empirical character of these scales are offered by Graefe, Schreyer, Williams and Knopf (1992). Scale profiles of these nine dimensions were constructed for study participants and subjected to cluster analysis. After many iterations of examining the structure of the profiles, it was determined that the variation across profiles could best be captured by the specification of four user experience groups. In effect, the data suggested that four distinct constituency groups exist among river recreationists using the Delaware River study areas. Again, details on the methodologies and decision-points that led to these conclusions are provided by Graefe, Schreyer, Williams and Knopf (1992).

Five of the nine scales were particularly useful in accounting for differences in desired experiences across groups. The five scales were:

activity commitment -- a measure of the intensity of focus on, and commitment to, the particular recreation activity at hand; the degree to which the activity carries intrinsic meaning in shaping self-definition and self-worth; the degree to which it serves as a vehicle without substitute for building feelings of mastery and competence.

arousal -- a measure of orientation toward active and intense activity as opposed to passive and tranquil activity; the degree to which risky, uncertain experiences are preferred over safe, predictable experiences; the degree to which there is orientation to thrilling, festive experiences rather than mellow and low intensity experiences.

control -- a measure of the intensity of interest in controlling the environment and other people; the degree to which the individual actively shapes the character of the recreation experience; the degree to which the recreationist wishes to emerge as a group leader or decision-maker.

escape -- a measure of disposition toward escaping everyday home and work environments; the degree to which the activity is used as a vehicle for escape as opposed to a phenomenon chosen for its own intrinsic properties.

affiliation -- a measure of the intensity of interest in social transactions; the degree to which there is focus on sharing with others as opposed to having a solitary, self-focused experience.

Figure 1 plots mean scores of the measures comprising each of these five scales for the four user experience constituency groups identified by cluster analysis. Table 1 shows the numbers of respondents comprising each constituency group.

Two themes emerge. First, the constituency groups are not even in size. Membership ranges from a low 8.3 percent of the sample to a high 38.7 percent of the sample. Nearly seventy percent of the sample is concentrated in two groups (Groups 3 and 4). Second, there are clear and conceptually meaningful differences between the four groups in desired experience portfolios.

Table 1. Number of Respondents in Each Constituency Group.

Constituency Group*	N	Percent
Group 1	17	8.3
Group 2	45	22.1
Group 3	63	30.9
Group 4	79	38.7
TOTAL	204	100.0

*Based upon oblique principal component cluster analysis -- Ward's minimum variance method (Graefe, Schreyer, Williams and Knopf 1992).

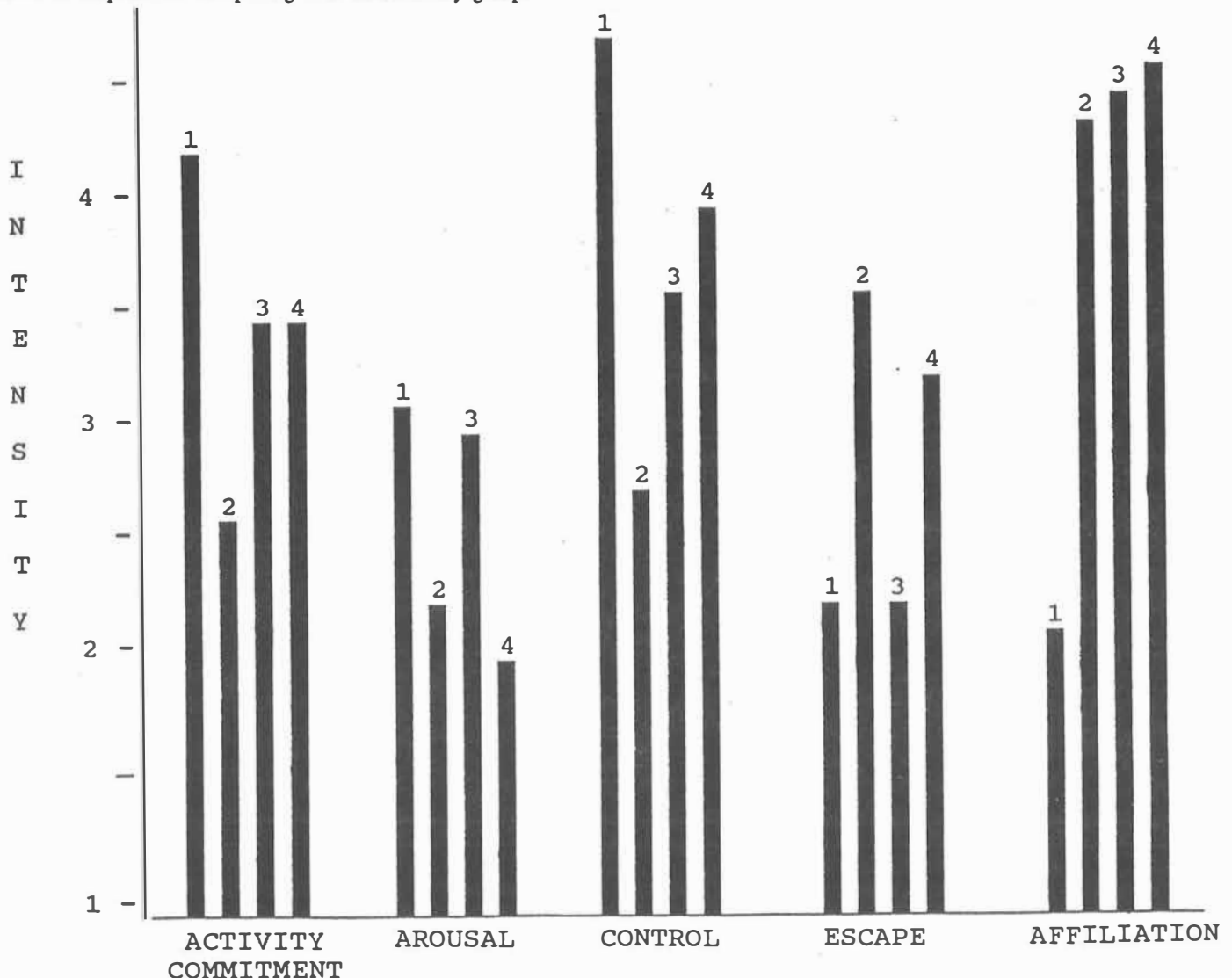


Figure 1. Desired experience profiles for Delaware River recreation constituency groups (Intensity score is positively related to orientation to the desired experience: see Graefe, Schreyer, Williams and Knopf 1992).

The smallest constituency group (Group 1) appears to be the one most intensely focused on the unique character of the Delaware River recreation experience. Its members show an exceptionally strong commitment to the activity they were pursuing, an even stronger orientation toward controlling the nature of the experience, and clearly distance themselves from the very dominant social orientation of all the rest of the Delaware River recreationists. They are attracted to the river recreation experience for the arousal it inherently provides; they are less interested in using the experience simply as a means to escape the home environment.

On the other hand, members of the next largest constituency group (Group 2) are quite low in their orientation to the particular recreation activity being pursued and equally low in the need to control the nature of the experience that unfolded. Instead, their quest is more squarely placed on escaping undesired situations back home and on socializing.

In turn, members of the second largest constituency group (Group 3) are almost equally interested in a social experience, yet they are clearly less interested in escape and more committed to the activity they had chosen for their recreation experience. And, it seems that they find particular meaning in that activity because of its arousal-inducing potential.

The largest constituency group (Group 4), in contrast, can be distinguished by its orientation toward a more sedentary experience. Like the majority of the other river recreationists, its members show a strong orientation toward a social experience. Yet, they show the lowest disposition of all groups toward producing an arousing experience. Their interests seem to be more centrally focused on using the activity to quietly gain control and enhance self-confidence as they cope with a stress-filled everyday environment back home.

Distinguishing Background Variables

Table 2 reveals background variables that exhibited statistically significant differences across the four constituency groups. Of the variables examined, most emerged as significant -- yielding further testimony to the distinctiveness of the four constituency groups identified by the clustering of experience portfolios.

Group 1 (high commitment to the activity; low interest in socializing) is comprised of the most experienced river recreationists with the greatest attachment to the Delaware River resource. Their desire for input into management of the resource runs particularly high -- twenty points over the average for the entire sample. They tend to be older recreationists (almost half are over 35) and are as likely to be alone as to be with someone else. If they are with someone else, it will likely be with a friend or acquaintance -- not a family member. They are much more likely to use the river on weekdays rather than weekends. In fact, weekday use overshadows weekend use by a three-to-one margin. Relative to the rest of the sample, they are somewhat more likely to use the Upper Delaware rather than the Water Gap area, and anglers have the highest probability of being part of this group.

Group 2 (high interest in socializing and escape; low commitment to activity) includes the least experienced river recreationists in the sample. Its members are not likely to participate in the river experience alone (in sharp contrast to Group 1). In fact, nearly half participate in groups containing at least five people. Group compositions are wide ranging -- from family to friends to acquaintances to combinations of all three. They tend to be young -- over half are twenty-five years old or less. Nearly two-thirds of these group members rate themselves in the novice categories. They tend to express little or no attachment to the Delaware River environment, and they show very low interest in providing input to management.

Group 3 (high interest in socializing and arousal; high commitment to activity) also contains a disproportionate number of young people -- in this case, sixty percent are twenty-five years old or less. However, unlike Group 2

individuals, they tend to express strong attachment to the Delaware River resource. Even while they are younger than Group 2 members, they tend to be more experienced and rate themselves higher in skill levels. They tend to be part of even larger groups than Group 2 members -- with at least a third participating in groups of ten or greater.

Group 4 (high interest in socializing but interested in sedentary experience; high commitment to activity) members tend to be similar to Group 1 members in that they are older and have more experience on the Delaware River. However, they carry lower attachment to the resource and are less intense about having input into management. While carrying a strong interest in socialization, their outing emphasizes the small group experience: three-quarters are in groups of only two, three or four. As was true with Group 1, a disproportionate number of anglers are represented. However, group composition for Group 1, is more varied to include friends, family, acquaintances and every combination thereof.

Management Implications

The purpose of this study was to identify the number of constituency groups seeking different types of experiences on segments of the Delaware River managed by the National Park Service, to identify their distinguishing characteristics, and to set the stage for discussion on what constitutes appropriate use for these resources.

Four distinct constituency groups were identified empirically. Managerially important caricatures of these four groups can be constructed by synthesizing information on their experience profiles (Figure 1) with that on background characteristics of group members (Table 2).

One group of people, which might be characterized as *active veterans*, are the most experienced, most committed, and most personally attached to the Delaware River as a meaningful place. Its members have been using the Delaware River for a long time. They are oriented to the recreation activity itself rather than the social opportunities that might emerge from it. They tend to seek out the more quiet, weekday experiences when they can be in control of the nature of their experience. More than any other group, their experiences seem to be focused upon -- and facilitated by -- the particular and unique stimulation associated with the Delaware River recreation experience.

A second group, which might be characterized as *young novices*, carry a more distant relationship with the resource. Its members are predominantly young recreationists searching for escape in a socializing context. They have extremely low experience in river recreation, and rate themselves as low in river recreation skills. They tend to socialize in large groups. The recreation activity and the recreation resource appears to be little more than a backdrop for the pursuit of the fundamentally important socializing goal. They have relatively little interest in providing input to management. Their orientation toward, and commitment to, the particular recreation activity being pursued is extremely low.

A third group, which might be characterized as *social thrill seekers*, also tend to be young and interested in the social experience. And, they tend to find meaning in the large group experience. However, in contrast to the *young novices*, these individuals tend to be more experienced and tend to attach much greater meaning to the unique character of the Delaware River experience. They seem to care a great deal about the particular activity they have chosen, valuing it for its arousal inducing potential. The activity -- and the environment -- appear to be integral to the experience. But on the whole, their interest in having input into management is substantially less than that expressed by the *active veterans*.

The fourth group, which might be characterized as *casual socializers*, contains members who are oriented to a social experience but wish to accomplish it in a more passive,

Table 2. Background Variables Exhibiting Statistically Significant Differences Across Constituency Groups (values in percent) *

	<u>River Experience Type</u>				
	Total Sample (n=204)	Group 1 (n=17)	Group 2 (n=45)	Group 3 (n=63)	Group 4 (n=79)
<u>Resource Used</u>					
Delaware Water Gap	61	53	60	46	75
Upper Delaware	39	47	40	54	25
<u>Time of Visit</u>					
Weekday	52	77	49	52	48
Weekend	48	23	51	48	52
<u>Group Type</u>					
Friends	48	29	38	37	54
Family	21	0	24	19	25
Family/Friends	12	0	11	13	15
Single	4	47	0	0	1
Other	20	24	27	32	4
<u>Group Size</u>					
Alone	4	47	0	0	1
Two through Four	57	24	51	46	77
Five through Ten	19	18	27	19	15
Over Ten	19	12	22	35	6
<u>Age</u>					
Under 21	17	6	20	36	3
21-25	24	24	31	24	20
26-35	28	24	31	19	34
Over 35	31	47	18	21	43
<u>Activity</u>					
Canoeing	53	59	67	54	44
Rafting	15	6	20	25	6
Fishing	17	29	13	5	25
<u>Activity Experience</u>					
Delaware River:					
Less than three years	50	18	76	54	40
Three or more years	50	82	24	46	60
Anywhere:					
Less than five years	60	35	80	54	58
Five or more years	40	65	20	46	42
<u>Annual Participation</u>					
Delaware River:					
One day or less	54	23	78	54	48
Greater than one day	46	77	22	46	52
Anywhere:					
Two days or less	45	18	67	48	27
Greater than two days	55	82	33	52	63
<u>Perceived Skill Level</u>					
Novice/Advanced Novice	45	12	66	43	41
Intermediate/Advanced/Expert	55	88	34	57	59
In control of activity					
none or some of time	25	0	35	24	27
In control of activity					
most or all the time	75	100	65	76	73
<u>Attachment to Delaware River</u>					
None or some	36	12	65	25	33
Fair amount/Great deal	64	88	35	75	67
<u>Desire for Management Input</u>					
None or some	54	35	70	55	47
Fair amount/Great deal	46	65	30	45	53

* Based upon Chi-square tests of significant differences (threshold p value of 0.05)

sedentary way. Its members seem to emphasize the small group experience that provides a tranquil form of escape and the re-establishment of control. They are substantially older than the norm, and have greater experience and skills. They carry a substantial commitment to their activity and the Delaware River resource which facilitates it. They are second only to the *active veterans* in their desire for management input.

Which of these constituency groups are most appropriate for the Delaware River resource? At first blush one is tempted to argue that if anything is inappropriate, it is the question itself. Since we are speaking about a public resource, we should not have the capacity to exclude any use as "inappropriate." Under this logic, each of the four constituency groups should be able to claim their right of access to the resource.

However, recreation research has made it clear that such logic is flawed. As each constituency group lays claim on a resource, the nature of the available experience changes and other groups can lose access to the kind of experience they desire (Schreyer and Knopf 1984). So the aftermath of what seems to be a laudable attempt to serve everyone is in fact a systematic discrimination against certain groups of recreationists. Research has identified the groups that face such discrimination; they are the long-standing, veteran users of resources who were initially attracted by the naturally occurring, unique attributes that the resources carried (Schreyer and Knopf 1984).

In the present study, the constituency group that appears to show the greatest requirement for the naturally occurring, unique attributes of the Delaware River is the *active veterans*. It is interesting that these long-standing, veteran users of the river are strongly overrepresented on weekdays and underrepresented on weekends. It is possible that as the character of the Delaware River experience has changed through the years by the increasing presence of large groups of socially-oriented recreationists on the weekends, the options for the *active veterans* to achieve their desired experience have been reduced. To the extent this is true, their rights to access have been discriminated against in favor of the other constituency groups. They are forced to seek meaning in the weekday environment -- but only a limited number of people have the luxury of creating that option. If this logic holds, the small numbers associated with the *active veterans* group (8.3 percent of sample) may well be an indication that the experience they seek is no longer readily available. As Shafer (1969) would put it: by attempting to serve everyone, many will not be served at all.

Given the scarcity of our recreation resources and the conflicting experience orientations of our recreation clientele, it is no longer an option to attempt to meet the needs of everyone at each resource. The onus is upon managers to create a vision that defines what is to be delivered at any given resource within a context of what is available elsewhere. In this way, the desired experiences of everyone might in fact be available somewhere. Managers of the Delaware River can define many visions for the appropriate use of the protected environment. One goal might be to favor the requirements of recreationists whose desired experiences are directly linked to the intrinsic properties of the natural resource. If this was the goal, then the most appropriate use would be that characterized by the *active veterans*. Under this management scenario, the constituency group characterized as *young novices* could be judged to hold needs that could be met in any number of alternate (and more plentiful) recreation settings. They could be directed elsewhere for their recreation experience without severely impacting upon their ability to achieve the outcomes they desire.

On the other hand, a goal of management might be to build new public constituencies and to introduce urban populations to outdoor experiences. Under this management scenario, it

would not only be important, but strategically wise, to emphasize opportunities for *young novices* on the river.

Perhaps the goal of management would be to build these new urban constituencies, but to favor recreationists that find value in the naturally occurring, unique properties of the Delaware River environment. Under this management scenario, the needs of the *social thrill seekers* should be emphasized.

Alternatively, the goal of management might be to offer a resource that meets the needs of stressed urban populations yet does it in a way that emphasizes tranquillity and low environmental impact. Under this management scenario, opportunities for *casual socializers* should be emphasized. While having social needs and a strong stress response that characterizes much of mass recreation, their small group character, their disposition toward low arousal, and their commitment to the resource would evoke much lower levels of social and environmental change than the *young novices* and *social thrill seekers*.

Certainly, definitions about what constitutes appropriate use are not mutually exclusive. It may be appropriate to accommodate a mix of constituency groups, or it may be appropriate to zone the resource to favor different constituencies at different places or times.

The decision about what constitutes appropriate use is not an easy one. Not only must the needs of existing clientele be considered, but also the needs of former clientele who no longer come to the resource because the available experience has changed. Not only must the current structure of services be evaluated, but also totally different forms of services that would appeal to people who are now alienated by what is available. Not only must the specific resource in question be considered, but also the array of opportunities available elsewhere.

While this study has served its purpose in identifying the number and distinguishing features of user experience constituency groups on the Delaware River, the task of defining appropriate use has just begun. That task rests beyond the bounds of research and is legitimately housed in the management arena. Yet, empowered by research, management is in better position to discern the complexities surrounding the decision and to assess the consequences. It is in this spirit that the research community offers itself as a facilitating partner and an enabler in the complex task of defining appropriate use.

Literature Cited

- Berger, J. L.; Schreyer, R. 1986. The experiential aspects of recreation: a review of relevant literature and suggestions for future research. USDI National Park Service Mid-Atlantic Research/Resources Report MAR-26.
- Bowley, C.S. 1979. Motives, management preferences and perceptions of crowding of backcountry hiking trail users in the Allegheny National Forest of Pennsylvania. Master's thesis, The Pennsylvania State University.
- Brown, P.J.; Haas, G.E. 1980. Wilderness recreation experiences: the Rawah case. *Journal of Leisure Research*. 12(3): 229-241.
- Driver, B.L. 1976. Quantification of outdoor recreationists' preferences. In: B. van der Smitten (ed.) Research, camping and environmental education. University Park, PA: The Pennsylvania State University. 165-188.
- Graefe, A.R.; Schreyer, R.; Williams, D.R.; Knopf, R.C. 1992. Defining the river recreation experience. Final Report, User Behavior Working Group, Use Allocation Project. USDI National Park Service Mid-Atlantic Region Research/Resources Management Report.

Hendee, J.C.; Catton, W.R.; Marlow, L.D.; Brockman, C.F. 1968. Wilderness users in the Pacific Northwest -- their characteristics, values and management preferences. USDA Forest Service Research Paper PNW-61. Pacific Northwest Forest and Range Experiment Station, Portland, OR.

Knopf, R.C. 1983. Recreational needs and behavior in natural settings. In: I. Altman and J. Wohlwill (eds.) *Behavior and the natural environment*. New York: Plenum Publishing. 205-240.

Lime, D.W.; Anderson, D.H.; Knopf, R.C.; Schomaker, J.H.; Schreyer, R. 1985. A research plan to study appropriate use on the Delaware Water Gap National recreation Area, the New River Gorge National River and the Upper Delaware Scenic and Recreational River. USDI National Park Service Mid-Atlantic Region Research/Resources Management Report.

Roggenbuck, J.W. 1975. Socio-psychological inputs into carrying capacity assessments for float-trip use of whitewater rivers in Dinosaur National Monument. Doctoral dissertation, Utah State University.

Schreyer, R.; Nielsen, N. 1978. Westwater and Desolation Canyons: whitewater river recreation study. Institute of Outdoor Recreation and Tourism Report. Logan, UT: Utah State University.

Schreyer, R.; Knopf, R.C. 1984. The dynamics of change in outdoor recreation environments -- some equity issues. *Journal of Park and Recreation Administration*. 2(1): 9-19.

Shafer, E. 1969. The average camper who doesn't exist. USDA Forest Service Research paper NE-142. Northeast Forest Experiment Station, Upper Darby, PA.

Shelby, B. 1980. Contrasting recreational experiences: motors and oars in the Grand Canyon. *Journal of Soil and Water Conservation*. 35: 129-131.



TRAVEL and TOURISM

DOMESTIC TRAVEL TRENDS: AN EXPLORATORY REVIEW AND ANALYSIS OF THE NORTHEAST MARKET

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The purpose of this study was to examine and explore domestic travel trends, from 1986 through 1989 within the Northeast Region of the U.S.; and to determine if trend patterns existed within selected travel variables when compared to the national patterns. Different trends exist between U.S. and Northeast Regional trends when domestic travel variables were examined. Implications and discussion points were provided. Keywords. Domestic travel, trends, Northeast U.S., volume segmentation, travel variables, and market implications.

Introduction

The travel industry plays a major role in the economic well being of the Northeastern United States. Tourism and related recreation businesses and attractions are key catalysts within this region's state economies and specifically dominant within Maine, New Hampshire, Vermont and Rhode Island. Each of the Northeast states, while facing a major economic recession within recent years, have continued to aggressively pursue the attraction of visitors. New York, New Jersey and Massachusetts have increased spending on state tourism promotion. While funding nationwide has increased for marketing state tourism, an important yet often overlooked use of funding is quality research and trend analysis. Carr (1990) indicated that a successful tourism research program should include market analysis, trend tracking and industry monitoring. Trend analysis can become an important tool in understanding travel markets.

Trend analysis plays an important role in nearly all organizations. The examination of trends in the tourism sector must be made for decision-making, planning, marketing and economic development to occur. Important among the trends analyzed is the examination of changing characteristics and patterns of the traveling public (Harris, et al. 1990 and Carr 1990). Evidence indicates that demographic shifts in the population age structure will affect many businesses and activities, especially tourism, as significant portions of the population have more time to travel (Research Alert 1990). This will be particularly true as baby boomers reach older age cohorts. The distinct differences in travel-specific behavior and participation rates exhibited by changes over time will likely shape future demand for these activities.

The examination of travel trends in the past has been confined to the macro reporting of the U.S. Travel Data Center's on-going analysis (See U.S. Travel Data Center's Reports 1991). With the advancement of the tourism field in the last decade has come the increased interest in the topic of marketing tourism and travel. This interest has fueled the growth of state tourism promotional budgets and the economic development initiatives of numerous regions, cities and rural towns and areas. However, there has been relatively little in-depth analysis of the regional trends beyond the initial counts and monitoring of travel patterns (Harris, et al. 1990). Therefore, this exploratory analysis of domestic travel within a specific region was undertaken.

Purposes of Study

The purposes of this study were three-fold: 1) to examine U.S. citizen domestic travel patterns in the United States in general and specifically to the Northeast during the period of 1986 to 1989; 2) to identify changing patterns in these travel trends by examining such variables as: number of travelers, purpose(s) of trip(s); nights away; trip volume or number of trips; trip purposes and travel destinations of the U.S. and specifically within the Northeast travel market; and 3) to explore the changes in travel volume markets within the Northeast domestic travel market as compared to the overall U.S. domestic travel market.

Methods

To understand the nature of domestic travel and participation, two major components of travel demand must be understood. First, there is the definition of domestic travel. "Domestic travel" is defined as "any trip(s) of over 100 miles (one way) within the continental 48 coterminous U.S. states taken in the previous 12 month period." This definition of domestic travel includes all types of travel taken which fits the mileage and regional description; but excludes all types of travel taken of distances shorter than 100 miles. Second, there is the "number of people who participate in the domestic travel." This statistic is called "market size." Often, much is made of this statistic; however, in and of itself it is somewhat less meaningful than a statistic which more specifically quantifies demand. "Travel days" or "trips taken" is a much more meaningful statistic for tourism agencies and businesses. This addresses the actual volume of travel occurrences. In this study, both domestic travel market size and volume were examined.

For the analysis of domestic travel, data were drawn from *Study of Media and Markets* (Simmons Market Research Bureau, Inc. 1986-1989). These annual market studies were stratified, national random probability samples for each year from 1986 through 1989. The methods included the distribution of self-administered questionnaires and follow-up telephone interviews. Sample sizes ranged from approximately 19,000 to 21,000 adults. The sample statistics were then extrapolated to the U.S. adult population of 18 years of age and older. The data were made available through Simmons Market Research Bureau of New York and the University of Massachusetts Library. Within this study only travelers who reside in the Northeast were examined. Excluded from this analysis were travelers who visited the Northeast U.S. from other countries and other U.S. regions (i.e., South, Midwest, etc.).

Definitions of terms used in this study include: a) market size -- the number of U.S. citizens who traveled domestically at least once; b) number of trips -- descriptive categories; c) purpose of the trip -- includes personal, business, business and pleasure, spouse-related travel, vacation; d) nights away -- four broad categories (30 or more, 15-29, 8-14, or less than 8 nights away); e) destination -- specific regions within the U.S.; f) trip volume -- total number of nights away; and g) travel group size -- 1, 2, 3, 4, 5 or more. Within some variables, categories were collapsed by Simmons for the Northeast (e.g., travel group size was available for 1, 2, 3 or more categories). The Northeast Travel Market includes travelers from the states of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, Pennsylvania, and New Jersey. The travel destination regions are defined as states of primary trip destination and include the following defined regions: a) New England Region; b) Middle Atlantic Region; c) East North Central Region; d) West North Central Region; e) South Atlantic Region; f) East South Central Region; g) West South Central; h) Mountain Region; and i) Pacific Region. A detailed description of these regions may be found in Simmons Technical Guide (1989). The three travel volume segments examined within this study were 1) "light" -- those who took one domestic travel trip; 2) "moderate" or "medium" -- those who took two to three domestic trips; and 3) "heavy" -- those who took four or more domestic travel trips within the previous 12 month period. Other variables included in the tables, but not

discussed in this study, were time of the year trip(s) taken and use of travel agency for domestic travel.

The data were analyzed using an average annual growth rate which is defined as the percent change in terms of the size of the market or travel volume. It is derived by taking the current year number (market size or market volume) subtracting the previous year number and dividing by the previous year number; percent change from year to year was then averaged over the study period of 1986 through 1989. Percent changes were compared to the national trends for each of the domestic travel variables to determine if trends in the Northeast were different than the U.S. domestic travel trends. A secondary statistic was also provided in the tables to measure trend changes. This statistic was a two-point moving average. This percentage change statistic is used to average sizes (market size or volume size) from year-to-year and then a percent change is calculated based on these two-point (two years) averages. This statistic is often used in business trend analysis when period-to-period changes fluctuate wildly or growth/decline or decline/growth patterns occur repetitively.

Selected Findings

Selected findings are presented by travel variable with reference first to the national trends and then the Northeast findings are presented. The overall summary of national trends are found in Table 1 and Northeast travel trends are summarized in Table 2.

U.S. Domestic Travel and Northeast Domestic Travel Market Overview

National Trend: Domestic travel in terms of number of travelers was flat in the late 80s. There were an estimated 86 million domestic travelers in 1986 and approximately the same number in 1989. The number of domestic travelers peaked in 1987 at 87.8 million. Trip volume did increase from 1986 through 1989 at an average annual rate of 1.7%. There were 392.3 million trips taken in 1986 and 410 million trips taken in 1989. It appears that approximately the same number of travelers were traveling slightly more often. The average number of trips taken per traveler increased from 4.6 trips in 1986 to 4.8 trips in 1989.

Northeast Trend: Domestic travel by the Northeast market indicated a decline in both the number of travelers and number of trips. Travel market size in the Northeast declined during the late 80s at a rate of 4.6% per year. In 1986, there were 16.9 million domestic travelers and by 1989 there were 14.5 million. However, the actual number of domestic trips taken did not decline as rapidly. The overall trip volume declined at an average annual rate of 2.1%.

Number of Round Trips

National Trend: The number of round trips taken domestically was up slightly by 1.7%. The number of domestic travelers who took five or more trips per year grew at faster rates than those who took four or fewer trips per year. The travelers who took five or more grew at an annual average rate of 5.5%. In 1986, those domestic travelers who took four or fewer trips per year comprised 77% of the all domestic travelers. By 1989, they comprised only 73%.

Northeast Trend: The number of round trip Northeast domestic travelers declined in all categories (one, two to three, and four or more). The number of domestic round trips taken by the Northeast market also declined at annual average rate of 2.1%. While travel in all categories of this variable indicated a decline; the average number of trips per traveler actually increased. This was due in part to a larger decline in the number of travelers than in the number of trips. The average number of domestic trips taken per Northeast traveler increased at average annual rate of 2.9%. In 1986, the average trips per traveler in the Northeast were 4.2 and in 1989, the average was 4.6.

Trip Volume Segmentation

National Trend: While the overall number of U.S. domestic travelers held constant at about 86 million during this period, there were changes in the distribution of travel volume segments. Nationally, about one-third of all travelers belongs to one of the three travel volume segments of light travelers (traveled only once); moderate (traveled two - three times) and heavy (traveled four or more times) during the previous year. Light travelers comprise 32% of all travelers and 7% of all trips, moderate travelers -- 34% of all travelers and 18% of all trips and heavy travelers -- 34% of all travelers and 75% of all trips. Only the moderate and heavy travel segments grew in terms of number of travelers during this period. The heavy group grew at a rate of 2.4% per year, the moderate group at a rate of 2.0% per year, and the light segment declined at a rate of 3.8% per year from 1986 through 1989. The travel volume based on the different segments indicated a growth in only the heavy segment. The growth rate was 2.7%. The domestic travel volume associated with the other two segments indicated a decline. In 1986, 392.2 million domestic trips of 100 miles or more were taken and 75% (294.6 million trips) were taken by the heavy traveling segment. By 1989, the number of domestic trips increased to 410 million and 77% (315.4 million trips) were taken by the heavy traveling segment.

Northeast Trend. The distribution of travelers within the Northeast is somewhat different than the national characteristics of travel volume segments. In the Northeast, on average through the late 80s, 35% of all travelers from this region were light travelers and they generated 8% of all Northeast domestic trips; 34% were moderate travelers who generated 19% of the trips; and 31 % were heavy travelers who generated 73% of the trips. All volume segments of travelers in the Northeast declined in numbers and the biggest decline was within the light travel volume segment. This segment declined in size by an average adjusted rate of nearly 8% per year. The heavy travel segment declined the least in numbers. There was less than a 1% decline per year in this segment's size and travel volume. Travel volume or the number of domestic travel trips taken by the Northeast market declined overall during this period by over 2% per year. The decline in number of domestic trips by the light travel segment was 8% per year and the moderate travel segment volume declined by 5% per year.

Purpose of Trips

National Trend. Simmons' data does provide some insights into the purposes of domestic travel; however, the purposes of all domestic trips are not known. The purposes for less than 30% of the all domestic trips are known. This is explained by Simmons data collection procedure. The purpose of each and every trip is not acquired in the process. Only the purposes of the last four trips are obtained. In this regard, probably more is known about the infrequent traveler. New trip purpose categories were added during the late 80s. They included "business and pleasure" and "accompanying spouse on business." Nevertheless, in those known cases at the national level, all types of domestic travel declined with the exception of trips taken for personal reasons. Business trips remained relatively flat and vacation trips declined only slightly. Both declined less than 1%.

Northeast Trend. Simmons data provides information for approximately 28% of all Northeast trips taken each year during this period. The Northeast market reflected the national trends in the direction in the changes in trip purposes; however, the magnitude of the changes were different. Business trips remained relatively flat and reflected a similar national trend -- a decline of less than 1% per year. Business and pleasure trips declined at a rate of 4.3% compared to the national rate of decline of 7.7% per year. Personal travel trips remained stable and increased slightly in the Northeast (.3%). However, domestic vacation trips declined at an average annual rate in the Northeast of 7.7% compared to the national rate of less than 1% (.7% actual).

Nights Away

National Trend. Travelers appeared to be staying away from home for a combined longer length of time during this period. In terms of the number of nights away from home the category with the largest amount of annual growth was a combined total of 30 or more nights. For this category of number of total nights away, an average annual growth rate of nearly 7% per year was found. The overall average number of nights away per traveler increased slightly from 11.7 nights to 11.8 nights. However, the average length of stay declined by less than 1% per year from 2.57 nights in 1986 to 2.49 nights in 1989.

Northeast Trend. The only category where any growth was noticed in the Northeast was within the none to two category. The number of travelers indicating this amount of number of nights away grew by 3.6% per year in this region. The overall combined number of nights away for all travelers in the Northeast declined by 9.9% per year and the decline was the largest in the 6 or more nights away category where the decline averaged 11.3% per year. The overall average number of travel nights away per traveler declined from 7.84 nights in 1986 to 6.42 nights in 1989. The average length of stay decline by less than 8.5% per year from 1.87 nights in 1986 to 1.4 nights in 1989.

Destinations

National Trend. New England has not fared well in terms of the number of travelers indicating travel to New England. Other regions indicated some growth, including the West North Central, the Mountain and the Pacific Regions. The number of travelers indicating New England as a travel destination declined at an average annual rate of over 9%. However, this measures only the number of travelers indicating travel to a region and not the number of trips. Also, less than 30% of all travel destinations are known in the data provided here.

Northeast Trend. The Northeast market selected New England less frequently as a travel destination throughout this period. In fact, within the Northeast market, New England as a regional destination market declined by an average annual rate of 16.6%. The Northeast market selected the Pacific Region more frequently during this period. This region grew at an annual rate of 26.4% within the Northeast market. However, a portion of the Northeast market appeared to stay closer to home. The Mid-Atlantic Region declined only slightly (less than 1%) and the South Atlantic Region remained relatively stable (less than 1% decline) among the Northeast market destination choices.

Travel Group Size

National Trend. The bulk of all domestic travelers are comprised of one or two people. Nearly 70% of all domestic travel parties are of this size. However, at the national level the rate of growth is most pronounced in the parties of 4 or more travelers. Domestic travel groups of 4 people are growing at a rate of 10.6% per year and travel parties of 5 or more are growing at a rate of 13.8% per year. Only the travel group sizes of one person and three people were declining. Each of these groups declined at 1% per year.

Northeast Trend. The bulk of Northeast domestic travelers are also comprised of one or two people (on average 73% of all travel groups). However, both of these group sizes are declining in this region. The larger market group size of 3 or more people is increasing at a rate of 1.6% per year.

Discussion

Trends were evident in the Northeast Travel Market from 1986 through 1989. This market did not necessarily reflect the national trends evident during the same time period. In summary, the Northeast market was:

- a mature or declining travel market;
- declining in both number of domestic travelers and domestic trips taken;

- declining in all domestic travel volume segments; however, the heavy travel segment declined the least;
- changing based on travel trip purposes; business and personal travel remained stable while vacation travel declined more rapidly than the national average;
- staying away from home less and the length of stay was shorter; although the number of trips per year increased slightly;
- selecting New England less as a regional destination, but selecting the Pacific and Mountain Regions more as a destination while the Mid-Atlantic and South Atlantic Regions remain somewhat stable choice destinations; and
- comprised of larger traveling groups (3 or more members).

While it is interesting to uncover new trends within regions and at the national level, the overall limitations to defining domestic travel as all trips of over 100 miles one-way is still problematic. Missed in this analysis are the many "day trips" or even overnight trips taken to see friends and family or simple "mini-vacations" to get-away that are shorter than 100 miles one-way. The regional geography of the Northeast may account for larger portions of this type of travel and does not fit the "domestic" travel description. For example, travel trips to Cape Cod from Boston, Worcester and Providence are within the 100 mile limit for large portions of the population of these cities and large portions of Cape Cod destinations. Likewise, travel to Western Massachusetts from Albany, Springfield and Hartford fall within the 100 mile domestic travel definition. Travel into parts of the other New England states (Maine, New Hampshire and Vermont) are also within the 100 mile radius of Boston, Springfield and Hartford. Numerous other regional examples exist. Perhaps, within the Northeast a significant portion of all travel trips is missed. Finally, it must be noted that the general public is often attracted to the Northeast and New England to live due to the close proximity of a wide variety of recreational pursuits and attractions.

"Segmentation change" over time is another important travel trend issue. People who participate in travel pursuits may change their rates of travel based on their individual household economic or social conditions or even climatic conditions. It is very possible that people who travel frequently one year might not travel as frequently the following year. The Northeast experienced the economic downturn of the past four years earlier than other parts of the country and signs of this impact upon domestic travel are evident in these data even though the period covered ends in 1989. The decline in the "light" travel market was most adversely affected in the Northeast. This market declined the most and nearly 50% of all light travelers have household incomes of under \$30,000 per year (Simmons Market Research Bureau, 1989). In contrast, 65% of all the "heavy" travelers, which did not decline as much, are from households of with yearly incomes in excess of \$30,000 per year (Simmons Market Research Bureau 1989).

Likewise, segmentation change also provides evidence of an overall mature market trend within the Northeast. When markets grow, a typical pattern might be to observe an increase in the light then moderate travel segments. This would then be followed over time by eventual increases in the more frequent or heavy travel segments. An impending decline would be evident when a reversal trend occurs. Here the heavy or frequent travel market would decline as these travelers might reduce their frequency and a corresponding upswing in the moderate level of travel would be observed. Infrequent or light travel would likely also decline. When both moderate and light travel segments continue to decline for a sustained period of time and the market becomes comprised of a higher percentage of frequent travelers, it is evident that one has entered a mature or decline stage. Domestic travel in the Northeast was also more adversely affected than at the national level because, on average, a larger portion of all travelers are light or infrequent domestic travelers. With little or no growth in these segments, no overall market growth can be expected. Consequently, the domestic travel market which does exist is composed of a larger

percentage of frequent travelers and reflects the mature or decline of domestic travel in the Northeast.

Insights into travel trends into what does occur within a region during a travel downturn were also reflected here. In the Northeast, domestic vacation travel was affected the most. The decline was over 7% per year. Businesses faced with a 7% decline per year must find replacement markets. When domestic travel does decline, travel to visit family and friends or for personal reasons appears to remain stable. This was evident at both the national level and within the Northeast. Business travel also remained relatively stable, but the mixing of business and pleasure and accompany the spouse on business travel declined. Although, not examined here, we do know that more of the U.S. travel market is comprised of foreign travelers (U.S. Travel Outlook 1991). Businesses within the Northeast must aggressively seek out these markets in the future.

The national trend of taking more, but shorter vacations is evident in these data, also. The number of trips taken per year is up. The average number of trips taken per year is just under five and the length of stay averages 2.5 nights per trip. The average number of nights away is relatively close to the average amount of paid vacation time in the U.S. According to the 1991 International Labor Organization's World Labor Report (Gover 1992), the average number of paid vacations per U.S. worker per year is just over two weeks. The decline in domestic travel may also be explained by the increased workload by many. According to Schor (1991), the average American puts in 158 more hours at work in 1989 than his or her counterpart 20 years earlier. The average number of total nights away per year and the length of stay in the Northeast are somewhat lower and have been declining. Travelers in this region are more likely to seek high quality, primary purpose trips and may elect to travel during a wider variety of times during the year. However, only the national data indicated a growth in shoulder season travel time. This may be partially explained by the fact that only a portion of the all travelers indicated the time of their travel for only a portion of their trips.

New England is not the "hot market" it was a decade ago for domestic travel. Other regions appear to have aggressively marketed their regions more successfully. This is evident at both the national and regional levels. The choice of New England as a prime destination choice has declined and the choice of New England even within the Northeast has declined. The aggressive nature of other regions, the revitalization of market areas, and overall changing domestic travel patterns may explain the repositioning of the New England Region. The shorter summer season and the older tradition for a "week long" domestic travel stay may have also contributed. Trips of 6 nights or more have declined and are more likely comprised of older travelers. In fact, 40% of all domestic travelers who stay 6 or more nights are 50 years of age or older (Simmons Market Research Bureau, Inc. 1989). This older travel market will eventually grow once the baby boomers begin to enter this age cohort, but the growth will not really begin until later in the 90s. It remains to be seen if the baby boom domestic travel market will reflect their parents' travel patterns.

The last major trend examined within this study related to the travel group size. The household size of the domestic travel market is larger. This clearly reflects the growing family travel market. Household groups of 3 or more traveling together domestically is up both at the national level and within the Northeast. Because more households are comprised of two-incomes and many reflect more diverse family structures, domestic travel will likely continue to be more frequent, shorter in terms of length of stay and more diverse. Further domestic travel segmentation is very likely. Opportunities for newly defined ecological/environmental, heritage/historical, cultural/educational and ancestral should take place. Domestic travel patterns are complex, dynamic and not always easily understood. This review of within the context of one regional market area sheds some new light on travel trends. Simply following national trends can be misleading. However,

closer monitoring of travel trends, both domestic and localized, is still needed.

Literature Cited

- Carr, James A. 1990. Trends in tourism market research. *Trends*. 27(3): 10-13.
- Gover, Tziviv. 1992. Vacation-time pinch: Americans work while rest of world relaxes. *Hampshire Gazette*. Northampton, MA: 17-18.
- Harris, Charles C.; Tynon, Joanne F.; and McLaughlin, William F. 1990. A comprehensive method for studying leisure travel. *Journal of Travel Research*. Vol. 29 (2): 39-44.
- Hornbach, Kenneth E. 1991. Socio-economic outlook: Outdoor recreation 2000. *Trends*. 28(2): 14-19, 47-48.
- Research Alert. 1991. Future Vision: The 189 Most Important Trends of the 1990s. Naperville, Illinois: Sourcebooks Trade. 248p.
- Schor, Juliet. 1991. *The Overworked American: The Unexpected Decline in Leisure*. Scranton, PA: Basic Books. 336p.
- Schwaninger, M. 1989. Trends in leisure and tourism for 2000-2010. In: Witt, S.F. and Moutinho, L. (Editors). 1989. *Tourism Marketing and Management Handbook*. Institute of Tourism, University of St. Gallen, St. Gallen, Switzerland. London, UK: Prentice Hall: 599-605.
- Simmons Market Research Bureau, Inc. 1986. Study of media and markets, volume p-10: Sports and leisure. New York, NY.
- _____. 1987. Study of media and markets, volume p-10: Sports and leisure. New York, NY.
- _____. 1988. Study of media and markets, volume p-10: Sports and leisure. New York, NY.
- _____. 1989. Study of media and markets, volume p-10: Sports and leisure. New York, NY.
- Simmons Market Research Bureau, Inc. 1989. *Technical Guide*. New York, NY.
- U.S. Travel Data Center. 1991. *Travel Outlook*. Washington, D.C.
- _____. 1990. *Travel Outlook*. Washington, D.C.
- Warnick, Rodney B. 1991. Hidden travel trends: 1980-1989 changes in the northeast. Northeast Travel and Tourism Research Conference, Peabody, Massachusetts.

**Table 1. Overall Domestic Travel within U.S. - Trips (over 100 miles one way)
within the 48 states within the previous 12 months?**

Traveled Over 100 miles	(# of Travelers)				Ave. Annual	Moving Ave.
	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>Chg. Rate</u>	<u>Chg. Rate</u>
Yes	86,038	87,829	85,891	86,025	0.0%	-0.6%
No	85,167	85,852	90,358	92,168	2.7%	3.3%
Total	171,205	173,681	176,249	178,193	1.3%	1.4%
# of Round Trips	(# of Travelers)				Ave. Annual	Moving Ave.
	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>Chg. Rate</u>	<u>Chg. Rate</u>
One	27,622	26,758	27,641	26,250	-1.6%	-0.4%
Two	18,802	18,897	19,246	19,190	0.7%	1.0%
Three	10,817	11,128	11,042	9,998	-2.5%	-2.0%
Four	8,617	7,559	8,259	7,726	-3.2%	-0.6%
Five	3,732	4,205	3,899	4,318	5.4%	1.7%
Six or More	16,449	19,280	15,804	18,543	5.5%	-2.0%
Total	86,039	87,827	85,891	86,025	0.0%	-0.6%
Volume Segments	(# of Travelers)				Ave. Annual	Moving Ave.
	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>Chg. Rate</u>	<u>Chg. Rate</u>
Light (1 trip)	29,619	26,758	27,641	26,250	-3.8%	-2.2%
Medium (2 to 3 trips)	27,622	30,025	30,288	29,188	2.0%	1.6%
Heavy (4 or more trips)	28,798	31,044	27,962	30,587	2.4%	-1.1%
Total	86,039	87,827	85,891	86,025	0.0%	-0.6%
Trip Volume Based on Volume Segments	(# of Trips)				Ave. Annual	Moving Ave.
	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>Chg. Rate</u>	<u>Chg. Rate</u>
Light (1 trip)	27,622	26,758	27,641	26,250	-1.6%	-0.4%
Medium (2 to 3 trips)	70,055	71,178	71,618	68,374	-0.8%	-0.4%
Heavy (4 or more trips)	294,596	309,022	281,420	315,382	2.7%	-0.6%
Total	392,273	406,958	380,679	410,006	1.7%	-0.5%
Average Trips Per Traveler	4.6	4.6	4.4	4.8	1.6%	0.0%
(Note: Number of trips derived from larger set of expanded trip categories.)						
Purpose of Trip	(# of Trips)				Ave. Annual	Moving Ave.
	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>Chg. Rate</u>	<u>Chg. Rate</u>
Business	13,918	14,063	14,105	13,859	-0.1%	0.0%
Business and Pleasure		8,264	7,627	7,046	-7.7%	-7.7%
Accom. Spouse on Business	2,720	2,122	2,257	2,294	-4.7%	-2.8%
Vacation	52,810	48,857	51,734	51,415	-0.7%	0.7%
Personal	35,127	36,452	32,230	35,446	0.7%	-2.8%
Do Not Recall	3,908	4,007	2,850	2,564	-12.1%	-17.2%
Total	108,483	113,765	110,803	112,624	1.3%	
Percent of All Trips	27.7%	28.0%	29.1%	27.5%		

Nights Away	(# of Travelers)				Ave. Annual	Moving Ave.
	1986	1987	1988	1989	Chg. Rate	Chg. Rate
30 or more	7,016	8,326	7,924	8,444	6.8%	3.3%
15 to 29	16,540	15,361	16,015	15,286	-2.5%	-0.9%
11 to 14	13,123	12,553	12,107	11,597	-4.0%	-3.9%
8 to 10	13,447	13,442	12,813	14,857	3.7%	1.5%
6 to 7	10,980	11,706	12,066	12,056	3.2%	3.1%
5	4,989	4,656	4,895	4,783	-1.3%	0.2%
4	5,726	5,536	5,598	6,083	2.2%	1.9%
3	4,239	5,354	4,470	4,039	0.1%	-5.5%
2	4,489	4,977	4,167	4,551	1.3%	-4.0%
1	3,440	2,988	2,881	1,772	-18.4%	-14.7%
None	2,050	2,931	2,956	2,557	10.1%	5.9%
Total	86,039	87,830	85,892	86,025	0.0%	-0.6%

Total Nights Away (Travelers x Nights Away Category)

	(# of Traveler Nights)				Ave. Annual	Moving Ave.
	1986	1987	1988	1989	Chg. Rate	Chg. Rate
30 or more	210,480	249,780	237,720	253,320	6.8%	3.3%
15 to 29	372,150	345,623	360,338	343,935	-2.5%	-0.9%
11 to 14	164,038	156,913	151,338	144,963	-4.0%	-3.9%
8 to 10	121,023	120,978	115,317	133,713	3.7%	1.5%
6 to 7	71,370	76,089	78,429	78,364	3.2%	3.1%
5	24,945	23,280	24,475	23,915	-1.3%	0.2%
4	22,904	22,144	22,392	24,332	2.2%	1.9%
3	12,717	16,062	13,410	12,117	0.1%	-5.5%
2	4,489	4,977	4,167	4,551	1.3%	-4.0%
1	3,440	2,988	2,881	1,772	-18.4%	-14.7%
None	0	0	0	0		
Total	1,007,556	1,018,833	1,010,466	1,020,982	0.4%	0.1%

Ave. Nights Away/Traveler	11.71	11.60	11.76	11.87	0.5%	0.7%
Ave. Nights Away/Trip	2.57	2.50	2.65	2.49	-0.9%	0.7%

Time Year Taken	(# of Travelers)				Ave. Annual	Moving Ave.
	1986	1987	1988	1989	Chg. Rate	Chg. Rate
January/February	22,153	22,905	20,222	17,251	-7.7%	-8.7%
March/April	27,022	28,063	25,275	21,817	-6.6%	-7.4%
May/June	30,064	31,083	31,236	30,229	0.2%	0.3%
July/August	41,084	42,337	40,109	40,119	-0.7%	-1.9%
September/October	29,687	29,996	28,592	27,617	-2.3%	-2.9%
November/December	22,927	23,353	20,125	19,307	-5.3%	-7.7%
Do Not Recall	2,124	2,300	2,785	4,254	27.4%	26.7%
Total	175,061	180,037	168,344	160,594	-2.8%	-3.7%

Use Travel Agent	(# of Travelers)				Ave. Annual	Moving Ave.
	1986	1987	1988	1989	Chg. Rate	Chg. Rate
Yes	20,217	20,229	22,495	23,204	4.8%	6.3%
No	69,492	71,649	66,458	73,471	2.1%	-0.4%
Do Not Remember	2,836	3,209	3,771	NA	15.3%	NM
Total	92,545	95,087	92,724	96,675	1.5%	0.5%

Destination	(# of Travel Choices)				Ave. Annual	Moving Ave.
	1986	1987	1988	1989	Chg. Rate	Chg. Rate
<i>Continental United States (Net)</i>						
New England	6,581	6,302	5,324	4,915	-9.1%	-10.8%
Middle Atlantic	12,302	12,081	12,894	12,610	0.9%	2.3%
East North Central	15,960	17,029	15,527	15,964	0.2%	-2.3%
West North Central	9,463	9,488	9,095	10,234	2.9%	1.0%
South Atlantic	26,538	26,663	26,050	24,799	-2.2%	-2.2%
East South Central	7,599	7,814	6,378	6,415	-5.0%	-8.9%
West South Central	10,332	10,634	10,005	9,840	-1.5%	-2.7%
Mountain	13,063	14,198	13,469	13,865	2.2%	0.1%
Pacific	15,326	16,016	15,772	16,025	1.5%	0.7%
Total	117,164	120,225	114,514	114,667	-0.7%	-1.7%
Percent of All Trips	29.9%	29.5%	30.1%	28.0%		

Household Members/Trip	(# of Travel Groups)				Ave. Annual	Moving Ave.
	1986	1987	1988	1989	Chg. Rate	Chg. Rate
5 or more	4,956	9,693	9,005	4,763	13.8%	0.6%
4	9,682	15,512	16,128	10,919	10.6%	5.5%
3	15,256	16,282	17,222	14,445	-1.2%	0.4%
2	41,821	43,122	41,840	43,790	1.6%	0.4%
1	42,217	37,085	35,945	40,306	-1.0%	-1.7%
Total	113,932	121,694	120,140	114,223	0.2%	-0.2%

Hshld Travelers Total	(# of Travelers)				Ave. Annual	Moving Ave.
	1986	1987	1988	1989	Chg. Rate	Chg. Rate
5 or more	24,780	48,465	45,025	23,815	13.8%	0.6%
4	38,728	62,048	64,512	43,676	10.6%	5.5%
3	45,768	48,846	51,666	43,335	-1.2%	0.4%
2	83,642	86,244	83,680	87,580	1.6%	0.4%
1	42,217	37,085	35,945	40,306	-1.0%	-1.7%
Total	235,135	282,688	280,828	238,712	1.5%	0.5%

NM: Statistic not meaningful in this category.

*Statistical sample small, use with caution.

Average Annual Change Rate is calculated on a year-to-year basis.

Moving Average Change Rate is calculated as a 2-point moving average, based on average of two years.

Source: Simmons Market Research Bureau, Inc. 1986 to 1989.

**Table 2. Domestic Travel by Northeast Market -Trips (over 100 miles one way)
within the 48 states within the last 12 months? (1986 to 1989)**

Traveled Over 100 miles		(# of Travelers)			Ave. Annual	Moving Ave.
	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>Chg. Rate</u>	<u>Chg. Rate</u>
Yes	16,924	17,709	17,279	14,536	-4.6%	-4.0%
No	20,737	19,795	20,087	23,173	4.1%	3.4%
Total	37,661	37,504	37,366	37,709	0.0%	-0.1%
# of Round Trips		(# of Travelers)			Ave. Annual	Moving Ave.
	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>Chg. Rate</u>	<u>Chg. Rate</u>
One	6,210	6,342	6,059	4,803	-7.7%	-6.8%
Two to Three Trips	5,688	6,181	5,954	4,862	-4.4%	-4.3%
Four or more	5,026	5,186	5,266	4,871	-0.9%	-0.3%
Total	16,924	17,709	17,279	14,536	-4.6%	-4.0%
Volume Segments		(# of Travelers)			Ave. Annual	Moving Ave.
	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>Chg. Rate</u>	<u>Chg. Rate</u>
Light (1 trip)	6,210	6,342	6,059	4,803	-7.7%	-6.8%
Medium (2 to 3 trips)	5,688	6,181	5,954	4,862	-4.4%	-4.3%
Heavy (4 or more trips)	5,026	5,186	5,266	4,871	-0.9%	-0.3%
Total	16,924	17,709	17,279	14,536	-4.6%	-4.0%
Trip Volume Based on Volume Segments		(# of Travelers)			Ave. Annual	Moving Ave.
	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>Chg. Rate</u>	<u>Chg. Rate</u>
Light (1 trip)	6,210	6,342	6,059	4,803	-7.7%	-6.8%
Medium (2 to 3 trips)	13,453	14,653	14,079	11,389	-4.7%	-4.6%
Heavy (4 or more trips)	51,416	51,621	52,997	50,228	-0.7%	0.1%
Total	71,079	72,616	73,135	66,420	-2.1%	-1.4%
Average Trips Per Traveler	4.2	4.1	4.2	4.6	2.9%	3.0%
Purpose of Trip		(# of Trips)			Ave. Annual	Moving Ave.
	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>Chg. Rate</u>	<u>Chg. Rate</u>
Business	2,412	2,459	2,625	2,374	-0.3%	1.4%
Business and Pleasure	0	1,180	1,026	1,071	-4.3%	41.0%
Accompanying Spouse on Busi	329	0	0	0	NA	NA
Vacation	11,760	10,903	11,253	9,474	-6.6%	-4.3%
Personal	5,370	6,195	5,898	5,332	0.3%	-1.3%
Total Known NE Purposes	19,871	20,737	20,802	18,251	-2.5%	-1.8%
Total # NE Trips	71,080	72,616	73,135	66,420	-2.1%	-1.4%
Percent Known of NE Trips	28.0%	28.6%	28.4%	27.5%		
(Total does not equal total trips for year, only known purpose of a portion of trips)						
Nights Away		(# of Travelers)			Ave. Annual	Moving Ave.
	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>Chg. Rate</u>	<u>Chg. Rate</u>
6 or More	6,966	6,608	6,849	4,634	-11.3%	-7.8%
3 to 5	4,727	4,967	5,060	4,218	-3.2%	-2.0%
None to two	5,230	6,134	5,372	5,684	3.6%	-1.3%
Total	16,923	17,709	17,281	14,536	-4.6%	-4.0%

Estimated Total Nights Away (Travels x Nights Away Category)

	<i>(# of Travel Nights)</i>				Ave. Annual	Moving Ave.
	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>Chg. Rate</u>	<u>Chg. Rate</u>
6 or More	107,052	102,195	106,025	71,051	-11.3%	-7.7%
3 to 5	19,145	19,645	20,384	17,083	-3.3%	-1.6%
None to two	6,508	7,286	6,022	5,165	-6.5%	-9.7%
Total	132,705	129,125	132,431	93,298	-9.9%	-6.9%
Ave. Nights Away/Traveler	7.84	7.29	7.66	6.42	-6.1%	-3.5%
Ave. Nights Away/Trip	1.87	1.78	1.81	1.40	-8.5%	-6.0%

Time Year Taken

	<i>(# of Travelers)</i>				Ave. Annual	Moving Ave.
	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>Chg. Rate</u>	<u>Chg. Rate</u>
January/February	3,842	4,795	4,316	3,292	-3.0%	-5.5%
March/April	5,197	5,614	4,823	3,613	-10.4%	-11.3%
May/June	5,436	5,980	5,464	4,408	-6.0%	-6.7%
July/August	8,457	8,849	8,331	7,226	-4.8%	-5.1%
September/October	5,620	5,643	5,736	4,923	-4.0%	-2.6%
November/December	3,978	3,730	3,366	2,709	-11.8%	-11.2%
Total	32,530	34,611	32,036	26,171	-6.5%	-6.7%

Use Travel Agent

	<i>(# of Travelers)</i>				Ave. Annual	Moving Ave.
	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>Chg. Rate</u>	<u>Chg. Rate</u>
Yes	4,632	4,706	5,000	5,094	3.2%	4.0%
No/Do Not Remember	12,292	13,003	12,279	9,442	-7.6%	-7.1%
Do Not Remember	NA	NA	NA	NA	NM	NM
Total	16,924	17,709	17,279	14,536	-4.6%	-4.0%

	<i>(# of Traveler Choices)</i>				Ave. Annual	Moving Ave.
	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>Chg. Rate</u>	<u>Chg. Rate</u>
<i>Continental United States (Net)</i>						
New England	4,318	4,151	3,276	2,460	-16.6%	-17.5%
Middle Atlantic	6,268	6,632	6,978	6,094	-0.5%	0.8%
East North Central	1,688	2,061	1,525	1,348	-5.2%	-12.1%
West North Central*	410	558	330	550	20.6%	-4.6%
South Atlantic	6,614	7,482	7,641	6,356	-0.5%	-0.1%
East South Central*	438	475	560	350	-3.7%	0.6%
West South Central	726	715	780	451	-11.5%	-7.0%
Mountain	1,183	1,020	1,245	1,002	-3.7%	1.0%
Pacific	1,286	1,508	1,542	2,460	26.4%	20.2%
Total	22,931	24,602	23,877	21,071	-2.5%	-2.6%
Percent of All Trips	32.3%	33.9%	32.6%	31.7%		

Household Members/Trip for Last Trip	(# of Travel Groups)				Ave. Annual	Moving Ave.
	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>Chg. Rate</u>	<u>Chg. Rate</u>
3 or more	3,798	4,879	5,619	3,436	1.6%	3.6%
2	6,357	6,543	6,385	5,675	-3.5%	-3.2%
1	6,768	6,287	5,276	5,425	-6.8%	-9.4%
Total	16,923	17,709	17,280	14,536	-4.6%	-4.0%

Hshld Travelers Total	(# of Travelers)				Ave. Annual	Moving Ave.
	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>Chg. Rate</u>	<u>Chg. Rate</u>
3 or more	11,394	14,637	16,857	10,308	1.6%	3.6%
2	12,714	13,086	12,770	11,350	-3.5%	-3.2%
1	6,768	6,287	5,276	5,425	-6.8%	-9.4%
Total	30,876	34,010	34,903	27,083	-3.2%	-1.9%

NA: Data not available for either year or region.

NM: Statistic not meaningful in this category.

*Statistical sample small, use with caution.

Average Annual Change Rate is calculated on a year-to-year basis.

Moving Average Change Rate is calculated as a 2-point moving average, based on average of two years.

Source: Simmons Market Research Bureau, Inc. 1986 to 1989.

LEISURE LIFESTYLE TYPOLOGY FOR VERMONT COMMUNITIES

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The purpose of this exploratory study was to develop a ZIP code taxonomy of rural communities based on lifestyles and to investigate the ability of the taxonomy to differentiate in purchasing propensity. A factor analysis of household leisure lifestyle data compiled by National Demographics and Lifestyles, Inc., for 140 Vermont ZIP codes revealed three factors of leisure lifestyles. These were used in a subsequent K-means cluster analysis which uncovered nine clusters or types of ZIP code lifestyles. The ZIP code types were found to be significantly different in purchasing potential for nine categories of products developed by CACI (a U.S. geodemographic market information firm). ZIP code data is becoming increasingly important for examining social services, market segmentation, tourism promotion and development, and planning; a ZIP code based typology could be a useful means for comparison and differentiation of households for such purposes.

Introduction

Studies of residential preferences and attraction to rural areas indicate non-economic motives for growth in nonmetropolitan areas (Swanson 1986). For many rural New England towns and villages, relative access to populated urban centers, attractiveness of natural resources, and idealization of the rural lifestyle resulted in increased growth during the 1970's and '80's. Quality of life in these more rural areas became a major attraction. Many of the quality of life attraction indicators for rural communities are subjective, such as "closeness of the small community," and a "better life." Some studies, however, have indicated that the prevalent leisure lifestyle is a paramount attractor and have attempted to identify and quantify such community variables using census, economic, and employment data as surrogates. On a more explicit basis, lifestyle indexes have been created by marketing and research firms to show the propensity of households within a specific geographic area (e.g., ADI, zip code regions) to engage in recreation, cultural, and hobby activities which indicate a particular "leisure lifestyles" (*The Lifestyle ZIP Code Analyst* 1991). Most of these psychographic studies make no attempt to cross classify geographic and geopolitical regions on the various attributes of leisure lifestyle nor even to identify the multi-attribute lifestyles of individuals or households in such areas. Instead they and other studies have focused on specific recreational and economic behavior, resident attitudes, or tourist attracting attributes of a specific geographic area (Blank 1989; Davis, Allen, & Cosenza 1988; Shih 1986; Davis & Sternquist 1987). Suggestions are then made that geographic areas which contain a large number of individuals or households who match the characteristics of the "types," develop discrete educational or promotional activities. Most tourism research has not addressed an efficient means of identifying and reaching these types. Identification of broad categories of households (i.e., in distinguishable geographic areas), differentiated by objective information on leisure lifestyles, could help policy makers, planners, and the public initiate investment, planning, education, and regulatory decisions related to tourism, growth,

and development; and provide a means to reach consumers of multiple recreational services and products. Such a classification scheme, thus, may also serve as a categorization construct (i.e., image) to attract individuals and businesses to a specified geographically defined market area.

Increasingly information on individuals and households is being produced on a zip code level because of its distinct ties to the postal system and to direct mail distribution. Broad based data on lifestyles and purchasing propensity, for example, are now being produced on a zip code basis, providing a productive means to tie a particular lifestyle to an identifiable and accessible market. Most geographical based typologies, however, have been constructed for specified media markets and communities (Hawes 1988, Bevins & Zwick 1988, Bevins 1990). No studies have attempted to construct a typology of zip code areas through the use of these lifestyle profiles; nor have they addressed the multi-attribute nature of lifestyles. The purpose of this research was to develop a classification (typology) of Vermont zip code areas based on leisure lifestyle characteristics. Such a typology can be compared to previously developed community classification schemes and may be used to differentiate the propensity to purchase specific products.

Methods

The study reported here used data taken from *The Lifestyle ZIP Code Analyst* (1991), a joint venture of Standard Rate & Data Service (SRDS) and National Demographics & Lifestyles (NDL). Fifty six demographic and leisure lifestyle are profiled in the *Lifestyle ZIP Code Analyst*. These profiles were developed from self-reported activity/lifestyle information collected from 16.4 million household responses to consumer information questionnaires which were inserted into the packaging of a variety of consumer goods. NDL follows standard statistical adjustment procedures in adjusting the raw data. Although 154 ZIP codes are profiled in Vermont, several ZIP codes areas are excluded (Fig. 1) from the data base because they fail to meet the requirement for the minimum number of household (e.g., 200 households for counties with less than 35,000 population) or sample size criteria.

Exploratory factor analysis was used to reduce the 56 lifestyle/activity attributes to underlying dimensions. The factor scores from these variables were subsequently used in nonhierarchical cluster analysis to classify and categorize the Vermont ZIP codes under study. Clusters of communities that emerged from the cluster analytic procedure can be thought of as a constructed type having some common characteristics in lifestyle. This commonality (or homogeneity) can then be used for comparison with other "types".

The cluster frame then was used to differentiate between ZIP codes on the basis of the potential to purchase 14 specific products and services. CACI (a U.S. geodemographic market information firm) developed purchasing potential indexes for all ZIP codes in the United States from a syndicated database developed by Mediamark Research, Inc. (MRI). The MRI database is derived from annual interviews with 40,000 American households. Detailed questionnaires are asked concerning specific product usage and amounts spent on consumer goods and services. Purchasing Potential Indexes for the 14 products and services were linked to the Vermont ZIP codes used to develop the cluster frame. A comparison of clusters of Vermont ZIP codes potential to purchase was attained using non-parametric statistical procedures.

Analysis and Results

A way of differentiating between ZIP codes on leisure/activity profiles is to determine whether the profiles form composite underlying dimensions. Exploratory factor analysis (R-type factor analysis) was used to reduce the lifestyle/activity attributes to underlying dimensions. In the first stage of this factor analysis 56 variables were reduced to 47; variables were eliminated based on high intercorrelations ($r \geq .70$) or an excessively low Measure of Sampling Adequacy ($MSA \leq .500$).

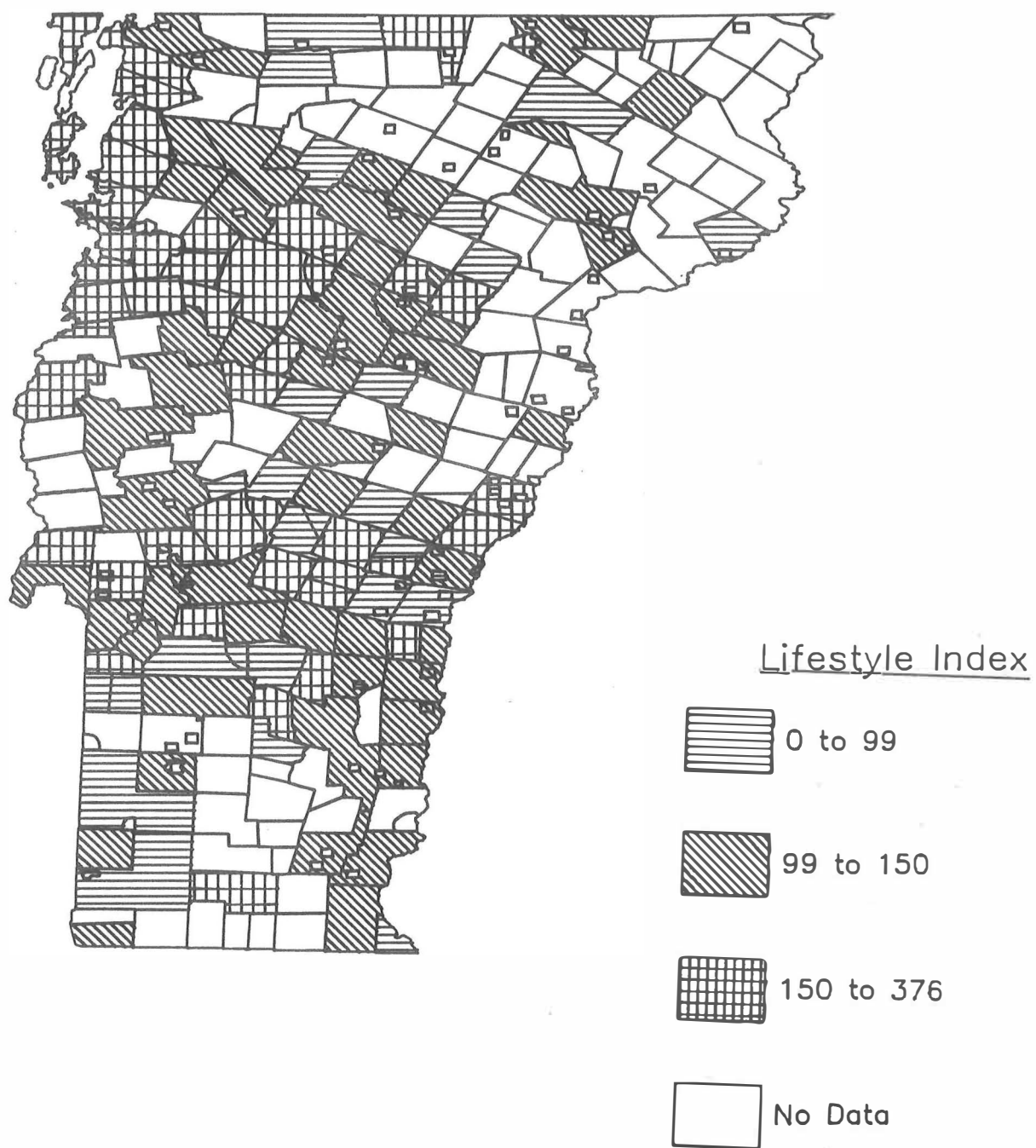


Figure 1. Boating/sailing lifestyle (1991).

Using the reduced set of variables, a second exploratory factor analysis suggested a three factor solution for rotation, based on the convergence of eigenvalues (≥ 1.00); explained variance ($\geq 5\%$); and scree tests (Hawes 1988). The results of the three factor Varimax (orthogonal) rotation are shown in Table 1. Labeling of the factors was based on the criteria of a minimal significant loading ($\geq .475$) of variables on the factor. Factor 1 suggests an upwardly mobile *leisured class* factor, epitomized by interest in running/jogging, interest in snow skiing and tennis, enthusiasm for wines and cultural events, and an interest in investment portfolios. This dimension is also characterized by the inverse relation to the natural resource extractive activities of hunting/shooting (-.697) and fishing (-.649), and an inverse relation to spending time with grandchildren (-.592) and participating in passive activities of needlework/knitting (-.586) and sewing (-.475). The second dimension indicates a *nature/domestic* orientation. Households of this group appear to be gardening (.690) and wildlife/nature (.684) enthusiasts, and less oriented toward passive television watching. The third factor reflects an orientation toward automobiles and motorcycles. The ZIP codes loading on this *motor trend* factor have a high incidence of households that do their own automotive work, either out of necessity or enjoyment (.535), and are motorcycle enthusiasts (.547). An interesting contrast in the factors is that unlike this latter factor, the first factor had a negative loading on automotive work (-.532), suggesting a significant differentiation between the two groups. The three underlying dimensions, thus, appear to form differentiating structures of lifestyle/activity profiles. Factor scores from the rotated three factor solution were then used in a subsequent cluster analysis to categorize Vermont ZIP codes into types.

Used in a wide variety of disciplines, cluster analysis is essentially a mapping procedure. The output from the procedure allows one to identify and label the cluster, and understand how cases group together. Various cluster analytic procedures are available, but generally can be divided between hierarchical and nonhierarchical techniques. A nonhierarchical, or iterative, cluster procedure was selected for use in this study because of the relatively large number of cases. The nonhierarchical technique uses multivariate profiles to sort the cases into k-clusters based on "seed" points (Goldsmith 1987). The initial seed points may be automatically defined by the cluster program and each case assigned to an initial seed. A centroid for the clusters is then computed and subsequently used as a seed point for the next iteration on which the cases are sorted (Goldsmith 1987). In the first stage of the cluster analysis for this study, an iterative partitioning method was employed to help determine ZIP codes which were outliers. Through subsequent iterations and elimination of outliers (single case clusters) the original 154 ZIP codes were reduced to a set of 140.

One of the difficulties in using nonhierarchical cluster analysis is the determination of the optimal number of homogeneous groups for the final solution. Heuristic procedures for determination seem to be predominant (Aldenderfer & Blashfield 1984). In K-means cluster analysis, the user must specify the number of groups present in the data prior to invoking the procedure (Aldenderfer & Blashfield 1984). In this study, the authors subjected the reduced set of ZIP codes to seventeen different cluster runs that ranged from 18 clusters to 2 clusters. A nine cluster solution was selected as optimal based on the criteria of interpretability of the clusters and least amount noise (fewest numbers of single outliers in the final solution). In order to assist in the interpretation of the cluster "types," the nine clusters' mean scores were plotted on the three factor dimensions (Fig. 2). A plot of Cluster I, which contained the largest number of cases (52), revealed that no single factor could be identified as interpreting the cluster (all three factor means were negative); this cluster was subsequently labeled as *Just Plain Folks*. The second cluster of 27 cases had a moderately high mean associated with the first factorial dimension and was negatively related to the other two. Because this first factor was a leisure class oriented dimension, the cluster was characterized as *Upward Mobile Leisure Class*. The third cluster also contained 27 cases. This cluster was characterized by moderate

positive means on Nature/Domestic and Motor Trends dimensions, but showed a negative mean on the Leisured Class dimension; this cluster was labeled as *Wildlife/Automotive Rural Center*. Cluster IV was characterized by a moderate positive mean on the second factor—Nature/Domestic—resulting in it being labeled Wildlife Environmentalist. The two ZIP codes comprising Cluster V, had a very high mean on the first factor. A subsequent analysis of the raw scores indicated a very high percentage of households in these two ZIP codes were wine and skiing oriented, and, thus, the cluster was labeled—*Wine/Ski*. An outlier cluster of one case was defined by high means on the Nature/Domestic (Factor 2) and Motor Trends (Factor 3) dimensions. After examining the raw data for this one case, Cluster VI was characterized as *Motorcycle/Gardening* enthusiasts. The six ZIP codes of Cluster VII had a moderately positive mean on Factor 3 and negative means on Factors 1 and 2. This latter cluster was subsequently labeled as *Auto & Motorcycle* enthusiasts. Cluster VIII had a very high positive mean on the second dimension (Factor 2) and negative means on dimensions one and three. The two ZIP codes of this cluster type were seen as gardening and environmental enthusiasts associated with *Mother Earth*. The final cluster type had moderately positive means on Factors 1 and 2, and a negative mean associated with Factor 3. An analysis of the raw data associated with the four ZIP codes in Cluster IX indicated a high percentage of households which were oriented toward gourmet foods, dining out and wines. This cluster was labeled as *The Diners*. In summary, the cluster analysis used in this study indicated that nine distinct "types" of ZIP code areas are prevalent within Vermont. Such constructed types are heuristic tools by which real events can be compared and comprehended and where the diversities and complexities of phenomena can be reduced to coherent levels (Luloff 1987). The value of constructed types lie in their use in comprehending and comparing empirical data, thus, they should be tested.

The final step of the exploratory analysis of this study was a test of the viability of the typology constructed in the cluster framework. It was hypothesized that the nine clusters should be able to be distinguished on their purchasing potential indexes for 14 products/services identified in the CACI data set. Because of the small numbers of cases in Clusters V, VI, and VIII, only six cluster "types" were used to test the Hypotheses: $H_0 =$ There is no significant difference in purchasing potential indexes for investments, savings, loans, apparel, shoes, sporting goods, groceries, drug store purchases, dining, pet goods/services, video rental, automotive products, furniture, and home improvement goods/services among the cluster types. A non-parametric version of Analysis of Variance, the Kruskal-Wallis Test, was used to examine whether differences existed among the six cluster "types" on each of the 14 goods/services purchasing potential indexes developed by CACI. The results are presented in Table 2. Significant differences among cluster "types" were found for nine of the fourteen goods/service indexes. No significant differences in clusters were apparent for the purchasing potential of "savings", "apparel", "shoes", "sporting goods", and "home improvement." The results of the Kruskal-Wallis analysis, thus, indicate limited support for the viability of the Vermont lifestyle cluster typology in differentiating purchasing potential for ZIP code areas, and its use as a heuristic taxonomy.

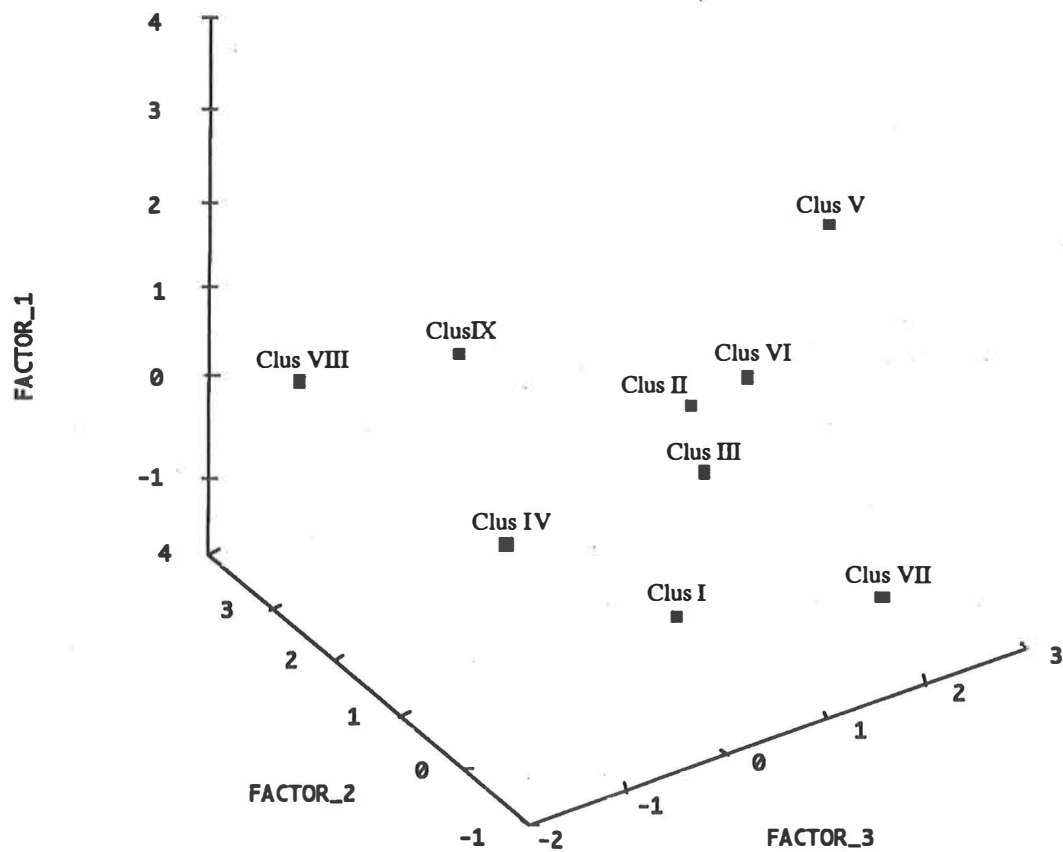
Implications

Two hundred years ago, Vermont communities were quite monolithic. Virtually all communities were alike with the majority of residents working in farming or forestry. Planning in one community was nearly identical to planning in neighboring communities. That is not the case today. There are at least a eight uniquely different types of communities in Vermont, each requiring a slightly different planning approach (Bevins and Zwick 1988). Similarly, as ZIP code data becomes the prevalent means of distribution for much of the marketing and concomitant geodemographic information, there will be a need for an attendant typological scheme for public policy initiatives and community action related to tourism and community development. The proper classification of ZIP code

Table 1. Vermont leisure lifestyle factors.

Lifestyle/Activity	Factor I The Leisured Class (59.7%) ^a	Factor II Nature/Domestic (24.2%)	Factor III Motor trends (16.1%)
Attend Cultural Arts/Events	.779		
Career Oriented Activities	.505		
Gourmet Cooking/Fine Foods	.570		
Real Estate Investments	.511		
Stock/Bond Investments	.647		
Wines	.780		
Golf	.591		
Physical Fitness/Exercise	.708		
Running/Jogging	.785		
Snow Skiing	.764		
Tennis	.758		
Fishing	-.649		
Hunting/Shooting	-.697		
Recreational Vehicles/4-WD	-.485		
Automotive Work	-.532		.535
Current Affairs/Politics	.504		
Entering Sweepstakes	-.526		
Grandchildren	-.592		
Needlework/Knitting	-.586		
Sewing	-.475		
Fine Art/Antiques		.554	
Watching Cable Television		-.689	
Watching Sports on Television		-.481	
Wildlife/Environmental		.684	
Gardening/Furniture		.690	
Home Work Shop		.549	
Household Pets		.650	
Motorcycles			.547

a/ Proportion of post-rotation variance explained



Cluster	Factor I	Factor II	Factor III
I Just Plain Folks.	-0.51	-0.69	-0.33
II Upward Mobile, Leisure Oriented	1.20	-0.36	0.23
III Rural Center Wildlife/ Automobile	-0.26	0.79	0.92
IV Wildlife Environment	-0.33	0.90	-1.08
V Wine/ Ski	3.34	-0.78	1.08
VI Motorcycles/ Gardening	-0.88	2.56	2.55
VII Auto & Motorcycle Enthusiasts	-1.01	-0.80	1.67
VIII Mother Earth	0.31	3.18	-1.62
IX The Diners	1.74	1.04	-1.35

Figure 2. Vermont ZIP code cluster plot: Three -factor model.

areas should use an objective classification scheme. Most regional planners are unfamiliar with such taxonomies. The research community has a moral obligation to provide assistance in such cases.

The utilization of typologies also has facilitated the description of many different forms of social and economic organizations (Findeis 1987). Their use in understanding spatial organization of economic activity is not new (Findeis 1987). Taxonomies based on leisure lifestyles, however, could become critical for the financing of the development of new facilities and services, the infrastructure of the rural tourism industry. As rural areas embrace tourism for economic diversification, lending institutions have required both new and existing business to justify their viability. Critical to this justification is a delineation of markets, requiring an understanding of segments and market penetration. A taxonomy based on leisure lifestyles provides the roots for such an understanding by establishing a simple classification of markets and a means to compare the areas in which they exist. Such taxonomies could provide a framework for assessing and making better decisions on financing and growing small business within the changing rural economy.

Table 2. Leisure lifestyle ZIP code clusters: Differences in buying propensity.^a

Goods/Service	Test Statistic (Kruskal-Wallis)	Significance ^b
Investments	H= 11.876	p≤ .05
Savings	H= 10.204	N.S.
Loans	H= 21.602	p≤ .005
Apparel	H= 5.743	N.S.
Shoes	H= 8.091	N.S.
Sporting Goods	H= 9.565	N.S.
Grocery	H= 20.088	p≤ .005
Drug Store	H= 11.583	p≤ .05
Dining	H= 13.916	p≤ .025
Pet Goods/Services	H= 28.221	p≤ .005
Video Rental	H= 22.703	p≤ .005
Automotive Products	H= 37.297	p≤ .001
Furniture	H= 24.085	p≤ .005
Home Improvement	H= 6.008	N.S.

a/ Note: Buying propensity index developed from data obtained from CACI; six clusters (Just Plain Folks, Upward Mobile Leisure Oriented, Rural Center Wildlife/Auto Oriented, Wildlife/Environment, .Auto & Motorcycle Enthusiasts, The Diners) were included in analysis.

b/ p≤ .05, 5 df., Chi Sq≥ 11.070

Literature Cited

- Aldenderfer, M.S.; Blashfield, R.K. 1984. Cluster Analysis. Newbury Park, CA: Sage Publications. 88p.
- Bevins, M.I. 1990. Community typology model. In: Proceedings of the 1990 Northeastern recreation research symposium; Saratoga Springs, NY. Burlington, VT: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 57-63.
- Bevins, M.I. ; Zwick, R.R. 1988. Evaluating the socio-economic impact of recreational development on communities through cluster analysis. In: Abstracts from the 1988 symposium on leisure research; National Recreation and Park Association, Indianapolis, IN
- Blank, U. 1989. Chapter 3—The community as a tourist destination area. The Community Tourism Industry Imperative: The Necessity, The Opportunity, Its Potential. pp. 22-40.
- Davis, D.; Allen, J.; Cosenza, R.M. 1988. Segmenting local residents by their attitudes, interests, and opinions toward tourism. The Journal of Travel Research. 27(2): 2-8.
- Davis, B.D.; Sternquist, B. 1987. Appealing to the elusive tourist: An attribute cluster strategy. The Journal of Travel Research. 24(4): 25-31.
- Findeis, J.L. 1987. Rural industrialization: Issues and the role of development typologies. In: Proceedings, Rural people and places: A symposium on typologies; 1986 October 22-24; Grantville, PA. University Park, PA: The Northeast Center for Rural Development: 33-43.
- Goldsmith, H. 1987. Developing a strategy for cataloging the residential environment of nonmetropolitan and rural areas. In: Proceedings, Rural people and places: A symposium on typologies; 1986 October 22-24; Grantville, PA. University Park, PA: The Northeast Center for Rural Development: 103-128.
- Hawes, D.K. 1988. Travel related lifestyle profiles of older women. Journal of Travel Research. 27(2): 22-32.
- _____. 1991. The Lifestyle ZIP Code Analyst. Wilmette, IL: Standard Rate & Data Service.
- Luloff, A.E. 1987. Typologies: Construct design and measurement issues. In: Proceedings, Rural people and places: A symposium on typologies; 1986 October 22-24; Grantville, PA. University Park, PA: The Northeast Center for Rural Development: 85-95.
- Shih, D. 1986. VALS as a tool of tourism market research: The Pennsylvania experience. Journal of Travel Research. 24(4): 2-11.
- Swanson, L.L. 1986. What attracts new residents to nonmetro areas? Rural Development Research Report 56. Washington, DC: U.S. Department of Agriculture, Economic Research Service. 15 p.

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Vander Stoep, Gail A., ed. 1993. **Proceedings of the 1992 Northeastern recreation research symposium**; 1992 April 5-7; Saratoga Springs, NY. Gen. Tech. Rep. NE-176. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 171 p. <https://doi.org/10.2737/NE-GTR-176>

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