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**Northeastern Forest
Experiment Station**

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Report NE-132

PROCEEDINGS OF THE 1989 NORTHEASTERN RECREATION RESEARCH SYMPOSIUM

APRIL 3-5, 1989

SARATOGA SPRINGS, NEW YORK

NORTHEASTERN RECREATION RESEARCH MEETING
POLICY STATEMENT

The Northeast 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.

NERR STEERING COMMITTEE

The Steering Committee wishes to thank John Nelson for his assistance in developing the conference data base.

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APRIL 3-5 1989

State Parks Management and Research Institute

Saratoga Springs, New York

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Recreation research at the Forest Service's Northeastern Forest Experiment Station in Burlington, VT will examine the social attributes that affect the perceived quality of forest recreation resources, the benefits that accrue to forest recreation users and to society in general, and how the supply/demand relationships for these resources affect the benefits. Several specific studies are described toward achieving these goals. Other studies, proposed by cooperating scientists, and that complement those identified in the Research Work Unit's plan, will be seriously considered for funding from within the Unit.

Recreation research initiated in the next 5 years may include some of the most important studies in our profession. The findings will probably affect recreation management into the 21st century, setting the stage for managerial action for years to come. Therefore, it is very important to know where we have been, where we are now, and where we are going. Most recreation researchers have a pretty good idea of where they have been and most of us probably know (or think we know) just about where we are now, but how many of us can honestly say what studies we will initiate during the next 3 to 5 years or what our accomplishments will be 7 to 10 years from now?

One way to increase the probability of specific accomplishments is to develop a set of goals. Forest Service researchers prepare a program of studies every 5 years in order to guide our research. Although this process takes time and may restrict our freedom to some extent, it encourages us to consider where we have been, where we are now, and where we would like to be 60 months from now. Our Research Work Unit has just completed the process and developed a Work Unit Description that maps out our program of research for the next 5 years. Even though, to some it may sound somewhat specific, it allows flexibility. Its title is "Quality Attributes, Valuation, and Supply Networks of Forest Recreation Resources."

In the 21st century we will experience increased population in both urban and rural environments. Moreover, the public perception of government's role in natural resources management will shift. Our elected officials and public servants will need a better understanding of the people's expectations for resources held in the public trust and of the interrelationships among resources as they relate to human well-being, whether alloted through government or commercial enterprises. Our mission is to develop a body of knowledge that contributes answers to the following three questions:

1. What are the social attributes of a recreation experience that affect the perceived quality of a forest recreation resource?

2. What are the benefits that accrue to recreational resource users and society in general, and what are the apparent values to place on these resources?

3. How do the supply-demand relationships for these resources affect the benefits they produce, the production costs of the benefits, and distribution of the benefits throughout society?

The clients of our research are the managers, planners, and administrators of National Forests, National Parks, and other Federal agencies, as well as their state and local counterparts. The results of our research will also provide valuable information to legislative bodies contemplating changes in the laws that affect public resource management and allocation. Further, we anticipate that our research will continue to benefit commercial recreation operators directly and indirectly.

The first problem addressed in our Work Unit Description--recreation quality--has received much attention over the years, and still has not been resolved. Management needs reliable techniques to identify and quantify the social attributes of recreation experiences that affect the perceived quality of forest recreation resources. For example, there is no universally accepted definition of perceived quality. We need to identify and quantify, for specific activities, the relevant physical and social factors that affect perceived quality. And we still have a long way to go before we will be able to manipulate the physical and social factors that can be applied to improve the overall quality of a forest recreation experience.

To resolve this problem, we propose a series of studies to establish a universally agreed upon definition of "perceived quality". We plan to enlist the services of a panel of recreationists, recreation resource managers, and students and faculty of recreation in order to define "perceived quality" for 10 forest recreation activities. The definitions for each activity will be content analyzed, then provided to the panel with instructions to redefine the term in view of others' perceptions. This iterative process will help achieve consensus for each activity.

Next, we will ask a similar panel to identify ›cial variables affecting the quality of an ›perience, given a specific activity and ›cation. The variables will be management ›ntrollable, such as use limitations, fee ›hedules, and level of rule enforcement; and ›controllable: level of user experience, user ›mmitment to the activity, and attitudes of the ›er. Five degrees of impact, ranging from "made significantly positive contribution toward ›hancing the overall quality of the experience" › "detracted from the overall quality of the ›perience" will rate each variable.

A set of social variables controllable by ›nagement, that affect the perceived quality of ›nagement, will be identified for each activity ›ailable at a site. Each variable will be ›aracterized as to how much and in what ›rection it might affect the perceived quality ' the experience. The total score of each ›riable within an activity should approximate ›e social experience score of that particular ›tivity and location. A user survey will verify ›e validity of the variables and the accuracy of ›e social experience quality scores.

The final phase of resolving this first ›oblem will be to differentiate controllable and ›controllable attributes, and to institute a ›ogram that allows management to control and ›st the variables. This phase will evaluate the ›fectiveness of managerial actions toward ›proving the quality of recreation experiences, ›d will require much interaction with recreation ›nagers. If successful, the final phase will ›sure a high degree of technology transfer. ›ose communication with managers during ›velopment of the social experience quality ›ores should facilitate this last phase.

The second problem in our mission examines ›e benefits that accrue to recreational resource ›ers and to the general public, and the values ›at both users and other members of society lace on those resources. Planners, managers, ›dministrators, and legislators need a better ›derstanding of public expectations, ›rceptions, motivations, and dependency on fish, ›ildlife, and other natural resources in order to ›cilitate decisionmaking. To address this ›oblem, we propose three sets of studies:

1. First, the various kinds of payoffs attributable to fish, wildlife, and other recreational resource use must be identified. To do this, it is necessary to quantify the sociocultural, psychological, and economic benefits of the resources and to distinguish recreation from the broader sociocultural and psychological benefits. Further, it will be necessary to determine values for non-marketed benefits of resource use.

2. Second, collection and analysis of information on the attitudes, perceptions, expectations, and values placed on publicly-owned recreation resources is needed. Survey techniques can be used to quantify option and existence values of fish, wildlife, and other recreational resources for nonusers (the general public); other techniques will be used to estimate the values accruing to users.

3. Finally, an examination of the extent of community dependence on fish and wildlife in rural areas and development of an input-output or simulation model of a mixed economy (with public, private, and subsistence sectors) will be made. The impact of urbanization and development can then be examined in terms of the share of the added affluence that accrues to traditional users and the compensation that they receive for losses of less readily measurable benefits.

The third problem in our mission concerns the effect of the supply-demand relationships for recreational resources on the benefits produced, and the production costs and distribution of the benefits.

Several recent studies suggest that the key area of concern for recreation supply is at the urban-rural interface, that zone of transition between the metropolitan suburbs and the more remote forest; a zone rich in a variety of recreation opportunities that include private, municipal, state, and federal resources. Unfortunately, we have little information on the interrelationship of these resources in fulfilling recreation needs.

Information is needed to identify the appropriate roles for the various sectors of providers, to identify supply gaps in rural communities, and to help avoid duplication of services. Additionally, there is little information about the role of open space in rural communities and its contribution, positively or negatively, to rural development. For example, several northeastern states have passed major bond issues to enable communities to pursue open-space acquisition programs. However, due to the lack of useful information, open-space programs have been initiated with little knowledge of the benefits that the community expects from a particular piece of open space, how these benefits are interrelated with other community open spaces, and how the benefits are distributed throughout the community-at-large.

To alleviate this situation, we propose to establish a series of studies to:

1. identify images of public recreation facilities,

2. specify public expectations and beliefs about recreation facilities at the urban-rural interface,

3. determine substitutability among public recreation sites,

4 identify the benefits of rural community open space,

5. estimate the economic value of rural community open space,

6. determine the costs associated with preservation of rural community open space, and

7. document public knowledge, beliefs, and values about National Forests in the United States.

In sum, as population pressures continue to build, the provision and conservation of high-quality recreation opportunities will become increasingly important. A long-term commitment to research on these topics is essential if we are to preserve and enhance the supply of such opportunities. Without additional research, these pressures may erode the existing recreation quality, and create a public that is vastly underserved.

Although we have identified several specific studies we plan to conduct, we recognize that others will be proposed by cooperators. Some may be replaced, and some may be funded as an outgrowth of these identified. We hope that this program is not presumptuous nor too conservative. We hope it has the flexibility for unusual opportunities if and when they occur. The program is based on the knowledge of our accomplishments over the past 5 years and on the resources we expect to have for the next 5 years. We recognize, however, that the best-laid plans do not always guarantee arrival on schedule.

USDA FOREST SERVICE'S NATIONAL RECREATION STRATEGY: IMPLICATIONS FOR OUTDOOR RECREATION RESEARCH

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The USDA Forest Service's National Recreation Strategy places increased emphasis on recreation resources and poses new challenges for managing the National Forests. To help meet these challenges, researchers must provide answers to new questions and develop new working relationships with managers and technology transfer specialists.

Over the past two years the Forest Service has developed and made substantial progress in implementing a National Recreation Strategy that places increased emphasis on National Forest recreation. The Strategy is partly in response to the increased public interest in National Forest recreation that surfaced during the development of plans for each of the National Forests.

At the request of Chief Robertson, the Strategy was developed by teams of Forest Service personnel from all areas and levels of the Agency, with substantial input from representatives of National Forest user groups. The Strategy has received widespread support within the Forest Service and from public and private groups. Sometimes referred to as the "Recreation Initiative," it has encouraged innovation at all levels, but especially from the "ground up."

I will outline some of the major directions encouraged by the Stategy, and discuss the implications for research to support National Forest management. The rapid agency response to the Strategy and the high degree of innovation involved create an urgent need for answers from researchers, as well as new kinds of working relationships between managers, technology transfer specialists, and researchers. The implications of this new climate for research are discussed in a final section. Much of this paper is based on my observations while leading one of the six Commissions that developed the Strategy.

Management Directions and Their Implications For Recreation Research

Listed below are 11 major management directions encouraged by the National Recreation Strategy, followed by a discussion of the associated implications for research.

1. Increased Emphasis On Recreation In A Multiple-Use Context.

Managers and planners will need additional information on the possibilities for producing recreation in conjunction with other forest outputs, as well as on the likely public responses to the possible output combinations. Research must help managers identify feasible options for joint or integrated production of forest outputs, estimate production costs, and predict user responses to various management programs, output combinations, and associated forest environments. A key aspect of this effort must be models that enable managers and planners to predict user perceptions of the forest environments created by various management options, as well as user choices between and uses of these environments. Improved information on resource values, measured in dollars as well as other measures of customer satisfaction, will be needed to help guide choices among the feasible management options.

2. A Wider Range Of Recreation Opportunities Often In Partnership With Others.

Managers will be evaluating a wider range of management alternatives, in some instances including higher levels of site development and services than were considered in the past. This may involve substantial investments of resources and major changes in forest environments. Decisions concerning these investments must consider their likely outcome in terms of the forest environments created and resulting customer satisfaction.

The scope of recreation research must be expanded to include these new management options that are likely to be given particular attention in high-use environments near urban areas and particularly attractive resources. Higher development levels are likely to generate increased conflict with the production of non-recreation outputs as well as among recreation users; these higher levels call for research aimed at helping identify potential conflicts as well as means of mitigating conflicts that do develop. These conflicts may be especially intense near urban areas because of the high levels of use, wide range of uses, and diverse user populations.

3. Increased Attention To Customer Satisfaction.

To improve the quality of recreation experiences and increase customer satisfaction, it is important to identify those aspects or attributes of the forest environment and associated experiences that are critical to customer satisfaction. It will be particularly useful to managers if research can develop models that can predict satisfaction levels associated with alternative forest environments and management programs. These models must give special attention to those forest attributes that are likely to be influenced by management options. It is also important to develop procedures for monitoring use of selected environments as well as the levels of user satisfaction so that the effectiveness of management efforts can be evaluated.

4. Increased Efforts To "Reach Out" And Serve Segments Of The Population That Are Currently Underserved.

It will become increasingly important to understand barriers to use and enjoyment of National Forests by those groups who do not ordinarily use them, make limited use of them, or do not enjoy their experiences. Once these barriers are identified, programs can be developed to increase use and enjoyment by those currently "underserved." Research is also needed on the perceptions, preferences, and choice of these important groups so that managers can do a more effective job of satisfying their needs. In addition, it is important to monitor the composition of the user population at selected sites to evaluate the effectiveness of management programs in meeting the needs of all Americans.

5. Increased Emphasis On Partnerships As An Effective Means Of Providing Needed Opportunities For Recreation.

I do not see a direct role for research in efforts to expand and enhance partnerships on the National Forests. However, researchers may play a useful role in efforts to evaluate the effectiveness of various types of partnerships. Partners will become increasingly important clients for research results. Recreation researchers should continue their strong record of effective partnerships with research, planning, and management groups.

6. Increased Attention To The Significance Of Particular "Places" For Recreation.

Outdoor recreation is often very "place" or "environment" specific, and individuals or groups are often tied to particular places that have a special significance to them. These places may be a very small and unique area, an extensive landscape, or combination of an area and a landscape. Management efforts that are unaware of or ignore these places often lead to intense conflicts with users -- usually after these significant places have been changed or disrupted. These problems can be reduced, in part, by research to identify the attributes of forest environments that are critical for particular types of individuals, groups, and activities.

7. Increased Emphasis On Providing Information For Users, From The Standpoint Of Both Interpretation And Marketing.

Even a greatly expanded effort to provide information to users will be small relative to the overall challenge, and research is needed to guide and increase the effectiveness of these programs in meeting user needs. Interest is rapidly increasing in marketing recreation and other forest outputs as well. Interpretation, information, and marketing efforts must be firmly grounded in research on those attributes of forest environments that are important to individuals and influence their choice of sites. Such efforts must also consider studies of the sources of information that individuals use or would like to use in finding out about areas and choosing among them.

8. Increased Monitoring To Detect Significant Changes In Uses, User Technology, Management Technology, And The Characteristics Of Users And Potential Users.

There is a clear need to monitor trends in use, users, user technology, management technology, and potential users. This will help identify possible changes in user tastes, preferences, and needs and help managers predict the implications of their actions in terms of the use and enjoyment by customers in the years ahead.

9. Improved Road And Trail System To Provide High Quality Opportunities For Recreation.

Improving the road and trail system is an expensive and environmentally sensitive job. The effort must be guided by research that identifies the attributes of roads, trails, and the associated corridor environments that are significant to users. Models that predict customer response to changes in attributes of the forest transportation systems and associated environments will be particularly useful.

10. Upgraded Knowledge and Skills Of Those Who Manage Recreation Resources

Although this item focuses heavily on recruitment, career ladders, and training it also requires up-to-date information to guide decisions. Research and technology transfer are critical to having that information available.

11. Increased Cooperation Between The National Forest System (NFS), Research, And State And Private Forestry (S&PF) To Provide Outdoor Recreation.

The National Recreation Strategy provides an excellent opportunity to strengthen the already strong ties between recreation research and NFS and to forge new ties to S&PF, which has expressed renewed interest in recreation. Much of the needed research cannot be accomplished without substantial cooperation with NFS, and much of the needed monitoring must be carried out jointly. There are strong needs for technology transfer, particularly with the private sector -- a key role for S&PF.

A New Climate For Researchers and Research

The National Recreation Strategy encourage innovation in recreation resource planning and management at all levels of the organization. It is one of several ongoing efforts aimed at "freeing up" people in the field to take the kind of actions

they think are appropriate to serve customers. This attitude was encouraged with widespread input of ideas into the development of the Strategy and continues with its implementation. Considerable efforts have been undertaken to remove the constraints that limited the application of good ideas in the past. This creates an exciting environment for management where all kinds of new things are being tried. Managers are not inclined to wait for research results before moving ahead (if this ever was the case). At this time it might be appropriate for researchers to:

a. Monitor the kinds of innovations being implemented on the National Forests and provide guidance where possible, being very careful not to dampen enthusiam for innovative ways of meeting customer needs.

b. Look for patterns in the new activities being undertaken and target future research toward meeting the information needs that are expected to develop.

c. Consider many of the innovations as experiments and evaluate the results to see where improvements can be made.

d. Develop active partnerships with managers and planners to help keep up with and work effectively within the changing environment.

Summary

The National Recreation Strategy is giving increased attention to providing recreation opportunities on the National Forests. Innovation is encouraged at all levels of the Forest Service but particularly in the field. The new directions contained in the Strategy have implications for the kinds of research that will be most useful in the years ahead, including increased attention to the production possibilities under integrated resource management, customer satisfaction, and preferences for a wide range of National Forest environments. At the same time, the Strategy calls for new partnerships between managers, researchers, and technology transfer specialists in an era of innovation, diversification, and expansion of recreation resource management programs on the National Forests.

NEW TOOLS FOR A NEW ERA

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This paper briefly describes the development of water resources development projects by the US Army Corps of Engineers. Project settings at the time of development and impacts of changes in our nation are described in relation to increased recreation use of the natural resources. Results of research are illustrated as tools for improved planning and management at the projects.

Background

The US Army Corps of Engineers has developed some 465 lakes throughout the United States in addition to other water resources projects for a variety of congressionally authorized purposes. These purposes originally included traditional public uses such as flood control, navigation, hydroelectric power generation and water supply.

Many of the dams were constructed in rural settings, often remote, during the 1940's and 1950's. Transportation was difficult compared to the relative ease with which we move people and things about today. Just out of World War II, the nation was building. Movement to the suburbs was only beginning. Disposable income and increased leisure time were not common place. Public demands for outdoor recreation opportunities and environmental protection did not exist as significant national issues.

Public land acquisition at the lakes was minimal. Only that required to satisfy the structural and operational integrity of the project for the traditional purposes was placed in public ownership. The result at older Corps lakes is a relatively narrow ribbon of land in public ownership around the impounded water.

Recent years have brought about some remarkable changes in our society. We have developed a rather impressive interstate highway system over 41,000 miles in length that links 43 state capitals. The highway system serves 90 percent of all cities with populations greater than 50,000 in addition to about one-half of the rural population. The interstate highway system represents only one percent of the total American road mileage.

The nation has experienced massive population and demographic changes. Urban sprawl has spilled out to and around Corps lakes. Many of those projects that were built in rural settings are now urbanized. The migration of Americans from the frostbelt of the north to the sunbelt of the south has resulted in more than a redistribution of human beings. Many of these migrants have settled near Corps projects and the value systems, needs, demands and preferences they bring with them require adjustments to the thinking and management strategies of Resource Managers.

Americans, as a population, are growing older. A recent study by Rand-McNally Corp. Identified the most popular retirement locations in the nation. The top five retirement communities are located at Corps water resources projects (Table 1). User preferences can be expected to change with changes in the average age of the user.

Technological advances in the work place, increased mobility and sophistication in virtually every facet of our society have brought about more leisure time for the average American. Although recent data indicate that the trend is reversing again and Americans are working a little more, average work hours are still lower than those of three or four decades ago. Sophisticated communications technology now enable us to conduct business while on vacation or enjoying recreational activities. Combination business-pleasure trips are commonplace.

These are a few of the dynamics of our society that have resulted in increased recreation use and corollary demands at Corps of Engineers facilities. Concurrent increases in demands for other outputs of water projects for public purposes including flood control, power production, navigation and water supply have further strained the available resources. While demands for outdoor recreation have increased significantly over the past several years (Fig. 1) the natural resources base has remained fairly constant. Corps lakes comprise 1.2 percent of the federal land available for public recreation, but they are host to over 29 percent of the recreation that occurs on federal lands (Table 2).

Growing, intensive use of finite resources demands planning and application of management strategies that are developed on a solid basis if the quality of the resources is maintained for sustained use by this and future generations. Results of research conducted at the Waterways Experiment Station are being used to manage smarter in the face of growing complex and challenging issues. Some of these research topics are discussed below.

Economic Impacts of Recreation Management

We intuitively know that development and management of parks has a profound impact on the economic structure of communities and regions where they are located. However, due to the vast and varied markets recreation programs serve it has always been difficult to accurately assess the economic impacts. When I speak of economic impacts I refer to the dollars imported into a local or regional area as a result of the recreation activity located there.

We have work underway to determine the conomic impacts that result from management of irks at Corps of Engineers lakes. The work is ing coordinated with the National Park Ser- ce, the US Forest Service, Tennessee Valley ithority and several state park agencies. ploying the Public Area Recreation Visitor rvey (PARVS) techniques surveys have been nducted at five Corps lakes (Fig. 2).

We have determined that the average visi- r to a Corps lake spends $1.96 per hour. We ve been able to break this expenditure rate wn by major activity group and by types of penditures. Our surveys have been limited to e southeastern United States and we are not a position to describe any regional differ- ces in expenditure rates at this point in our udies. Data collection and analysis thus far ve been limited to expendable goods. Durable ods such as boats and camping equipment have t yet been addressed in our research.

Work still remains to broaden our surveys that we may regionalize visitor expenditures get a truer picture of the economic impacts sociated with Corps parks. Application of e results of this research in decisions about e cost effectiveness of managing certain irks, negotiations with potential non-federal stsharing partners and justification for cer- in management strategies are apparent.

sitor Use Estimation Procedures

Techniques have been developed to accu- tely estimate the volume of recreation use d describe the activities in which our visi- rs engage. Most Corps recreation managers ve been trained in the use of these proce- res and we are approaching a level of con- stency in use estimation that is yielding creasing accuracy in our figures.

Use estimation procedures have been taught National Recreation and Park Association nferences and the techniques have been opted by local and state park agencies.

It is imperative that accurate use data be ailable. These data provide the foundation r a wide variety of important decisions and put into additional methods such as deter- nation of economic impacts.

spersed Recreation Use Estimation

While we are becoming increasingly com- rtable with application of our use estimation ocedures to determine how many visitors use veloped parks, we recognize that much recrea- on use occurs on project lands outside the rk boundaries. Work is underway to develop chniques to accurately estimate the volume of at use and the activities engaged in.

Completion of this work in a couple of ars will arm the manager with an additional tool for use in making important management decisions.

Automated User Permit System

The Corps currently manages 614 campgrounds at 182 of our lakes where we charge a use fee. Our fee collections exceed thirteen million dollars annually. Numbered, accountable permit forms have been used historically to record the necessary information and provide the camper with a permit and fee receipt. These hard copy permits were also the source of trend data that are annually collected and analyzed at the Waterways Experiment Station.

Researchers at the Experiment Station are in the final stages of development of an automated fee collection system. We call it the Automated User Permit System or AUPS. AUPS is a menu driven software system totaling more than 530,000 bytes of source code, comprised of over forty individual program modules, accessing eight databases and managing numerous index files compartmentalized under two separate major components on two separate disks.

We are entering our final season of field testing the automated system at twenty-nine fee campgrounds throughout the country. The purpose of this important phase of the research effort is to insure that all the bugs are worked out of the system and we can recommend a tested product to our headquarters for Corps-wide implementation.

Initial estimates are that implementation of AUPS will result in annual cost savings of approximately one million dollars and time savings of about two and one-half months per year. The new system will accommodate a reservation system, the use of credit cards, and analysis of trend data at the project.

Geographic Information Systems

One of the biggest boons to effective land use planning and management in recent years is the development of geographic information systems (GIS). We are using GIS as a tool in development of master plans, operational management plans and cultural resources management plans. Our objective is to develop the technology needed to automate the preparation and use of these management tools. GIS is an important part of that effort.

Visual Impact Assessment

A technique has been developed at the Waterways Experiment Station to quantify visual quality. Trackable numerical values are assigned to attributes of a landscape. By use of visual simulations, the proposed development is superimposed upon the landscape to present the development as it would appear when completed. Another assignment of values is then

made and comparisons yield the impacts associated with the proposed development.

This technique has been used successfully in a variety of projects ranging from dune stabilization on the Atlantic coast to selection of disposal sites for dredged material on the Mississippi River to proposed bridge construction across a large lake in Louisiana.

The technique fills a technological gap in implementation of the National Environmental Policy Act. NEPA requires assessment of aesthetic impacts resulting form significant federal actions, but, until this technology was developed, methods were not available to accurately satisfy that legal requirement.

Wildlife Management Manual

The Wildlife Management Manual is being developed to serve as a tool for biologists across the nation. Over sixty chapters have been completed to date. They provide life histories, life requisites and management techniques for particular game and non-game species. Important food and cover species of vegetation and particular wildlife management prescriptions are featured so that a biologist may have a handy source of wildlife management information at his or her disposal.

The manual has been quite successful. Several universities are now using it as text for wildlife management courses, several state agencies are using it on a regular basis and many favorable comments have been received on its utility. The Environmental Laboratory at the Waterways Experiment Station was awarded the environmental design award in 1988 by the Chief of Engineers for production of the Wildlife Management Manual.

Summary

This has been a quick look at some of the recent results of some research conducted by the Waterways Experiment Station. Over the past several years demands have been increasing steadily and resources to satisfy those demands have not been commensurate. Natural resource managers have responded by working harder. Our goal is to provide tools for our natural resource planners and managers so that they may work smarter in the face of increasing demands for limited resources.

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TABLE 1

RETIREMENT PLACE	NEARBY CORPS PROJECT
MURRAY-KENTUCKY LAKE, KY	LAKE BARKLEY
CLAYTON - CLARKESVILLE, GA	LAKE HARTWELL
HOT SPRINGS - LAKE OUACHITA, AR	LAKE OUACHITA, DEGRAY LAKE, NIMROD LAKE
GRAND LAKE - LAKE TENKILLER, OK	TENKILLER FERRY LAKE, FT. GIBSON LAKE, LAKE EUFAULA, WEBBER'S FALLS LAKE
FAYETTEVILLE, AR	BEAVER LAKE

SOURCE: BOYER, RICHARD, SAVAGEAU, DAVID 1987. RETIREMENT PLACES RATED. RAND McNALLY, CHICAGO/NEW YORK/SAN FRANCISCO.

TABLE 2

AGENCY	VISITATION (IN PERCENT)	FEDERAL LANDS (IN PERCENT)
FS	38.34	26.9
CE	29.16	1.2
NPS	18.45	10.7
BLM	6.93	47.6
BR	5.11	0.6
TVA	1.05	0.14
FWS	0.96	12.8

FIGURE 1

SUMMARY OF REPORTED USE OF CORPS OF ENGINEERS
MULTIPURPOSE LAKES - MILLIONS OF RECREATION DAYS
1957 - 1986

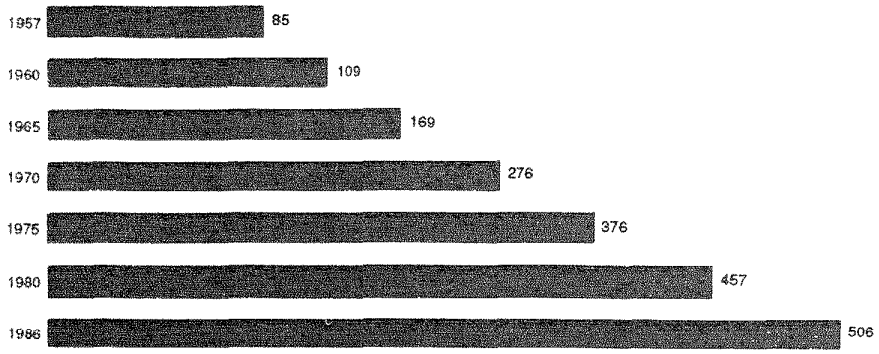
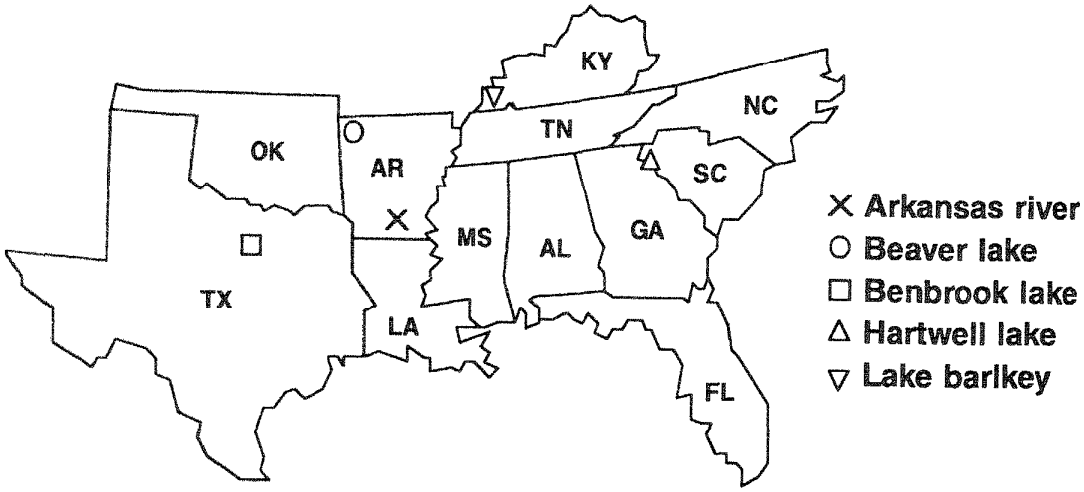


FIGURE 2



Outdoor Recreation Trends in the Northeastern United States: 1979-1989

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Abstract. Outdoor recreation participation trends in the northeastern United States were examined from 1979 through 1987 using secondary syndicated market research data from Simmons Market Research Bureau. Selected recreational activities reviewed included water-based, resource-based and winter-based activities. Trend patterns were noted in outdoor recreation activities by participation rates, market size, participation volume, and demographic characteristics.

Keywords: outdoor recreation, participation rates, market size, trends, participation volume size, market change.

Introduction

The Northeast, and New England in particular, have long been recognized as providing a wide variety of outdoor recreation opportunities. Research has indicated that a number of outdoor recreation pursuits have increased in popularity over the decades of the 70s and 80s (National Outdoor Recreation Survey, 1983; Clawson, 1985; PCAO, 1986; O'Leary, et.al., 1988; Hartmann, et.al., 1988; and Kelly, 1988). While these studies have indicated increases in a number of recreation activities, others have revealed a general decline in the amount of leisure time for many Americans (Richard, 1988; Manuel, 1988; and Harris Poll cited in Boston Globe, 1985). Other studies have revealed declines in participation rates in selected recreation activities in the United States (Robinson, 1987 and Warnick and Howard, 1985). During the past thirty years, there have been several attempts to monitor outdoor recreation trends. However, much of this research has been conducted sporadically and has not been monitored on a yearly basis. Meanwhile, interest in outdoor recreation activities have prompted growth in rural communities, fostered tourism throughout various regions, and spurred private investment in commercial recreation establishments and product-related manufacturing and retail outlets. Americans are even making quality of life decisions based on the abundance of outdoor recreation opportunities within or near their residences. The need for reliable outdoor recreation trend data is imperative from both policy and planning perspectives. However, the real issue surrounding the monitoring of outdoor recreation trends is that it is difficult to measure such trends because annual data are not consistently collected and reported. With the rapid changes in many activities and participant interests, there is indeed a need for a yearly national outdoor recreation trend data base.

This study serves to examine the market for outdoor recreational activities in the Northeast for the years 1979 through 1989 where data exist. Hopefully through this review of market trends on an annual basis during the past decade we should be able to plan for decade leading us to the year 2000 in both the Northeast and the entire United States.

Data, when examined over a nine-year period of 1979 through 1987, provide the opportunity to monitor longitudinal outdoor recreation trends. These data also help address a number of important marketing questions. For example:

1. How many participants are there?
2. Are the markets for outdoor recreation activities actually growing in size?
3. Who really are the participants in terms of their demographic profiles or characteristics?
4. How frequently and extensively do participants participate in selected activities?
5. To what extent has the public's total demand for outdoor recreational activities grown?
6. What market trends are visible and what might one expect in the future?

These questions among others serve as the focus for this study.

Purpose of Study

The purposes of this research paper were four-fold: 1) to examine outdoor recreation activity trends from 1979 through 1987 in three groupings of: a) resource-based activities, b) water-based activities, and c) winter-based activities; 2) to examine these trends specific to the northeastern United States in regard to market sizes; 3) to examine national changes in market sizes within selected outdoor recreation activities based on demographic characteristics of participants; and 4) to examine national changes in participation volume within selected outdoor recreation activities.

Methods

To analyze the trends, data were compiled from the annual surveys presented in the Study of Media and Markets[1] (Simmons Market Research Bureau, Inc., 1979 through 1987). This research firm annually measures respondents' participation rates, demographic characteristics, and media use for a wide variety of leisure, sport and outdoor recreation activities. Data were obtained from household interviews collected on a national stratified random probability sample for each year from 1979 through 1987. (Please note that data for 1981 were not available for this report.) The data collection process included self-administered questionnaires and telephone interviews. The sample sizes ranged from approximately 15,000 individuals to as high as 20,000 adults. Results were then projected to the adult population, age 18 years and over, living in the coterminus 48 states of the United States. Respondents were asked to indicate "the recreational activities each played or participated in, during the previous 12 months."

[1] Permission to use Simmons Market Research Data was made possible through Kay Wall, President; Syndicated Studies Division; Simmons Market Research Bureau; New York, New York.

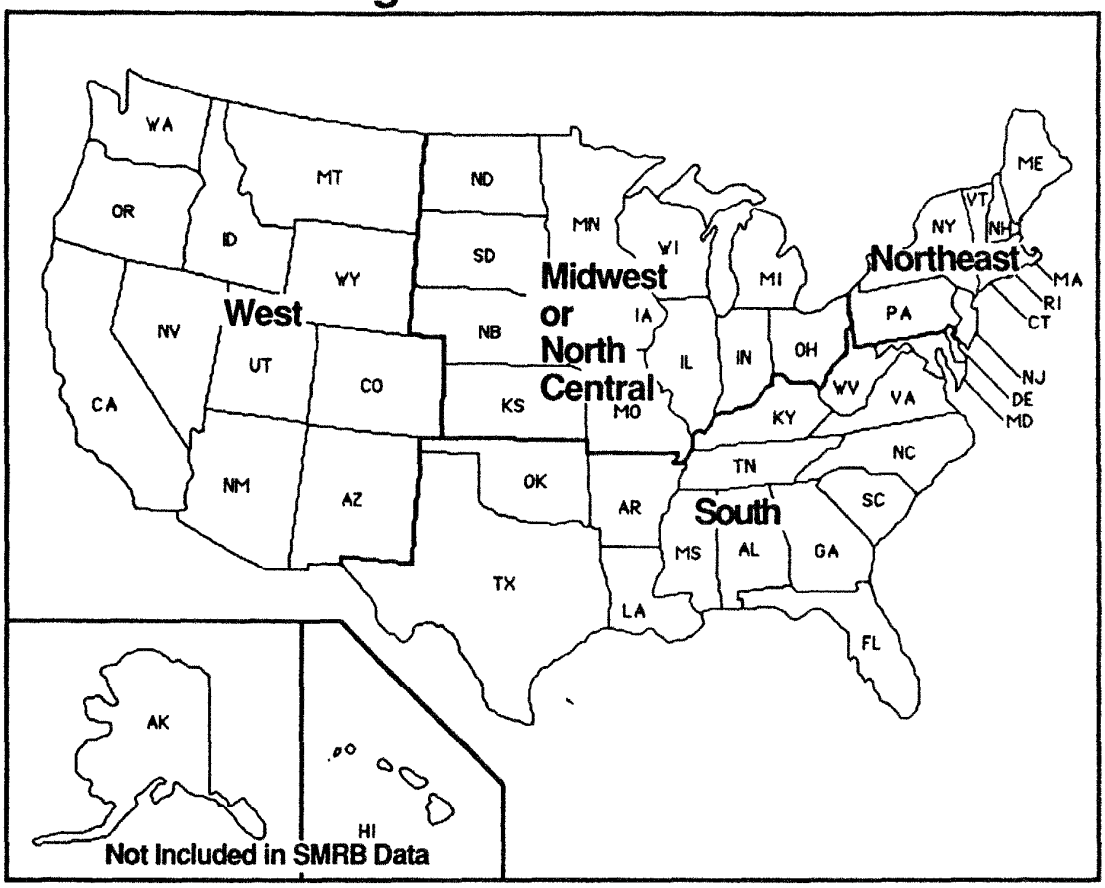


Figure 1. U.S. market regions.

Simmons Market Research Bureau (Technical Manual, 1987) breaks the United States into four regions. The Northeast is defined as an area which includes the states of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey and Pennsylvania. The other regions within the United States are the South, the Midwest or North Central and the West. Alaska and Hawaii are not included within the regional configuration. The regions are displayed in Figure 1.

The three groupings of outdoor recreation activities examined here included resource-based, water-based and winter-based activities. Resource-based activities included backpacking, overnight camping, golf, hiking and hunting. Backpacking and hiking were treated as the same activity for 1979 and 1980, but were split into two separate activities beginning in 1982. Golf, which is often thought of as a sport, was treated as a resource-based activity due to the amount of land utilized for the activity. Golf courses also preserve a considerable amount of open space within many communities. Water-based activities included swimming, sailing, power boating and water skiing. Winter-based activities included downhill skiing, cross-country skiing, snowmobiling and ice skating. Demographic characteristics of one activity from each grouping were examined by age, sex, educational status and income. The resource-based activity examined was overnight camping, the water-based activity was power boating, and the winter-based activity was downhill skiing. Golf was also reported due its increasing popularity among all market segments.

Participation rate is defined as the percent of the total U.S. adult population who participate in the selected outdoor recreation activity. Market size is a weighted estimate of the total number of participants engaged in the activity on a yearly basis. Market volume or participation volume is derived from multiplying the market size of each participation level category (defined as participation days, categorized by 1-4 days, 5-9 days, 10-14 days, 15-19 days, etc., through 60+ days) by the median number of days for each category. Participation volume is presented in three segments: light (1-4 participation days); moderate (5-19

participation days); and heavy (20 or more participation days). The total number of days the activity is played is presented for each of these volume categories as well as the total number of participants in each category. Market size and market volume changes are presented for three periods: 1979 through 1983, 1983 through 1987, and 1979 through 1987.

Selected Results

National participation rates. Participation patterns by activity participation rate for the U.S. over the nine year period revealed some dramatic changes in the resource-based and winter-based activities. However, the participation rates for the water-based activities remained relatively stable (See Figure 2).

Resource-based activities: Participation in golf grew steadily. The participation rate in 1982 was approximately eight percent and by 1987 it had increased to 11 percent. Overnight camping, which peaked in the 70s, continued to decline through the early 80s until 1983 when rates rose slightly until 1986. Participation rates for hunting dropped slightly from 1979 through 1985. In 1986, an increase in participation was noted; however, the rate dropped in 1987 to previous levels. Backpacking and hiking were relatively stable with slight declines toward the end of nine-year period.

Water-based activities: Participation rates for three of the activities remained relatively stable. These activities were sailing, power boating and water skiing. Swimming participation rates fluctuated through 1985; however, since 1985 participation rates have dropped nearly three percent and national participation rates dropped below 30 percent by 1987.

Winter-based activities: The most dramatic finding was the sustained drop in participation rates for ice skating. The rates dropped steadily from 1980 through 1987 with the exception of 1984 when an increase in the participation rate was noted. Participation rates for downhill skiing grew slightly from 1980 through 1985, then began to decline. Rates for cross-country skiing increased from 1982 through 1987. Snowmobiling participation rates fluctuated during this period, but were in a steady decline from 1985 through 1987.

Participation rates alone do not indicate the total story of market changes by activity. Next , the changes in market size (number of actual participants) by region are examined.

Market size change in the Northeast. Participation does vary by region of the country. The market size in terms of numbers or participants is important for making market decisions. In some cases, recreational participation rates may be declining slightly, but the overall market size by number of participants may actually be increasing. This is partly due to population growth and demographic changes over time. Therefore, careful review of market size data is essential in monitoring outdoor recreation trends. While statistics are not presented here, one may want to examine further the population and demographic changes within one's own region to appreciate these impacts. In this section changes in market size for each recreation activity group are presented relative to three time periods (1979 through 1983, 1983 through 1987, and 1979 through 1987). For additional insights one should compare the rates of changes by region with overall U.S. changes. See Table 1 through Table 3 for market sizes and changes by U.S. region.

Resource-based activities: The most dramatic market size change in the Northeast has been for golf. The market size of golf players has grown by 27 percent from 1979 through 1987 in the Northeast. However, the growth in golf has not been as dramatic in the Northeast as it has in the other U.S. regions. There is some indication that backpacking and hiking are are growing in market size.

Water-based activities: Market sizes for all water-based activities in the Northeast have declined for the periods of 1979 through 1983 and 1979 through 1987. In all regions but the Northeast, the market size for sailing increased from 1983 through 1987. There was nearly a 29 percent decline in the number of sailors in the Northeast during this period. A similar pattern was also found for swimming. Two of the other regions experienced growth in market size for swimming and the South had a slight decline of two percent. Meanwhile, the Northeast had a 17 percent drop in the number of swimmers during the same period.

Winter-based activities: The Northeast has experienced a growth in market size for snowmobiling and cross-country skiing. Over the period from 1979 through 1987, the market size for snowmobiling has increased 26 percent and for cross-country skiing nearly nine percent. The market size for downhill skiing has declined 27 percent in the Northeast from 1979 through 1987. This region was also the only region to experience a decline in market size from 1983 through 1987 for downhill skiing. The decline was 39 percent while the market size in all other regions increased by over 30 percent. The decline in ice skating has been a national trend, but the market size has actually declined over 50 percent in the Northeast.

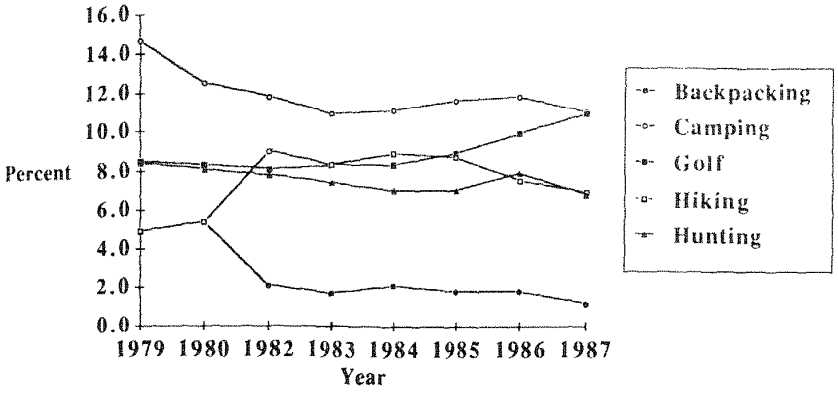
Regional statistics do reveal variations across the country; however, over time participation also varies by demographic characteristics. Next, the national demographic changes, which affect outdoor recreation participation, are presented for selected recreation activities.

Demographic characteristics of participants for selected activities. For this section, four outdoor recreation activities were examined: golf, power boating, downhill skiing and overnight camping. Each of the demographic characteristics (age, sex, educational status and income level) was measured by market size (number of participants within the category). (Please note these statistics are national and not by region.) See Table 4 through Table 7 for market sizes by demographic characteristics and percentage changes.

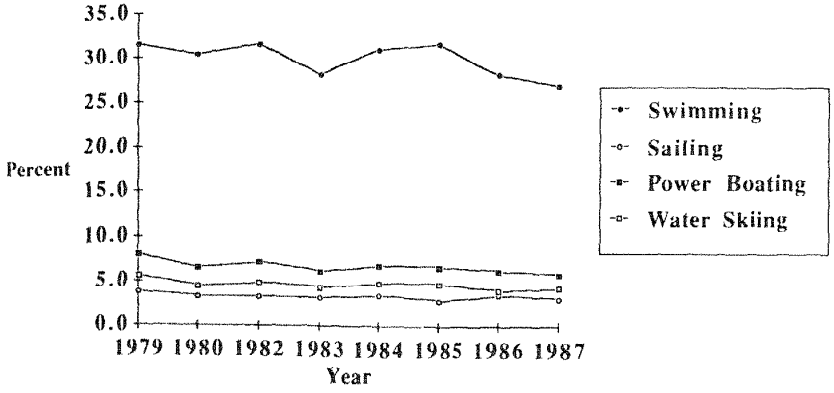
More people of nearly all ages and backgrounds are playing golf. Golf, an activity primarily for older adults, is being played by an increasing number of younger adults under the age of 44. Substantial growth in market size among women was also noted. The female adult golf market size has increased by 62 percent from 1979 through 1987. More college-educated individuals are also playing golf.

For downhill skiing, the age segment with the biggest increase was the 35-44 year old segment. The number of skiers in this age segment has grown by 102 percent from 1979 through 1987. The market of downhill skiers with

Participation Rates of Resource-Based Activities



Participation Rates of Water-Based Activities



Participation Rates of Winter-Based Activities

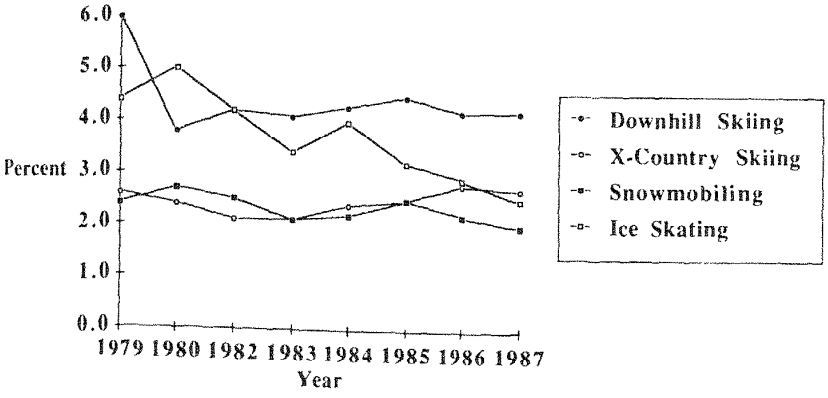


Table 1. Market Size of Resource-Based Activities by US Region (In Thousands)

Activity	Year								Market Size Change (%)		
Region	Market Size (Number of Participants)								'79-'83	'83-'87	'79-'87
Camping	**1979**	**1980**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**Change**	**Change**	**Change**
Northeast	3,656	3,204	3,105	3,315	3,427	3,057	3,365	2,846	-9.3%	-14.1%	-22.2%
Midwest	6,087	4,847	5,981	4,871	5,014	5,500	6,099	6,106	-20.0%	25.4%	0.3%
South	5,171	5,050	4,209	4,320	4,549	4,529	4,620	4,432	-16.5%	2.6%	-14.3%
West	8,049	6,719	5,722	5,413	5,564	6,537	6,084	5,663	-32.7%	4.6%	-29.6%
US Total	22,963	19,820	19,017	17,919	18,554	19,623	20,168	19,047	-22.0%	6.3%	-17.1%
Backpacking	**1979***	**1980***	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**'79-'83 Change**	**'83-'87 Change**	**'79-'87 Change**
Northeast	1,253	1,887	654	579	867	570	577	341	NA	-10.0%	NA
Midwest	1,336	1,805	611	559	578	441	473	379	NA	-32.2%	NA
South	1,469	1,424	695	550	1,075	512	757	638	NA	16.0%	NA
West	3,540	3,393	1,395	1,365	1,019	1,541	1,208	789	NA	-42.2%	NA
US Total	7,598	8,509	3,355	2,853	3,539	3,064	3,015	2,147	NA	-24.7%	NA
*Backpacking and hiking reported as same activity for this year, changes would be misleading.											
Hiking	**1979***	**1980***	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**'79-'83 Change**	**'83-'87 Change**	**'79-'87 Change**
Northeast	1,253	1,887	2,682	2,822	3,086	3,132	2,916	1,797	NA	-36.3%	NA
Midwest	1,336	1,805	4,236	3,417	4,038	3,815	3,496	4,040	NA	18.2%	NA
South	1,469	1,424	2,788	3,151	3,327	3,048	2,710	2,533	NA	-19.6%	NA
West	3,540	3,393	4,895	4,323	4,534	4,802	3,738	3,655	NA	-15.5%	NA
US Total	7,598	8,509	14,601	13,713	14,985	14,797	12,860	12,025	NA	-12.3%	NA
*Backpacking and hiking reported as same activity for this year, changes would be misleading.											
Hunting	**1979**	**1980**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**'79-'83 Change**	**'83-'87 Change**	**'79-'87 Change**
Northeast	2,149	2,354	2,001	2,441	1,888	2,019	1,798	1,733	13.6%	-29.0%	-19.4%
Midwest	3,705	3,624	4,512	3,395	3,798	3,588	4,632	4,289	-8.4%	26.3%	15.8%
South	4,626	3,972	3,742	4,402	4,017	4,165	4,776	4,145	-4.8%	-5.8%	-10.4%
West	2,636	2,912	2,338	1,997	2,000	2,102	2,252	1,699	-24.2%	-14.9%	-35.5%
US Total	13,116	12,862	12,593	12,235	11,703	11,874	13,458	11,866	-6.7%	-3.0%	-9.5%
Golf	**1979**	**1980**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**'79-'83 Change**	**'83-'87 Change**	**'79-'87 Change**
Northeast	2,645	2,439	2,665	3,261	3,264	3,046	NA	3,360	23.3%	3.0%	27.0%
Midwest	4,412	4,799	4,655	4,660	5,084	5,348	NA	6,611	5.6%	41.9%	49.8%
South	3,613	2,941	3,012	2,999	3,407	3,304	NA	4,830	-17.0%	61.1%	33.7%
West	2,639	2,916	2,687	2,813	3,132	3,402	NA	4,102	6.6%	45.8%	55.4%
US Total	13,309	13,095	13,019	13,733	14,888	15,110	NA	18,903	3.2%	37.6%	42.0%

high incomes ($35,000 per year plus) has continued to grow since 1982.

There appear to be two different growth markets for power boating: older adults (age 55 and above) and college educated adults. The market of adult power boaters with high incomes ($35,000 per year plus) has increased in size since 1982.

Although the participation in overnight camping has declined in recent years, there are some growth markets. While not the dominant market segment in overnight camping, the older adult market (age 55 and above) grew substantially from 1983 through 1987. The market of overnight campers with incomes of $30,000 to $60,000 has continued to grow since 1984.

Finally, the changes in volume generated by three user segments for each of these four activities are presented.

Participation volume for selected recreation activities. Each of these selected outdoor recreation activities was examined by the number of participants within each use segment and the number of activity days generated within each of the three segments -- light (1-4 days); moderate (5-19 days) and heavy (20 or more days). See Table 8 for information on number of participants and participation volume.

Golf is now an activity played by a wider variety of individuals as described earlier. While the amount of golf played was increasing in all use segments, the percentage change in number of golfers and the number of golf days played was the highest among the light and moderate segments for the nine year period of 1979 through 1987. Overall, the number of golfing days is up by 24 percent and the number of golfers is up 42 percent.

Overall participation in downhill skiing in terms of the number of skier days has declined by approximately four percent from 1979 through 1987. Nevertheless, over the period of 1979 through 1987, there was a 22 percent increase in the number of days skied and a 26 percent increase in the number of skiers within the heavy use segment. This growth has seem to slow in the most recent years of 1983 through 1987. There has been a relatively recent increase of 10-12 percent in the number of skiers days and the number of skiers among the light and moderate use groups during this same period (1983 through 1987).

Over the long term period examined here (1979 through 1987), the use levels in power boating appear to be declining. However, when the more recent period is examined from 1983 through 1987, there appears to be growth in both the number of boaters and the number of boating days generated for the moderate and heavy use groups. The growth in power boating is most noticeable in the moderate use group. The size of this segment has

Table 2. Market Size of Water-Based Activities by US Region (In Thousands)

Activity / Region	Year — Market Size (Number of Participants)								Market Size Change (%)		
Swimming	**1979**	**1980**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**'79-'83 Change**	**'83-'87 Change**	**'79-'87 Change**
Northeast	12,129	12,070	11,870	12,150	12,985	12,870	11,668	10,039	0.2%	-17.4%	-17.2%
Midwest	12,554	11,589	14,066	11,704	14,308	14,348	12,910	13,628	-6.8%	16.4%	8.6%
South	13,190	13,454	14,867	13,166	14,022	14,866	14,428	12,947	-0.2%	-1.7%	-1.8%
West	11,217	11,068	10,249	9,392	10,923	11,583	9,118	9,979	-16.3%	6.3%	-11.0%
US Total	49,090	48,181	51,052	46,412	52,238	53,667	48,124	46,593	-5.5%	0.4%	-5.1%
Sailing	**1979**	**1980**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**'79-'83 Change**	**'83-'87 Change**	**'79-'87 Change**
Northeast	1,348	1,523	1,419	1,646	1,530	1,508	1,513	1,175	22.1%	-28.6%	-12.8%
Midwest	1,470	1,240	1,279	1,053	1,139	965	1,460	1,259	-28.4%	19.6%	-14.4%
South	1,368	1,056	1,325	1,264	1,525	1,054	1,897	1,596	-7.6%	26.3%	16.7%
West	1,676	1,426	1,282	1,256	1,748	1,388	1,158	1,310	-25.1%	4.3%	-21.8%
US Total	5,862	5,245	5,305	5,219	5,942	4,915	6,028	5,340	-11.0%	2.3%	-8.9%
Water Skiing	**1979**	**1980**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**'79-'83 Change**	**'83-'87 Change**	**'79-'87 Change**
Northeast	1,299	972	1,044	1,149	1,193	1,141	1,045	830	-11.5%	-27.8%	-36.1%
Midwest	2,243	2,262	2,611	2,064	2,549	2,239	2,007	2,696	-8.0%	30.6%	20.2%
South	2,856	2,044	2,579	2,421	2,252	2,436	1,992	2,162	-15.2%	-10.7%	-24.3%
West	2,331	1,891	1,717	1,542	2,239	2,249	2,024	1,972	-33.8%	27.9%	-15.4%
US Total	8,729	7,169	7,951	7,176	8,233	8,065	7,068	7,660	-17.8%	6.7%	-12.2%
Power Boating	**1979**	**1980**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**'79-'83 Change**	**'83-'87 Change**	**'79-'87 Change**
Northeast	2,401	1,818	1,992	1,843	2,305	2,097	2,043	1,496	-23.2%	-18.8%	-37.7%
Midwest	3,847	3,497	4,374	3,174	3,405	3,765	3,517	3,878	-17.5%	22.2%	0.8%
South	4,002	2,871	3,067	2,965	3,404	3,115	2,993	2,881	-25.9%	-2.8%	-28.0%
West	2,341	2,336	2,217	2,196	2,425	2,420	2,169	1,955	-6.2%	-11.0%	-16.5%
US Total	12,591	10,522	11,650	10,178	11,539	11,397	10,722	10,210	-19.2%	0.3%	-18.9%

Table 3. Market Size of Winter-Based Activities by US Region (In Thousands)

Activity / Region	Year — Market Size (Number of Participants)								Market Size Change (%)		
Snowmobiling	**1979**	**1980**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**'79-'83 Change**	**'83-'87 Change**	**'79-'87 Change**
Northeast	761	1,047	917	902	1,149	1,080	687	958	18.5%	6.2%	25.9%
Midwest	2,614	2,015	2,439	1,861	1,917	2,344	1,934	1,574	-28.8%	-15.4%	-39.8%
South	132	324	220	176	250	353	358	349	33.3%	98.3%	164.4%
West	267	880	498	482	415	394	705	563	80.5%	16.8%	110.9%
Totals	3,774	4,266	4,074	3,421	3,731	4,171	3,684	3,444	-9.4%	0.7%	-8.7%
X-Country Ski	**1979**	**1980**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**'79-'83 Change**	**'83-'87 Change**	**'79-'87 Change**
Northeast	982	924	957	1,076	1,387	1,188	1,034	1,065	9.6%	-1.0%	8.5%
Midwest	1,565	1,538	1,578	1,348	1,557	1,604	1,968	2,196	-13.9%	62.9%	40.3%
South	233	393	187	148	178	387	468	523	-36.5%	253.4%	124.5%
West	1,304	1,002	730	910	910	1,078	1,321	989	-30.2%	8.7%	-24.2%
Totals	4,084	3,857	3,452	3,482	4,032	4,257	4,791	4,773	-14.7%	37.1%	16.9%
Downhill Ski	**1979**	**1980**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**'79-'83 Change**	**'83-'87 Change**	**'79-'87 Change**
Northeast	1,986	1,427	1,622	2,396	1,685	1,808	1,874	1,459	20.6%	-39.1%	-26.5%
Midwest	1,420	1,358	2,009	1,333	1,550	1,778	1,382	1,743	-6.1%	30.8%	22.7%
South	1,187	952	996	874	951	1,013	1,049	1,195	-26.4%	36.7%	0.7%
West	3,254	2,207	2,108	2,208	3,051	3,040	2,876	2,885	-32.1%	30.7%	-11.3%
Totals	7,847	5,944	6,735	6,811	7,237	7,639	7,181	7,282	-13.2%	6.9%	-7.2%
Ice Skating	**1979**	**1980**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**'79-'83 Change**	**'83-'87 Change**	**'79-'87 Change**
Northeast	2,739	3,292	2,379	2,078	2,398	2,056	1,594	1,279	-24.1%	-38.5%	-53.3%
Midwest	1,893	2,233	2,140	1,928	2,075	1,702	1,677	1,471	1.8%	-23.7%	-22.3%
South	1,051	1,152	1,401	756	1,056	989	1,047	733	-28.1%	-3.0%	-30.3%
West	1,141	1,312	931	778	1,121	690	717	790	-31.8%	1.5%	-30.8%
Totals	6,824	7,989	6,851	5,540	6,650	5,437	5,035	4,273	-18.8%	-22.9%	-37.4%

Table 4. Demographic Profiles for Overnight Camping
(Market Size by Demographic Descriptor, '000)

	Year								(Market Size Changes %)		
	Number of Participants								Change	Change	Change
	1979	1980	1982	1983	1984	1985	1986	1987	'79-'83	'83-'87	'79-'87
Age:											
18-24	5,717	4,664	4,918	4,411	4,290	4,136	4,079	3,358	-22.8%	-23.9%	-41.3%
25-34	7,377	6,462	6,649	6,130	6,155	6,421	7,024	6,608	-16.9%	7.8%	-10.4%
35-44	4,642	3,931	3,560	3,683	3,712	4,599	4,633	4,179	-20.7%	13.5%	-10.0%
45-54	2,886	2,630	2,153	1,992	2,176	2,119	2,118	2,192	-31.0%	10.0%	-24.0%
55-64	1,445	1,372	1,146	1,202	1,432	1,607	1,643	1,605	-16.8%	33.5%	11.1%
65 & Over	895	762	589	501	789	742	671	1,104	-44.0%	120.4%	23.4%
Sex:											
Male	12,548	10,399	9,705	9,071	9,644	9,764	10,383	9,690	-27.7%	6.8%	-22.8%
Female	10,414	9,421	9,311	8,848	8,910	9,859	9,785	9,356	-15.0%	5.7%	-10.2%
Education:											
Grad. College	4,289	3,609	3,720	3,665	3,918	3,957	4,608	4,288	-14.5%	17.0%	0.0%
Attend. College	5,178	4,364	4,096	3,731	4,579	4,402	5,199	4,302	-27.9%	15.3%	-16.9%
Grad. H.S.	9,176	8,898	8,068	7,902	7,259	8,494	7,884	7,531	-13.9%	-4.7%	-17.9%
No Grad H.S.	4,319	2,949	3,133	2,621	2,798	2,771	2,477	2,926	-39.3%	11.6%	-32.3%
Income:											
$60,000 plus	NA	NA	NA	NA	NA	NA	2,195	2,100	NA	NA	NA
$50,000 plus	NA	NA	NA	NA	2,520	2,710	3,618	3,687	NA	NA	NA
$40,000 plus	NA	NA	NA	NA	4,604	5,574	6,501	6,435	NA	NA	NA
$30,000 plus	NA	NA	NA	NA	8,272	9,518	10,684	10,653	NA	NA	NA
$30,000-39,000	NA	NA	NA	NA	NA	NA	4,184	4,218	NA	NA	NA
$20,000-29,000	NA	NA	NA	NA	NA	NA	4,897	4,101	NA	NA	NA
$25,000 plus	7,331	8,103	9,089	9,762	10,703	11,696	NA	NA	33.2%	NA	NA
$20-24,999	3,931	3,683	3,031	2,220	2,324	2,522	NA	NA	-43.5%	NA	NA
$15-19,999	4,834	3,248	2,407	1,985	1,989	2,001	NA	NA	-58.9%	NA	NA
$10-19,999	9,426	6,166	4,805	4,396	4,008	4,003	3,449	3,054	-53.4%	-30.5%	NA
$10,000 under	1,546	1,410	2,081	1,541	1,520	1,403	1,138	1,238	-0.3%	-19.7%	-19.9%

Table 5. Demographic Profiles for Downhill Skiing
(Market Size by Demographic Descriptor, '000)

	Year								(Market Size Changes %)		
	Number of Participants								Change	Change	Change
	1979	1980	1982	1983	1984	1985	1986	1987	'79-'83	'83-'87	'79-'87
Age:											
18-24	3,463	2,084	2,762	2,518	2,319	1,935	2,427	2,153	-27.3%	-14.5%	-37.8%
25-34	2,536	1,901	2,023	2,271	2,458	2,860	2,248	2,513	-10.4%	10.7%	-0.9%
35-44	763	1,028	1,036	1,094	1,675	1,560	1,463	1,544	43.4%	41.1%	102.4%
45-54	649	606	391	594	409	848	583	709	-8.5%	19.4%	9.2%
55-64	295	254	426	221	271	300	380	220	-25.1%	-0.5%	-25.4%
65 & Over	142	72	97	113	105	135	81	143	-20.4%	26.5%	0.7%
Sex:											
Male	4,718	3,352	3,831	3,758	3,985	4,256	4,100	4,426	-20.3%	17.8%	-6.2%
Female	3,129	2,592	2,904	3,053	3,252	3,382	3,081	2,856	-2.4%	-6.5%	-8.7%
Education:											
Grad. College	2,494	2,144	1,900	2,522	2,564	2,758	2,423	2,610	1.1%	3.5%	4.7%
Attend. College	2,178	1,509	2,160	1,870	2,089	2,363	2,199	2,127	-14.1%	13.7%	-2.3%
Grad. H.S.	2,587	1,908	2,140	1,950	2,046	2,006	2,038	2,079	-24.6%	6.6%	-19.6%
No Grad H.S.	588	382	535	469	538	512	522	465	-20.2%	-0.9%	-20.9%
Income:											
$60,000 plus	NA	NA	NA	NA	NA	NA	1,299	1,600	NA	NA	NA
$50,000 plus	NA	NA	NA	NA	1,481	1,892	1,842	2,356	NA	NA	NA
$40,000 plus	NA	NA	2,209	2,592	NA	NA	NA	NA	NA	NA	NA
$35,000 plus	2,067	1,621	NA	NA	NA	NA	NA	NA	NA	NA	NA
$30,000 plus	NA	NA	3,677	4,002	NA	NA	NA	NA	NA	NA	NA
$25,000 plus	3,942	3,231	4,405	4,836	5,238	5,647	NA	NA	22.7%	NA	NA
$20-24,999	924	764	569	585	612	615	NA	NA	-36.7%	NA	NA
$10-19,999	2,271	1,535	1272	940	854	854	711	652	-58.6%	-30.6%	-71.3%
$10,000 under	496	251	490	451	522	522	482	339	-9.1%	-24.8%	-31.7%

Table 6. Demographic Profiles for Power Boating
(Market Size by Demographic Descriptor, '000)

	Year (Number of Participants)								(Market Size Changes %)		
	1979	1980	1982	1983	1984	1985	1986	1987	Change '79-'83	Change '83-'87	Change '79-'87
Age:											
18-24	3,845	2,779	3,027	2,009	2,320	2,473	2,254	2,317	-47.8%	15.3%	-39.7%
25-34	3,381	3,140	3,857	3,504	3,358	3,496	3,209	3,163	3.6%	-9.7%	-6.4%
35-44	2,472	1,809	2,028	1,978	2,558	2,641	2,169	2,138	-20.0%	8.1%	-13.5%
45-54	1,438	1,553	1,492	1,412	1,677	1,293	1,432	1,093	-1.8%	-22.6%	-24.0%
55-64	1,029	720	808	833	1,056	915	1,072	937	-19.0%	12.5%	-8.9%
65 & Over	427	521	440	444	570	580	587	563	4.0%	26.8%	31.9%
Sex:											
Male	8,044	5,842	6,173	5,870	6,398	6,601	5,636	5,942	-27.0%	1.2%	-26.1%
Female	4,548	4,681	5,478	4,310	5,141	4,796	5,086	4,268	-5.2%	-1.0%	-6.2%
Education:											
Grad. College	2,471	1,945	2,212	2,239	2,730	2,623	2,654	2,776	-9.4%	24.0%	12.3%
Attend. College	3,075	2,576	3,223	2,265	2,813	2,958	2,602	2,696	-26.3%	19.0%	-12.3%
Grad. H.S.	5,047	4,851	4,835	4,313	4,551	4,598	4,363	3,744	-14.5%	-13.2%	-25.8%
No Grad H.S.	1,997	1,151	1,381	1,362	1,445	1,217	1,103	995	-31.8%	-26.9%	-50.2%
Income:											
$60,000 plus	NA	NA	NA	NA	NA	NA	1,452	1,757	NA	NA	NA
$50,000 plus	NA	NA	NA	NA	1,947	2,477	2,308	2,887	NA	NA	NA
$40,000 plus	NA	NA	2,634	2,793	NA	NA	NA	NA	NA	NA	NA
$35,000 plus	2,317	2,059	NA	NA	NA	NA	NA	NA	NA	NA	NA
$30,000 plus	NA	NA	4,955	4,643	NA	NA	NA	NA	NA	NA	NA
$25,000 plus	5,161	4,485	6,607	6,124	7,452	7,996	NA	NA	18.7%	NA	NA
$20-24,999	2,205	1,889	1,359	1,183	1,182	1,067	NA	NA	-46.3%	NA	NA
$10-19,999	4,254	3,503	2,715	2,080	2,022	1,855	1,410	1,147	-51.1%	-44.9%	-73.0%
$10,000 under	723	493	969	791	910	479	482	568	9.4%	-28.2%	-21.4%

Table 7. Demographic Profiles for Golf
(Market Size by Demographic Descriptor, '000)

	Year (Number of Participants)			(Market Size Changes %)		
	1979	1983	1987	'79-'83 Change	'83-'87 Change	'79-'87 Change
Age:						
18-24	2,242	2,401	3,067	7.1%	27.7%	36.8%
25-34	3,266	3,546	5,743	8.6%	62.0%	75.8%
35-44	2,458	2,571	3,996	4.6%	55.4%	62.6%
45-54	2,362	2,279	2,410	-3.5%	5.7%	2.0%
55-64	1,965	1,705	2,028	-13.2%	18.9%	3.2%
65 & Over	1,017	1,231	1,659	21.0%	34.8%	63.1%
Sex:						
Male	9,831	9,764	13,231	-0.7%	35.5%	34.6%
Female	3,478	3,968	5,672	14.1%	42.9%	63.1%
Educational Status:						
Grad. College	3,977	4,497	5,891	13.1%	31.0%	48.1%
Attend. College	3,465	3,109	5,337	-10.3%	71.7%	54.0%
Grad. H.S.	4,342	4,709	5,985	8.5%	27.1%	37.8%
No Grad H.S.	1,525	1,418	1,691	-7.0%	19.3%	10.9%
Income:						
$60,000 plus	NA	NA	3,168	NA	NA	NA
$50,000 plus	NA	NA	4,902	NA	NA	NA
$40,000 plus	NA	4,639	1,940	NA	-58.2%	NA
$30,000 plus	NA	NA	12,086	NA	NA	NA
$30-39,999	NA	NA	4,146	NA	NA	NA
$20-29,999	5,589	3,154	3,604	-43.6%	14.3%	-35.5%
$10-19,999	3,515	2,156	2,210	-38.7%	2.5%	-37.1%
$10,000 under	660	838	1,003	27.0%	19.7%	52.0%

Table 8. Participation Volume for Recreation Activities by Market Size and Volume

Activity *Market Size*	*Number of Participants ('000)*			*Size Change (%)*		
Camping	**1979**	**1983**	**1987**	**'79-'83**	**'83-'87**	**'79-'87**
Light Participants	9,278	7,114	8,798	-23.3%	23.7%	-5.2%
Moderate Participants	10,326	8,447	7,978	-18.2%	-5.6%	-22.7%
Heavy Participants	3,360	2,328	2,272	-30.7%	-2.4%	-32.4%
Total Participants	22,964	17,889	19,048	-22.1%	6.5%	-17.1%

Market Volume	*Number of Participation Days ('000)*			*Volume Change (%)*		
Camping	**1979**	**1983**	**1987**	**'79-'83**	**'83-'87**	**'79-'87**
Light (1-4 days)	18,556	14,228	17,596	-23.3%	23.7%	-5.2%
Moderate (5 - 19 days)	104,542	84,614	79,026	-19.1%	-6.6%	-24.4%
Heavy (20 days or more)	115,824	78,366	77,833	-32.3%	-0.7%	-32.8%
Total Participation Days	238,922	177,208	174,455	-25.8%	-1.6%	-27.0%

Market Size	*Number of Participants ('000)*			*Size Change (%)*		
Downhill Skiing	**1979**	**1983**	**1987**	**'79-'83**	**'83-'87**	**'79-'87**
Light Participants	3,955	3,396	3,815	-14.1%	12.3%	-3.5%
Moderate Participants	3,459	2,654	2,924	-23.3%	10.2%	-15.5%
Heavy Participants	433	762	543	76.0%	-28.7%	25.4%
Total Participants	7,847	6,812	7,282	-13.2%	6.9%	-7.2%

Market Volume	*Number of Participation Days ('000)*			*Volume Change (%)*		
Downhill Skiing	**1979**	**1983**	**1987**	**'79-'83**	**'83-'87**	**'79-'87**
Light (1-4 days)	7,910	6,792	7,630	-14.1%	12.3%	-3.5%
Moderate (5 - 19 days)	34,868	27,348	30,188	-21.6%	10.4%	-13.4%
Heavy (20 days or more)	13,280	21,978	16,238	65.5%	-26.1%	22.3%
Total Participation Days	56,058	56,118	54,056	0.1%	-3.7%	-3.6%

Market Size	*Number of Participants ('000)*			*Size Change (%)*		
Golf	**1979**	**1983**	**1987**	**'79-'83**	**'83-'87**	**'79-'87**
Light Participants	4,560	4,874	6,696	6.9%	37.4%	46.8%
Moderate Participants	4,532	4,988	6,911	10.1%	38.6%	52.5%
Heavy Participants	4,217	3,871	5,297	-8.2%	36.8%	25.6%
Total Participants	13,309	13,733	18,904	3.2%	37.7%	42.0%

Market Volume	*Number of Participation Days ('000)*			*Volume Change (%)*		
Golf	**1979**	**1983**	**1987**	**'79-'83**	**'83-'87**	**'79-'87**
Light (1-4 days)	9,120	9,748	13,392	6.9%	37.4%	46.8%
Moderate (5 - 19 days)	48,269	54,916	72,312	13.8%	31.7%	49.8%
Heavy (20 days or more)	180,395	157,350	209,179	-12.8%	32.9%	16.0%
Total Participation Days	237,784	222,014	294,883	-6.6%	32.8%	24.0%

Market Size	*Number of Participants ('000)*			*Size Change (%)*		
Power Boating	**1979**	**1983**	**1987**	**'79-'83**	**'83-'87**	**'79-'87**
Light Participants	4,498	4,173	3,853	-7.2%	-7.7%	-14.3%
Moderate Participants	4,899	3,937	4,221	-19.6%	7.2%	-13.8%
Heavy Participants	3,196	2,069	2,137	-35.3%	3.3%	-33.1%
Total Participants	12,593	10,179	10,211	-19.2%	0.3%	-18.9%

Market Volume	*Number of Participation Days ('000)*			*Volume Change (%)*		
Power Boating	**1979**	**1983**	**1987**	**'79-'83**	**'83-'87**	**'79-'87**
Light (1-4 days)	8,996	8,346	7,706	-7.2%	-7.7%	-14.3%
Moderate (5 - 19 days)	50,813	41,759	49,477	-17.8%	18.5%	-2.6%
Heavy (20 days or more)	118,007	73,700	79,258	-37.5%	7.5%	-32.8%
Total Participation Days	177,816	123,805	136,441	-30.4%	10.2%	-23.3%

increased by approximately seven percent and the volume by nearly 19 percent from 1983 to 1987.

The biggest percentage change in camping days was within the light use segment. The number of overnight camping days by light user group has increased by 24 percent from 1983 through 1987. Camping days in all other segments have declined from 1979 through 1987.

Discussion

An examination of market outdoor recreation activity trends on a year to year basis for the period of 1979 through 1987 does reveal specific patterns and changes in the various participant markets. While not all inclusive, some discussion points are raised here.

Participation rates and regional differences. It is again evident from these data that the vast majority of American adults do not participate in many of the most common leisure activities as suggested by Robinson (1987) and Warnick and Howard (1985). While overall participation rates are low, market size in some cases is actually growing or at least remains relatively stable. On the other hand, there were striking regional differences within specific outdoor recreation activities. For example, power boating is growing in market size (number of adult boaters) more within the Midwest for the period of 1983 through 1987 than in any other region. While some would initially think that boating would be more popular in the coastal states, further evidence indicates that the largest shares of boat registrations per state are held by Michigan (highest, 746,979 registrations) and Minnesota (third highest, 673,503) (Boat Owners Association of the United States, USA Today, 1989). Therefore, regional differences within outdoor recreation activities do exist and do vary greatly.

Northeast outdoor recreation participation. The Northeast appears to vary dramatically from other parts of the United States. For example, the outdoor recreation activities which appear to be growing within this region are trail related. Cross-country skiing and snowmobiling are outdoor activities which are growing within this region. There is also some indication that hiking may be in a growth pattern again in the Northeast. Although, data for bicycling were not examine within the context of this study, it too is becoming increasingly popular within the region. Other examples of how the Northeast differs over the period of 1983 through 1987, include: 1) a decline in the market size growth of camping while all other the regions are indicating growth; 2) much slower market size growth in golfing as compared to the other regions; 3) a declining market size for sailing while all other regions are indicating growth; and 4) a declining market size for downhill skiing while all other regions are indicating growth. There appears to be some indication that the supply of facilities for some of these activities may be more problematic within the Northeast. The high cost of real estate can certainly limit the number of new golf courses that can be built and there appears to be a real shortage of boat slips and moorings within the region. Consequently, regional supply factors do need to be monitored and appear to limit and slow growth if they are not sufficient to keep up with demand.

Demographic impacts on outdoor recreation participation. Over a relatively short period of time, less than ten years, demographic changes have made substantial impacts in market sizes and market shifts within outdoor recreation activities. For example, in camping, an activity enjoyed by families in the 60s and 70s, there appears to be substantial growth in older age segments (over 55 years of age) and college educated markets. The impact of baby boomers within the activity of downhill skiing is clearly evident. The market segment with the largest growth in this activity is the 35 to 44 year old segment. For golf, the biggest growth segments are younger adults and the female markets. Agencies which carefully monitor demographic changes may be able to create unique market niches or anticipate changes more quickly over the next decade.

The golf boom. Of all the outdoor recreation activities examined over this period of time, golf is clearly the activity with the longest period of sustained growth in market size, participation rate, and participation volume. The market size has grown in nearly all demographic, use and regional variables examined here. However, it is unlikely that growth will continue at such a pace without significant changes in the supply and innovations in the game. First, the rate of building new golf courses has slowed. In 1988, approximately 200 new golf courses were built as compared to the building rate average of 500 per year between 1959 and 1971 (Shuster, 1989). The shortage of golf courses and the slower building rate may well restrict the expansion of market growth in the game. Furthermore, waiting times and crowded courses may lead to dissatisfaction among a significant number of golfers. There will also be more incidents of player conflicts between the entry level golfers, the "hackers" and the experienced golfers, the "whackers." New innovations in speeding up the game may help alleviate some of the problems. Shorter or down-sized courses, specially designed practice facilities, golf simulators and other innovations will help. However, the provision of new facilities and the careful management of player conflicts are necessary to ensure sustained growth in this activity.

Evidence of environmental problems. Swimming is one the country's most popular activities. Various studies have indicated relatively high and stable participation rates. However, there appears to be some problem within the activity as a result of this review. From 1985 through 1987, the participation rate and market size of participants have declined. This decline may be a result of the environmental problems associated with unsafe beaches, rivers and lakes. While there appears to be a link here, the demand for the construction of private swimming pools is high. One would think that "at-home" swimming would offset the decline or at least result in a more stable market condition. However, Simmons does not differentiate between swimming at public, private and/or residential facilities; so, it is difficult to arrive at a firm conclusion here. However, safety is a problem at public open water facilities and appears to have had some impact on swimming participation. The extent of the impact on declining participation rate is not yet conclusive.

Impact of special events. There appears to be some indication that special events do have real impact upon participation in some activities. For example, a special event such as the Winter Olympics appears to have had impact upon ice-skating participation. The participation rate and overall market size for ice skating has declined every year for this activity with the exception of the Winter Olympic years of 1980 and 1984. There were rate "spikes" in each of these years. Agencies should anticipate the impact of such events within their programming and marketing and should probably work to build interest prior to the event and to sustain interest in the activity after the event.

Use segment size and volume. Warnick and Howard (1985) suggested that in addition to assessing overall participation patterns within recreational activities, managers should also strive to understand the importance of carefully analyzing the distribution of existing users along a continuum from "light" to "heavy users." Managers within particular leisure service industries should seek to analyze the "mix" of light, moderate, and heavy users and the volume created by each segment. Indeed, the analyses by participant use segments has revealed some interesting findings here. For example, even though the overall participation rate of an activity may be declining, there may be a pronounced growth rate within one of the activity's participant use segments. This was evident in camping and downhill skiing. The analysis of this type of information if incorporated into a marketing information system may provide the key to maintaining and building market shares, constituencies or loyal customers, and public support or repeat business. This analysis of selected activities has indicated that use segments within an activity are distributed differently and have dissimilar growth and decline rates.

Two tier society. Although income levels and participation rates were not extensively examined within this study, the data on income levels by activity market size appear to indicate that participation in outdoor recreation activities reflects conditions within society. There is evidence that the United States is becoming a two tier society: one tier of rather wealthy individuals and another tier of relatively poor individuals and a rapidly declining middle class. Within nearly all of the activities examined here, participation rates and market sizes are increasing within the wealthier market segments and declining drastically among the lower income market segments. This may be also be a reflection on the fact that many outdoor recreation activities are now more expensive than in past decades. In the keynote address, Wilbur LaPage called for an "environmental ethic" (LaPage, 1989). This "ethic" would instill in us the desire to care and take pride in out outdoor environment. It appears that we also may need an "recreation ethic" which strives to provide increased enjoyment among all Americans and not just among those who can afford it.

Conclusion

The findings reached by analyzing these data do indicate that outdoor recreation participation patterns are clearly evident and useful when monitored on annual basis. There is also indication that by monitoring trends in this fashion changes in participation patterns may be anticipated. Even within declining markets, growth segments may be found. Those agencies which incorporate some type of yearly monitoring process into their market information systems should more readily be able to develop some marketing and planning strategies for the years ahead.

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SATISFACTION WITH FACILITIES AND SERVICES IN DELAWARE STATE PARKS, INCLUDING A COMPARISON OF SURVEY TECHNIQUES

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Satisfaction ratings for Delaware State Parks were obtained during summer, 1984, using both mailback questionnaires and personal interviews. The results indicate that satisfaction varied across parks and individual visits, and was generally higher for inland, forested parks as compared to coastal parks. Satisfaction ratings were also higher in the personal interviews as opposed to the mailback questionnaires, perhaps reflecting a reluctance of interviwees to offer negative feedback to an interviewer on site. Satisfaction ratings can supply managers with important information about the effectiveness of a variety of facilities and amenities.

Introduction

Delaware's state park managers and administrators must accommodate a variety of users at both forested, inland and coastal state parks. Various special interest groups representing hikers, bird-watchers, surf fishermen, campers, boaters, environmentalists, etc. closely scrutinize the park policies regarding fees, facilities, and services offered in order to be aware of whether their needs are being met. This study (1) determined user satisfaction with fees, facilities, and services in Delaware's state parks, and (2) compared two survey techniques--a handout post card questionnaire and a personal interview.

Methods

Since one study objective was to compare survey techniques, the study was designed to hand out a one-page post card survey which could be mailed back after the visit. A personal interview survey form utilizing the identical questions related to satisfaction with park personnel, facilities, and fees was administered by the same persons who handed out the post card surveys.

Surveys were either handed out or administered in each park using a proportionate sample based on the attendance at each park in 1983. The number of questionnaires handed out and the number returned is shown in Table 1, while the number administered by personal interview is shown in Table 2. Response rates

Table 1. Questionnaires Handed Out and Returned by Park, Delaware State Parks, 1984

Type of Park	Questionnaires Handed Out		Questionnaires Returned		Response Rate
	No.	Percent	No.	Percent	Percent
Inland Parks					
Bellevue	318	32.0	128	37.6	40.2
Brandywine	147	14.8	37	10.9	25.2
W. S. Carpenter	41	4.1	19	5.6	46.3
Killens Pond	94	9.5	33	9.7	35.1
Lums Pond	279	28.1	84	24.7	30.1
Trap Pond	144	11.5	39	11.5	34.2
Subtotal:	993	100.0	340	100.0	
Coastal Parks					
Cape Henlopen	504		187	34.4	37.1
Delaware Seashore	950		320	58.8	33.7
Fenwick/Holts	98		37	6.8	37.7
Subtotal:	1552		544	100.0	
Historical					
Fort Delaware	34		14		41.2
Total:	2579		898		34.8

for the handout questionnaire varied from 25.2 percent in Brandywine Park to 46.3 percent in W.S. Carpenter Park. The overall response rate was 34 percent.

Table 2. Personal Interviews Conducted by Park, Delaware State Parks, 1984

	Surveys Completed	
	No.	Percent
Inland Parks		
Bellevue	37	30.6
Brandywine	16	13.2
W. S. Carpenter	12	9.9
Killen Pond	11	9.1
Lums Pond	32	26.4
Trap Pond	13	10.7
	121	100.0
Coastal Parks		
Cape Henlopen	59	32.8
Delaware Seashore	110	61.1
Fenwick/Holts	11	6.1
	180	100.0

Interviewers noted weather conditions and day of the week when questionnaires were handed out or administered. Post card surveys were color coded for weekends or weekdays and codes were placed on the cards to denote each park and weather conditions. Identical information was placed on personal interview forms. Questionnaires were handed out or administered on selected weekdays and weekends for the period from July 1 through Labor Day weekend, 1984.

State parks were categorized as either inland forested parks or coastal parks to compare satisfaction levels and activity participation. The null hypotheses tested included: (1) There would be no significant difference in satisfaction level among park users in inland parks vs. coastal parks, (2) There would be no significant difference among users of individual parks, (3) There would be no significant difference in satisfaction level by day of the week of use, (4) There would be no significant differences in satisfaction level under alternative weather conditions, (5) There would be no significant difference in satisfaction level among first-time visitors compared to repeat visitors, and (6) No significant difference would be recorded from respondents to the personal interview questionnaire compared to the handout questionnaire.

Results

User Satisfaction

A major objective of the study was to assess user satisfaction with park personnel, facilities, and fees. A series of questions was designed with a five-point rating sacle--five denoted the user was very satisfied, and one indicated the user was very dissatisfied. The satisfaction questions included the following components:

1. Park personnel
2. Cleanliness of facilities
3. Condition of facilities
4. Availability of space for activities
5. Recreational opportunities
6. Overall level of satisfaction

Mean satisfaction scores for day users returning the handout questionnaires are compared in Table 3 utilizing Student's t-test. In all instances, except satisfaction with park personnel, scores were significantly higher among

Table 3. Mean Satisfaction Scores for Inland and Coastal Delaware State Parks, 1984

Satisfaction Variable	Mean Rating Score		t Value
	Inland Parks	Coastal Parks	
Park Personnel	4.38	4.29	1.50[a]
Cleanliness of Facilities	4.05	3.77	3.89
Condition of Facilities	4.17	4.02	2.41
Availability of Space	4.55	4.26	5.00
Recreation Opportunities	4.28	4.14	2.11
Overall Satisfaction	4.34	4.23	2.16

[a] Not significant; all other values significant at the .05 level.

users of inland forested parks compared to users of coastal parks. This may reflect a lesser degree of crowding in some of the forested parks which led to greater availability of facilities and cleaner facilities. Carpenter Park, the latest to be developed, tends to have the lowest use levels and also received the highest satisfaction scores. The lowest mean rating was for cleanliness of facilities in coastal parks reflecting heavy levels of use during the summer recreation season, which is dominated by swimming-related activities. Satisfaction ratings obtained in personal interviews tended to be significantly higher than those obtained from the mailback questionnaire (Table 4).

Weekday park users responded with significantly higher satisfaction scores for condition of facilities, recreation opportunities, and overall satisfaction with the visit compared to weekend users (Table 5). This may again reflect the lack of crowds on weekdays. Interviewers had to abandon attempts to conduct personal interviews and hand out questionnaires on Mondays because of a shortage of users, especially in the inland parks.

Weather conditions at the time of the visit also influenced user satisfaction. Sunny conditions elicited significantly higher mean satisfaction scores, even for satisfaction with parks personnel, than other weather conditions.

Table 4. Mean Satisfaction Scores from Personal Interviews and Handout Questionnaires, Delaware State Parks, 1984

Satisfaction Variable	Mean Rating Score		
	Personal Interview	Handout Questionnaire	t Value[a/]
Park Personnel	4.46	4.32	2.57
Cleanliness of Facilities	4.07	3.87	2.90
Condition of Facilities	4.32	4.07	4.19
Availability of Space	4.69	4.38	5.92
Recreation Opportunities	4.55	4.19	6.13
Overall Satisfaction	4.56	4.26	6.11

a/ All values are significant at the .01 level.

Table 5. Mean Satisfaction Scores for Weekday and Weekend Users, Delaware State Parks, 1984

Satisfaction Variable	Mean Rating Score		
	Weekday	Weekend	T Value
Park Personnel	4.35	4.23	1.39 a/
Cleanliness of Facilities	3.87	3.87	-.03 b/
Condition of Facilities	4.09	3.90	2.21 c/
Availability of Space	4.36	4.45	-1.14 a/
Recreation Opportunities	4.22	4.05	1.91 b/
Overall Satisfaction	4.28	4.15	1.86 c/

a/ Not significant
b/ Significant at the .05 level
c/ Significant at the .10 level

First-time visitors' scores were compared with those of repeat visitors. With the exception of a significantly higher mean score among first-time visitors for satisfaction with space availability, the scores were the same.

Users were asked whether park admission fees were too low, just right, or too high, and the responses were compared with user satisfaction. Significantly higher mean satisfaction scores were indicated by respondents who said fees were too low compared to those who said fees were too high.

Activity Participation

The ten state parks offer a variety of recreational opportunities, but the activity mix varies by park. Participation for the inland parks and coastal parks is compared in Table 6. Coastal activities are heavily oriented towards swimming and fishing, followed by picnicking and camping. Inland activities have a somewhat different orientation, although picnicking predominates. However, nature walks, hiking, and jogging are important activities, with swimming of lesser importance than in coastal parks. Swimming is available in three of the six inland parks.

code of their primary residence. Results are presented in Tables 7 and 8. Over three-fourths of inland park users are Delaware residents. Park locations cause these parks to be used as neighborhood or county parks. The majority of coastal park users are out-of-state residents, with Pennsylvania predominating. This may indicate that they are seeking a different experience than can be found in their own state.

Visit Characteristics

Repeat visitors accounted for over four-fifths of the respondents for both inland and coastal parks. Only 16 percent of visitors responding were at the parks on their first visit. Inland park users tend to visit their parks more frequently with approximately 24 percent of the users reporting 25 or more visits per year (Table 9). However, coastal users tend to stay longer per visit (Table 10). Over half of the coastal visitors reported staying between 5 and 8 hours, while over two-thirds of the inland users stayed less than 4 hours. Frequency and length of visit may be related to the types of recreational activities; picnics, hikes, and nature walks appear characteristic of shorter visits, while ocean beach swimming and fishing correlated with lengthier visits.

Table 6. Recreation Activity Participation in Inland and Coastal Delaware State Parks, 1984

Activity	Inland Park		Coastal Park	
	No.	Percent	No.	Percent
Bicycling	49	14.4	47	8.6
Boating	62	18.2	57	10.5
Camping	19	5.6	132	24.3
Canoeing	39	11.5	2	0.4
Disc Golf	35	10.3	8	1.5
Fishing	59	17.5	207	38.1
Hiking	89	26.2	64	11.8
Horseback Riding	15	4.4	2	0.4
Jogging	65	19.1	68	12.5
Nature Walks	166	49.1	115	21.1
Picnicking	221	65.0	199	36.6
Surfing	0	0	54	9.9
Swimming	135	39.7	496	91.2
Tennis	24	7.1	17	3.1
Other Sports	90	26.5	79	14.5

Participants rated their most important recreational activity. For those expressing a preference, swimming ranked highest in both the inland and coastal parks.

Residence of Users

Respondents to both the personal interviews and the handout questionnaires indicated the zip

Summary and Conclusions

This study has compared two survey techniques and provided data for park managers on user satisfaction with facilities, services, fees, and personnel. Significant differences were noted in satisfaction levels among the parks studied and between the inland, forested parks and the coastal parks. Therefore, the null hypotheses formulated for testing were rejected.

Table 7. State of Residence for Personal Interviewees, Delaware State Parks, 1984

State of Residence	Inland Parks		Coastal Parks	
	No.	Percent	No.	Percent
Delaware	95	78.5	78	43.3
Pennsylvania	11	9.1	47	26.1
Maryland	11	9.1	30	16.7
Virginia	0	0.0	11	6.1
Others	4	3.3	14	7.8
Total	121	100.0	180	100.0

Table 8. State of Residence for Handout Survey Respondents, Delaware State Parks, 1984

State of Residence	Inland Parks		Coastal Parks	
	No.	Percent	No.	Percent
Delaware	259	76.2	199	36.3
Pennsylvania	48	14.1	186	34.2
Maryland	10	2.9	67	12.3
Virginia	0	0	19	3.5
New York	0	0	12	2.2
Others	8	2.4	33	6.1
No Answer	15	4.4	28	5.1
Total	340	100.0	544	100.0

These results can provide evidence concerning the effectiveness of individual park managers, the level of maintenance, the availability of facilities and services, and satisfaction with fees in each of the parks.

A comparison of survey techniques revealed that significantly higher satisfaction scores for facilities and services were obtained from the personal interview compared to the handout, mailback questionnaire. This may reflect a greater reluctance for interviewees to offer negative feedback to interviewers compared to those responding in private on a post card survey. However, since the post card survey is a lower cost technique which yielded significant differences among parks for the same attributes as the personal interview, this appears to be an acceptable alternative for obtaining useful management data. This appears especially true when the post card is returned to a neutral third party (University) as was done in this case. Limited state agency research budgets provide additional justification for considering the handout questionnaire option.

at all major access points on the same days as boat use was being measured. Interviews were conducted as boaters were completing their boating activities for the day.

Since the study focused on the assessment of peak use conditions, data collection was conducted on selected weekends during the 1987 boating season. The sampling schedule was designed to represent the varying levels of weekend use and included a total of eight days of data collection, two of which fell during the Memorial Day and Fourth of July holiday weekends.

Description of Sample

The population of Raystown Lake boaters may be divided into three groups based upon their means of access to the lake: (1) boat ramp users who trailer their boats to the lake for the day, (2) those who store their boats for the season at one of the two marinas on the lake, and (3) campers who launch their boats at a boat ramp when they arrive at Raystown and keep their boats at or near the campsite until the end of their visit. A total of 1150 boat operators aged 18 years and older were sampled. Twenty-nine percent of the interviews were gathered at marina sites (i.e., Seven Points Marina and Lake Raystown Resort Marina). Another 32% of the interviews took place in the four campgrounds. The remaining 39% of the surveys were administered at seven ramp access points, with an average of 65 boaters being interviewed at each site.

Most boaters at Raystown Lake operate runabouts with an average length of 18 feet and an average of 128 horsepower. Ninety percent of those sampled had boats registered in the state of Pennsylvania. As well, 94% of the survey respondents reported that their primary home residence was in Pennsylvania. Boaters traveled an average of 90 miles from their homes to boat at Raystown. Raystown Lake boaters typically had ten years of boating experience and spent an average of 28 days per year boating, 19 of which were at Raystown Lake. Lake visitors participated in a variety of boating activities, the most popular of which was pleasure cruising (36%), followed by water skiing (23%), swimming (21%) and fishing (18%). Both trolling and swimming were mentioned more often as secondary activities than as primary ones, as were "other" activities such as jet skiing, sitting on the boat, skidooing, and picnicking. The majority of boaters at Raystown were in family groups with an average of 4.5 people.

Independent Variables

Respondents were asked to reflect on their just-completed experiences to provide information about their boats, basic patterns of recreating on the lake and levels of past boating experience. In addition, perceptions of boating conditions on the lake and an evaluation of the boating experience were assessed in a variety of ways. Using a nine-point crowding scale, visitors were asked to describe the boating conditions at the launch area at the start and end of the trip, on the lake itself while boating, and at any stopping points on the lake. Respondents were additionally asked to evaluate how the number of other boaters affected their experiences using a nine-point rating scale covering a range of three possible reactions: positive, neutral and negative. Subjective evaluations of specific aspects of the boating experience were used as potential predictors of satisfaction. Twenty statements dealing with various aspects of boating conditions: satisfaction, safety, conflict with other boaters, and reasons for avoiding or not participating in boating activities were measured on a five-point Likert scale ranging from strongly disagree to strongly agree.

Dependent Variable

A scale comprised of six items probing the general degree of satisfaction with the boating experience was used to measure overall satisfaction. This satisfaction scale was adapted to boating from previous use and validation with fishermen (Graefe and Fedler 1986), hunters (Vaske, Fedler and Graefe 1986) and river users (Ditton et al. 1981).

Results

User Group Comparison

Comparing the perceptions of the three major user groups on the lake (i.e., campers, marina users, boat ramp users) revealed few significant differences. Thus, although these three types of users were quite distinct in their patterns of boating and the boats they used, all three groups generally perceived their boating experiences very similarly.

Overall Satisfaction

This study used several types of variables to measure boating quality as perceived by the users of Raystown Lake. This was necessary because experiential quality is a concept that is elusive and difficult to measure. Previous studies have shown that multiple item indices can provide measures that are more valid and reliable than single ratings of overall satisfaction (Ditton et al. 1981; Vaske et al. 1986; Graefe and Fedler 1986).

The satisfaction index used in this study was patterned after indices that have been used successfully in the studies cited above. The index includes six statements that are in essence different ways of measuring the extent of satisfaction with the overall boating experience. The index was computed as the mean of the responses to the six individual items.

An analysis was conducted to identify the reliability of the Satisfaction Index (Table 1). This analysis was based on the degree of correlation between the various statements. All of the items were strongly intercorrelated, resulting in an overall reliability coefficient (Cronbach alpha) of .80. This level of reliability is consistent with that found in other studies using similar indices.

Table 1. RELIABILITY STATISTICS FOR OVERALL SATISFACTION INDEX

SATISFACTION STATEMENT	ITEM MEAN	STANDARD DEVIATION	CORRECTED ITEM-TOTAL CORRELATION	ALPHA IF IF ITEM DELETED
I thoroughly enjoyed my boat trip today	3.9	.78	.65	.73
My boating experience was not as enjoyable as I expected it to be*	3.8	.88	.61	.74
I cannot imagine a better boating trip	2.6	.97	.41	.80
I do not want to go on any more boat trips like this one*	4.1	.70	.57	.76
My boat trip was well worth the money I spent to take it	4.0	.62	.56	.76
I was disappointed with some aspects of my boat trip*	3.4	1.00	.54	.76
Overall Index	3.6	.58		.80**

*Scoring for these items was reversed in computation of statistics because agreement with these items indicated lower satisfaction.

**Alpha value for the overall index indicates the reliability with all six items included in the index.

Raystown boaters appear to be quite satisfied with their boating experiences overall (Table 2). More than 80% agreed that they had "thoroughly enjoyed their trip today," although only 17% agreed strongly. An even greater proportion of the boaters felt their trip was well worth the money it cost them, and very few indicated they did not want to go on more trips like the one they had experienced that day. On the other hand, a majority of the respondents disagreed with the statement, "I cannot imagine a better boating trip." About one-third of the sample indicated that they were disappointed with some aspects of the experience. In sum, boaters tended to report relatively high satisfaction, although for many the experience did not measure up to their ideal or best ever boating outing. The average score on the index comprised by all six statements was 3.6 on a scale ranging from one to five.

Table 2. RESPONSES TO VARIABLES INCLUDED IN THE OVERALL SATISFACTION INDEX (VALUES IN PERCENT)

	RESPONSES						
	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	N	$\bar{X}$
I thoroughly enjoyed my boat trip today	1	8	7	66	17	1140	39
My boating experience was not as enjoyable as I expected it to be*	11	69	6	13	2	1141	22
I cannot imagine a better boating trip	5	54	16	23	2	1138	26
I do not want to go on any more boat trips like this one*	23	69	3	4	1	1138	19
My boat trip was well worth the money I spent to take it	0	5	4	77	14	1138	40
I was disappointed with some aspects of my boat trip*	4	60	5	30	2	1132	26

*Scoring for these items was reversed in computation of statistics because agreement with these items indicated lower satisfaction.

Experiential Impacts

Number of boats. Boating activity on Raystown Lake was measured using aerial photography and counts of vehicles parked at all major access points around the lake. Overall use levels, determined from aerial photos taken between 1:00 and 3:00 p.m., ranged from 794 to 1101 boats on the lake. The lowest boating densities were encountered on the last three sampling days. These lower use levels may reflect a normal tailing-off of boating activity toward the end of the season, coupled with unseasonably cold weather during August, 1987.

Crowding on lake. Several survey questions explored feelings of crowding among Raystown boaters (Table 3). Perceived crowding varied significantly at different points of the boating experience. Boaters felt most crowded while actually out on the lake. On a scale of one to nine, with nine being "extremely crowded", 36% of boaters considered crowding on the lake to be a seven or greater (mean=5.7). Respondents reported feeling least crowded at the access areas at the start of their trip. Only 15% reported crowding here as a seven or greater (mean=3.8). Perceived crowding at stopping places and at the end of the day was not as great as out on the lake but was greater than at the access areas at the start of the trip. These findings are consistent with previous research noting increased sensitivity to crowding the greater the distance from an entrance point.

ble 3. PERCEIVED LEVEL OF CROWDING AT VARIOUS POINTS DURING THE BOATING EXPERIENCE (VALUES IN PERCENT)

	PERCEIVED DEGREE OF CROWDING										
	Not at all Crowded								Extremely Crowded		
	1	2	3	4	5	6	7	8	9	N	X
wding at the cess area at the rt of your trip.	20	17	20	9	7	14	5	4	6	1145	3.8
wding out on the te while boating	4	5	10	10	12	23	14	13	9	1149	5.7
wding at the laces where you opped today hile boating	12	13	15	11	11	13	9	10	7	675	4.6
wding at the ocess area when ou stopped boating	17	17	15	8	10	13	8	6	7	1114	4.2

Influence of others. Another question related to crowding directly asked individuals how the number of boaters at the lake that day affected their overall boating experience. Over half of the respondents reported that the number of boaters had no effect on their experience (Table 4). Consistent with the previous crowding data, those who did report an influence of others were more likely to indicate that the number of boaters reduced, rather than increased, their enjoyment. Forty percent of respondents indicated some reduction in their enjoyment, although few of these reported a severe reduction.

Table 4. RESPONSES TO "HOW DID THE NUMBER OF BOATERS AT THE LAKE TODAY AFFECT YOUR OVERALL BOATING EXPERIENCE"

	Increased My Enjoyment				No Effect		Reduced My Enjoyment		
	1	2	3	4	5	6	7	8	9
Number	13	18	29	29	581	131	208	79	39
Percent	1	2	3	3	52	12	18	7	3

Displacement. Four statements were included in the survey to measure the types and extent of displacement by crowding experienced by boaters at Raystown Lake. Some displacement does seem to be occurring, although few boaters indicate that they might stay away from the lake altogether due to crowding (Table 5). About one-fourth of the boaters reported being displaced from favorite parts of the lake (place displacement) and during peak time periods (time displacement) as a result of crowds. Twenty-three percent of the study subjects indicated they had forgone some boating activity because of crowding (activity displacement). There was little agreement, however, with the statement, "If I had known what it was going to be like here today, I would not have come on this visit." Overall, only five percent agreed with this statement designed to measure the likelihood of complete displacement from the lake.

Waiting time to get on the lake. Study respondents were also asked how they felt about the amount of time they had to wait to get on the water. Raystown boaters appear to be quite satisfied with the amount of waiting time they encountered (Table 5). Overall, only six percent of those sampled agreed or strongly agreed with the statement, "I did not like the amount of time I had to wait to get on the water today" (mean=2.0).

Noise. Noise does not appear to be much of a problem on Raystown Lake. Noise from other boats reduced the enjoyment of only five percent of the boaters interviewed (Table 5).

Behavior. More boaters expressed problems with the behavior of other boaters than with the noise from other boats (Table 5). Nearly one-fourth of the respondents indicated that the behavior of other boaters interfered with the quality of their boating experience. The most frequent types of behavior causing these reactions were boaters coming too close or going too fast, and boaters disobeying rules such as not observing speed limits in no-wake zones. Rude and careless behavior was also mentioned frequently as an interference with boating quality.

Safety. More than three-fourths of the boaters agreed with the statement, "Boating conditions on the lake today were safe" (Table 5). However, some boaters did feel that "There was an unsafe number of boats on the water today" (Table 5). In support of the perception of safe conditions, only 17% agreed or strongly agreed with this statement (mean=2.4).

Finally, one question directly asked respondents whether other boats came too close to their boat. More than one-third of the sample felt that other boats had come closer than desirable (Table 5). This finding, coupled with the earlier observation that boats coming too close was one of the most frequently mentioned types of objectionable behavior, suggests that this may be the greatest safety concern among Raystown boaters.

Regression Analysis

A series of regression models were developed to identify the direct and indirect relationships between overall satisfaction and the pool of experiential impacts. Standardized regression coefficients were used to assess the relative importance of each independent variable to the dependent variable. Zero order correlations were also reported to illustrate the bivariate relationships between key study variables. Results of the regression models and correlation analyses are shown in Table 6.

Table 5. SUMMARY OF RESPONSES TO INDICATORS OF VISITOR DISPLACEMENT, CONFLICTS, AND PERCEPTIONS OF SAFETY (VALUES IN PERCENT)

	RESPONSES						
	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	N	$\bar{X}$
I stayed off the lake during part of the day today because there were too many boats on the lake	7	63	3	19	8	1141	2.6
I avoided my favorite parts of the lake today because there were too many boats there	7	62	7	21	4	1142	2.5
I did not participate in some boating activities today because of crowded conditions on the lake	5	70	2	20	3	1134	2.5
If I had known what it was going to be like here today, I would not have come on this visit	16	77	2	4	1	968	2.0
I did not like the amount of time I had to wait to get on the water today.	12	81	2	5	1	1129	2.0
The noise of other boats reduced my enjoyment on the lake today	10	82	3	5	0	1140	2.0
The behavior of other boaters interfered with the quality of my boating experience	4	67	6	18	4	1140	2.5
Other boats came closer to my boat than I like	2	60	4	27	7	1141	2.8
Boating conditions on the lake were safe today	1	11	10	75	3	1135	3.7
There was an unsafe number of boats on the water today	5	67	11	14	3	1144	2.4

In combination, the series of regressions form the basis for a model illustrating how people perceive satisfaction with the boating experience (Figure 1). Paths shown in this model represent only significant relationships between variables. Results showed that 42% of the variance in satisfaction could be explained by the pool of experiential impacts.

Table 6. SUMMARY OF MULTIPLE REGRESSIONS OF BOATING IMPACT VARIABLES ON OVERALL BOATING SATISFACTION

	DEPENDENT VARIABLE					
INDEPENDENT VARIABLE	Perceived Crowding On Lake		Influence Of Other On Experience		Satisfaction Index	
	r	Beta	r	Beta	r	Beta
Enjoyment reduced by noise	.08		.15		-.23	-.09
Stayed off lake part of day because of too many boats	.35		.37	.11	-.41	-.13
Behavior of other boaters interfered with quality of boating experience	.29		.33	.09	-.39	
Boating conditions on lake perceived to be safe	-.37	-.14	-.38	-.14	.48	.23
Other boats came too close	.28	.08	.30		-.37	-.15
Perception of unsafe number of boats on the water today	.38	.14	.33		-.41	-.06
Avoided favorite parts of lake because of too many boats	.40	.20	.38	.13	-.39	-.07
Did not do some activities because of crowded conditions	.36	.15	.37	.12	-.40	-.10
Total number of boats on lake (from aerial photos)	.20	.14	.06		-.05	
Had to wait too long to get on the water today	.10	.06	ns		-.11	-.06
Influence of number of boaters on overall boating experience					-.42	-.15
Perceived crowding on the lake			.46	.24	-.38	
PERCENT OF VARIANCE EXPLAINED (R SQUARED)		.30		.33		.42

The satisfaction index tended to be highly associated with nearly all of the impact variables. The variables most strongly related to satisfaction were the perception that conditions on the lake were safe (r= 48), the influence of the number of boaters on the overall boating experience (r=- 42), and the various measures of visitor displacement (time, r=- 41; activity, r=- 40; place, r=- 39;) Many of the impact indicators, however, had correlations with the satisfaction index that were nearly as high. The exceptions, or those variables most *weakly* associated with satisfaction, included noise from other boats, waiting time to get on the lake, and the actual number of boats on the lake

Additional analyses identified a wide range of relationships between impact indicators. For example, noise was weakly associated with most other impacts, echoing the earlier finding that very few boaters were bothered by noise. The behavior of other boaters showed a stronger pattern of relationships, including the high correlation of behavior and agreement with the statement that other boats had come too close. Behavior and crowding were correlated, although not significant direct predictors of satisfaction. The various types of displacement were moderately correlated with each other, suggesting that individuals who stayed off the lake at certain times also tended to avoid particular places or forego activities on the lake.

The number of boats showed a pattern of weak or insignificant relationships with the various impact indicators. Respondents were generally satisfied with conditions regardless of the number of boats at the lake. The number of boats did contribute, however, to the level of perceived crowding on the lake, although not as strongly as other indicators (i.e., displacement, safety). The number of boats, perceptions of safety and displacement accounted for 30% of the variance in crowding. Perceived crowding on the lake, in turn was relatively strongly associated ($r = .46$) with the reported influence of the number of others on the boater's experience. Results indicated that 33% of the variance in the influence of others could be explained by the perception of crowding, coupled with the direct impact of displacement and safety indicators.

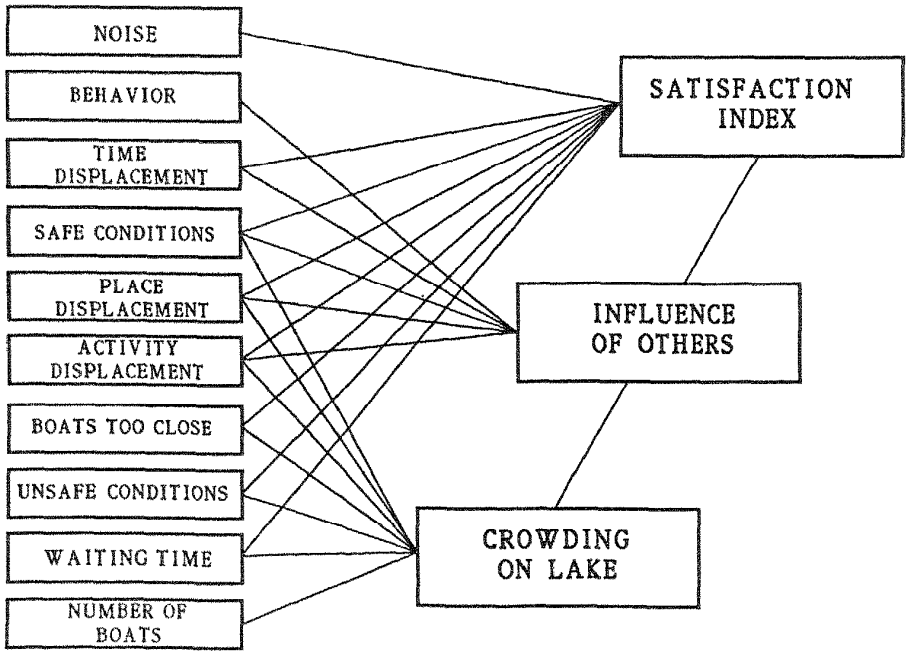
Conclusions and Implications

This study focused on the relationship between a full set of experiential impacts and overall visitor satisfaction. Results of the visitor survey suggest that Raystown Lake boaters were generally satisfied with their boating experiences regardless of the number of boats at the lake. However, Raystown boaters reported moderate levels of crowding on the lake, and a significant proportion of those sampled reported experiencing inappropriate behaviors of other visitors, concerns over boating safety and having been displaced in some way.

Analyses revealed that boating quality, as measured by overall satisfaction, is to a large extent a function of these perceived impacts to the boating experience. Thus, although overall satisfaction is not *directly* related to the number of boats on the lake, boat density does influence satisfaction *indirectly* through a series of mediating impact variables (e.g., crowding, safety, displacement).

These findings are consistent with previous research. It is widely recognized that there is a distinct difference between density and crowding (Stokols 1972). Density refers to the number or concentration of people in a given area, while crowding is the negative evaluation of a certain density, a value judgment that there are too many people. Numerous studies lend support to a traditional crowding model in which use levels influence the

Figure 1. MODEL OF BOATING SATISFACTION AT RAYSTOWN LAKE



numbers of contacts between individuals, which in turn lead to perceptions of crowding (Graefe et al. 1984). These same investigations found that the relationship between density and crowding is mediated by a variety of variables, such as visitors' expectations, preferences, and prior experience. Most importantly, crowding perceptions vary depending on the types of behaviors encountered and the location of encounters with other visitors. At Raystown Lake, displacement had the greatest influence on perceptions of crowding. Crowding, in turn, had the greatest direct effect on perceived influence of others. The high correlation between crowding and the influence of others might suggest that both are measures of the same concept.

The pool of experiential impact variables accounting for 42% of the variance in satisfaction represents an increase above the 30-40% of variance typically accounted for in previous studies (e.g., Ditton et al. 1981; Vaske et al 1986). This provides additional support for the inclusion of negative (e.g., displacement, safety), as well as positive (e.g., motive fulfillment) impacts in the analysis of experience satisfaction.

Management Implications

The results of this study can be used to address a variety of management issues and decisions. An important result of the study is the documentation of existing conditions on Raystown Lake and the relationships between these conditions and peak use boat densities. This information provides a basis for: (1) evaluation of the acceptability of current conditions, (2) identification of management actions designed to improve current conditions, (3) evaluation of the probable impacts of various potential options for further facility development on Raystown Lake, and (4) development of procedures for monitoring the quality of boating at Raystown Lake in the future.

Results suggest that current peak use conditions are acceptable to most Raystown boaters, however these conditions could be improved by focusing management on those indicators with the greatest influence on satisfaction. For example, one third of the boaters sampled reported that other boats had come too close to them while boating. Such incidents were one of the greatest safety concerns among Raystown boaters. These incidents were unrelated to the number of boats on the lake. This information suggests the need for management to pursue actions that will reduce the frequency of boats coming too close to each other. Manipulating the number of boats on the lake would have little effect since the problem is due to the behavior rather than the number of boaters encountered. Expanding enforcement of existing regulations and offering educational programs aimed at making offending boaters aware of the impacts of their actions are more likely to bring about improvements in this situation.

In addition, the results of this study may be used as a basis for establishing quantitative standards of acceptability. Current management frameworks rely on standards to make the evaluation process objective and systematic. Standards provide a means of describing the type of experience that is to be provided in measurable terms. Problem identification then is based on the comparison of existing conditions and corresponding standards. In this case, there are no pre-existing standards for the boating experience at Raystown Lake. Knowledge of the current level of various impact indicators provides a baseline upon which an initial set of standards (e.g., optimum boating capacity) can be determined, as well as a point against which future conditions can be compared. Future monitoring should include measures of both boating densities and selected impact indicators. Monitoring of boating densities should be incorporated into the routine duties of rangers stationed at major access points on weekends. Impact indicators can be monitored only through direct contacts with exiting visitors.

In sum, perception of boating quality is a multifaceted and complex concept. Maintaining boating quality in the future will require careful attention to the inter-related set of indicators that are most strongly associated with overall satisfaction.

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THE STATEWIDE COMPREHENSIVE OUTDOOR RECREATION PLANNING PROCESS: THE MASSACHUSETTS METHODOLOGY AND EXPERIENCE

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This paper summarizes the procedures and methods which were incorporated into the development of the 1988-1989 Massachusetts Statewide Comprehensive Outdoor Recreation Plan. In addition to the standard supply and demand measures, the research included a number of assessment procedures which strengthened the development of policies and the determination of their priorities.

Keywords: outdoor recreation planning; statewide comprehensive outdoor recreation plan, supply and demand; supply inventory; demand analysis; community involvement; regional analysis; and Massachusetts.

Introduction

On five-year cycles, the U.S. Department of the Interior, through the National Park Service, requires states seeking eligibility and access to Land and Water Conservation Funds to file a statewide comprehensive outdoor recreation plan (SCORP) and/or update. These plans are used to chart the course for planning and spending of federal funds for the following five-year period. The plans and the methodologies vary widely from state to state. Some include in-depth demand studies while others include an inventory update and policy analysis. Others follow no detailed step-by-step planning process. While most are thorough, and important to the state planning process, few are of value at the local level. Still others are not comprehensive in the manner in which they include input from the variety of administrators who must implement outdoor recreation policies.

The 1988-1989 Massachusetts Statewide Comprehensive Outdoor Recreation Plan, entitled Massachusetts Outdoors: For Our Common Good, 1988-1992, was concluded in December of 1988. The purpose of this paper is to review some of the strengths and weaknesses of the statewide comprehensive outdoor recreation planning process and to present the Massachusetts experience in the development of its methodology, the planning processes and the applications. Specific methodologies are presented for each of the five major stages which were incorporated into the development of this five-year outdoor recreation, parks and conservation plan.

The Massachusetts experience was directed by the Department of Environmental Management over a two-year period. The previous SCORP, conducted in 1983, was an update which was primarily policy-oriented and, prior to that, the last comprehensive approach took place in 1978. The planning and preparation process differed from most other state SCORPs in that a commitment was made early to be as comprehensive as possible, particularly by involving the many individuals affected by outdoor recreation planning.

The methodology included five major phases: (1) a statewide public forum and hearing process; (2) a supply and demand analysis; (3) a municipal managers' survey of local and state planning issues and priorities; (4) a state facility managers' survey and (5) a public information and relations survey. While some of these components are common to the SCORP process, numerous changes and innovations were made in the Massachusetts SCORP in an effort to make the results more meaningful and applicable at both the state and local level. An outline of the primary components includes the following:

I. State Agency Involvement
   - A. Technical Advisory Board (TAC)
   - B. Survey of state facility managers
   - C. State employee public relations survey
   - D. Hiring of a state SCORP Project Director

II. Community Involvement
   - A. Local administrators' survey
   - B. Regional public meetings

III. Supply Inventory
   - A. Revised inventory form
   - B. Inclusion of assessment factors
   - C. Data collection at the local level

IV. Demand Analysis
   - A. Statewide survey of the general population
   - B. Survey of racial minorities
   - C. Survey of disabled individuals
   - D. Inclusion of satisfaction levels, travel time, site locations, latent demand

V. Integration of Factors
   - A. Single design day approach
   - B. Seasonal adjustments
   - C. Qualitative factors
   - D. Importance-effectiveness scale
   - E. Statewide and regional analyses

Methods

SCORP planning regions

In addition to examining issues from a statewide perspective, data were grouped into seven planning regions. While the numbers were too small to permit comparisons of some categories, for the most part, the presentation of regional

ta provided revealing results. The seven planning regions e reported in Figure 1.

atewide involvement

The state made a clear commitment to obtaining broader rticipation in the planning process throughout at the state vel rather than farming the planning project off to one gency such as the forests and parks or natural resource gency. The Executive Office of Environmental Affairs volved all of the state land holding agencies in the 1988 CORP including the Department of Environmental lanagement, Food and Agriculture, the Metropolitan istrict Commission, Coastal Zone Management and the epartment of Fisheries, Wildlife and Environmental Law nforcement. Representatives from each of these agencies ere joined by experts from both private and non-profit gencies. Together, they served on the newly developed echnical Advisory Committee which provided continuous uidance and direction throughout the project period. To rther expand the information base, public meetings were eld in five regions of the state. They were used in general ays to aid in the development of surveys and to shed light n interpreting their results.

upply inventory

The supply analysis incorporated a number of nnovations in the application of planning data. First, the nventory of recreation supply covered nearly 12,000 sites rom across the state and was not limited to a simple ounting process of what exists. The process, handled rimarily at the local level, included a more aggressive data ollection procedure which included assessment information n such items as site conditions, use levels, expansion ossibilities and limitations, multiple-use patterns, and andicapped accessibility. Data were obtained from municipal key administrators and planners, from current aster and outdoor recreation plans, and from a variety of ublications produced by many public and private agencies nd organizations. The inventory form is presented in igure 2 and a summary of the results, by owner type, ppears in Table 1.

Demand analysis

The demand analysis incorporated in-depth information urvey on recreation participation among the state's opulation rather than merely asking how many times espondents participated in a given activity. Travel time, ocation of participation, assessment of experiences and pportunities, latent demand, participation patterns in both varm and cold seasons and on weekdays and week-ends vere a few of the examples of the measures used. More han 3500 adult telephone interviews were obtained onsisting of 2800 randomly sampled individuals within the tate's general population, 600 Black and Hispanic residents nd 150 individuals with physical disabilities. Participation atterns by activity type are presented in Table 2 and Tables 3-7 include findings related to (a) annual activity days of articipation, (b) participation rates, (c) dissatisfaction evels, (d) coastal beach visitation rates and access atisfaction and (e) travel time.

ntegrating supply and demand

The integration of supply and demand data permitted ome new approaches to the supply and demand analysis. First, findings of supply and demand analysis were calculated on the basis of one design or peak day of use, rather than the calculation of seasonal demand and supply figures which are often more difficult to interpret. Findings were also presented in terms of current capacity in such a manner as to indicate whether there was excess capacity or a deficiency. Qualitative factors were considered which included dissatisfaction measurements of recreational opportunities and travel barrier measurements shared by participants. The factors which were used in the integration of supply and demand for the state as a whole are presented in Table 8 and Figure 3. Additional insights into the planning preferences of the residents were obtained through the household survey. Individuals were asked to make planning decision choices based on preferences within their home region for water-based versus land-based or equal facility development emphasis; maintenance or existing areas versus development or new areas or an equal emphasis; an emphasis on recreation versus conservation or an equal emphasis; and three specific planning issues. The results of these planning preferences are presented in Table 9. An example of the regional analyses for the Connecticut Valley Region appears in Table 10.

Furthermore, more than 60 percent of the administrators of the Commonwealth's 351 cities and towns shared information about the importance of and effectiveness in addressing issues of local concern for 23 different planning issues. This information was translated onto an importance-effectiveness scale for identification of the priority issues to be undertaken at the local level. Each planning issue falls within one of four quadrants which describes the planning issue in terms of importance and effectiveness. Issues of high importance and high effectiveness were classified within an "Effective Work" category; issues with high importance and low effectiveness were classified within a "High Priority" category; issues of low importance and effectiveness were classified within a "Low Priority" category; and issues of low importance and high effectiveness were classified within a "Low Importance" category. The statewide planning analysis of these 23 planning issues appears in Figure 3 and regional example of the Connecticut Valley Region Appears in Figure 4.

Policy Formulation

Many significant patterns emerged as a result of completing this multi-faceted procedure. The informational data base was finally incorporated into development of many policies which were categorized by priority (high, medium and low). While these policies are not presented here they are available from the Department of Environmental Management. To carry out each and every policy would require more funds than are presently or likely to be available over the next five years. However, they will serve as important guides in influencing the expenditure of outdoor recreation, park and conservation areas as funds do become available.

Summary

The intent of this presentation was to share some of the different methods incorporated into the development of the methods and techniques for the Massachusetts SCORP. Although not analyzed in detail here, a large portion of the results are presented. Social survey research if carefully detailed and planned can be instrumental in documenting

Figure 1. SCORP planning regions.

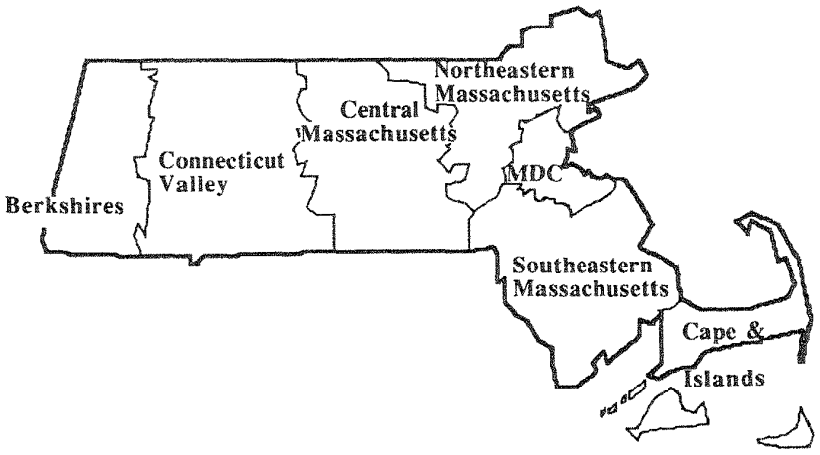

Figure 2. SCORP Inventory Form **1988-89 STATEWIDE COMPREHENSIVE OUTDOOR RECREATION PLAN SUPPLY INVENTORY**

1. NAME: _____ 2. ADDRESS: _____ 3. TOTAL AREA: _____(ACRES)
A. Acreage Improved for Recreation Use:_____(ACRES)
B. Could recreational use be expanded at this site? ___YES ___NO

NEW ___
UPDATE ___
REFER ___
DELETE ___

4. OWNER TYPE: _____ 5. ADMIN. AGENCY:_____
6. SITE BOUNDARY: ____A. All Within ____B. Extends Beyond, Under Your Mgmt
____C. Extends Beyond Town Boundary, Managed by Other(s)
7. OTHER OWNER(S):_____
8. SITE ACCESS: ___ A. Public, No Fee ___ B. Public, Fee ___ C. Public, Non-Resident Fee ___ D. Public, Resident Only
___ E. Private, Members Only for Fee ___ F. Private, Open to Public for Fee ___ G. Private, No Fee
9. PUBLIC TRANSPORTATION AVAILABLE TO SITE: ____YES ____NO
10. AUTOMOBILE ACCESS: ____YES ____NO 11. Parking Capacity: SUMMER ___ WINTER: ___ 12. Is there a parking fee? ___YES ____NO
13. Are there any physical factors limiting development for future parking?: ____YES ____NO

14. FACILITIES: *(PLACE the QUANTITY/SIZE under "#" for each facility, indicate if HANDICAPPED ACCESSIBLE "HP" by checking column 2)*

#	*HP* (Please check if handicapped accessible.)
____	A. Boat Ramps
____	B. Boat Slips & Moorings
____	C. Cabins
____	D. Signif. Hist./Cult./Arch. Feature
____	E. Signif. Natural Feature
____	F. Nature Center
____	G. Tent Sites
____	H. Trailer Sites
____	I. Picnic Tables
____	J. Shelters
____	K. Trails (MILES)

#	*HP* (Please check if handicapped accessible.)
____	L. Archery/Target Shooting Range
____	M. Basketball Courts (**Outdoor**)
____	N. Fields, Baseball/Softball
____	O. Fields, Football/Soccer
____	P. Fields, General Open Space Recreation Area
____	Q. Golf Holes
____	R. Playgrounds/Tot Lots
____	S. Tennis Courts

SIZE

____ (MILES)	T. **Usable** Beach Frontage (Fresh Water)
____ (MILES)	U. **Usable** Beach Frontage (Saltwater)
____ (SQ.FT.)	V. Skating Rinks
____ (SQ.FT.)	W. Swimming Pools
____ (PEOP/HR.)	X. Ski Lifts

#	*HP* (Please check if handicapped accessible.)
____	Y. Comfort Station
____	Z. Developed Spectator Seating(#Seats)
____	AA. Equipment Concession(Rental)
____	AB. Food Concession
____	AC. Stages/Band Shells
____	AD. Visitors' Center

15. NUMBER OF FRESH WATER BODIES AT SITE: _____(NUMBER)
16. ACREAGE FRESH WATER? _____(ACRES)
17. AMOUNT OF TIDAL FRONTAGE? _____ (MILES)
18. IS THIS SITE WITHIN A COASTAL ZONE BOUNDARY? ___YES ___NO
19. ARE ANY TRAILS DESIGNATED FOR MOTORIZED RECREATION VEHICLES?: ___NO ___YES, if yes, how many miles? _____(MILES)
20. DOES SITE HAVE A TRAIL DESIGNED FOR PHYSICALLY DISABLED?: ___YES ___NO

21. ACTIVITIES: *(Please CHECK ALL ACTIVITIES which OCCUR at this site.)*

__A. Boating (Motor)	__H. Camping	__P. Archery/Target Shooting	__W. Bicycling	__AA. Ice-Skating
__B. Boating (Non-Motor)	__I. Hiking	__Q. Baseball/Softball	__X. 4-Wheeling	__AB. Skiing (Downhill)
__C. Fresh Water Fishing	__J. Hunting	__R. Football/Soccer	__Y. Horseback Riding	__AC. Skiing (X-Country)
__D. Saltwater Fishing	__K. Organized Nat/Hist/Cultural	__S. Golf	__Z. Motorcycling/ATV	__AD. Snowmobiling
__E. Swimming (Pool)	__L. Nature Observation	__T. Other Team Sports		__AE. Other: _____
__F. Swimming (Fresh-Water)	__M. Picnicking	__U. Organized Special Events		__AF. Other: _____
__G. Swimming (Saltwater)	__N. Sightseeing	__V. Tennis		__AG. Other: _____
	__O. Walking/Jogging			

22. SITE DESCRIPTION: _____A. General Outdoor Recreation _____B. Natural Environment Area _____C. Historic and Cultural
23. USE LEVEL AT THE SITE: ___A. Optimal _____B. Overused _____C. Underused

TOWN: COUNTY: CZM COMMUNITY: SITE EXTENDS INTO:
DEM REGION: MDC SITE CODE: SITE NUMBER:
-- FOR OFFICE USE ONLY --

Table 1. Outdoor recreation sites by owner type.

	Municipal	County	State	Federal	Private Profit	Private Non-profit	Statewide*
Number of Sites:	7,192	41	752	107	1,341	1,507	10,940
Total Acreage:	298,679	1,810	488,975	80,163	101,222	132,052	1,102,900
Acreage Improved Recreation:	11,290	2	12,829	1,082	5,606	7,252	38,061
Possible Expansion Sites:	1,322	4	139	16	118	205	1,804
Natural Resource Facilities							
Cabins	80	0	21	10	232	296	639
Significant Hist/Cult/Arch	323	2	68	19	8	114	534
Significant Natural Feature	306	0	80	8	26	127	547
Nature Center	31	1	14	1	3	48	98
Tent Sites	455	10	1,193	396	2,706	2,374	7,134
Trailer Sites	787	0	2,683	927	13,305	394	18,096
Picnic Tables	7,874	28	7,907	1,062	12,393	5,122	34,386
Shelters	149	0	61	1	56	189	456
Recreation Facilities							
Archery/Target Shooting	44	0	2	3	23	87	159
Basketball Courts	1,426	0	40	6	37	73	1,582
Baseball/Softball Fields	2,197	2	68	12	40	144	2,463
Football/Soccer Fields	1,057	2	30	5	16	79	1,189
Open Recreation Fields	1,284	0	152	17	72	238	1,763
Golf Holes	565	18	54	18	3,786	269	4,710
Playgrounds/Tot Lots	1,566	0	71	3	44	54	1,738
Tennis Courts	2,862	10	238	17	1,116	632	4,875
Skating Rinks (per 1000 sq. ft.)	2,999.5	0.0	686.8	10.6	340.8	461.6	4,499.3
Swimming Pools (per 1000 sq. ft.)	749.2	0.0	242.5	31.1	680.3	435.7	2,138.8
Ski Lift (people per hr.)	4,355	0	14,801	0	87,010	7,500	113,666
Trail-Based Facilities							
Trails (miles)	887.2	13.0	1,458.4	140.7	281.3	859.5	3,640.1
RV Trails	32	0	40	6	5	8	91
RV Trail (miles)	57.3	0.0	384.8	13.2	47.0	1.1	503.4
Designated Handicapped Trails	65	0	10	4	4	19	102
Water-Based Facilities							
Boat Ramps	284	2	138	9	99	30	562
Boat Slips and Moorings	4,964	0	28	1	17,662	286	22,941
Freshwater Bodies	1,402	19	422	36	266	491	2,636
Freshwater Body Acreage	37,883	214	60,351	1,854	6,550	9,318	116,170
Freshwater Beach (miles)	47.1	0.0	7.5	3.5	7.8	29.6	95.5
Saltwater Beach (miles)	74.0	0.0	28.0	15.8	7.0	17.7	142.5
Tidal Frontage (miles)	227.4	1.2	67.4	32.4	20.6	70.2	419.2
Support Facilities							
Comfort Stations	547	5	278	48	327	279	1,484
Developed Spectator Seating	114,664	3,300	49,101	31	50,740	61,407	279,243
Equipment Concessions	41	0	27	1	138	11	218
Food Concessions	203	1	52	10	330	58	654
Summer Parking Spaces	239,420	2,023	50,456	11,307	132,783	70,696	506,685
Winter Parking Spaces	175,073	513	31,743	7,674	70,586	45,808	331,397
Stages/Band Shells	90	2	17	3	12	16	140
Visitor Centers	26	0	20	9	20	54	129

*Unclassified sites = 23 (1,124 acres)

Table 2. Participation rates by activity group (Percent).

Activity Group	Percent Rate	Individual Activity
Water-Based:		
Swimming	50	Scuba Diving
		Snorkeling
		Swimming
		Water Sports
Boating	11	Board Sailing
		Boating
		Canoeing
		Power Boating
		Row Boating
		Sailing
		Water Skiing
Fishing	7	Freshwater Fishing
		Ice Fishing
		Saltwater Fishing
Trail-Based:		
Walk-Jog-Run	33	Jogging
		Running
		Walking
Bicycling	9	Bicycling
Winter-Based:		
Downhill Skiing	15	Downhill Skiing
X-Country Skiing	8	Snowshoeing
		X-Country Skiing
Ice Skating	8	Ice Hockey
		Ice Skating
Recreation or Field-Based:		
Tennis	8	Tennis
Golf	7	Golf
Field Sports	6	Field Hockey
		Football
		Frisbee
		Kite Flying
		Lacrosse
		Soccer
		Softball
		Volleyball
Natural Resource-Based:		
Camping	6	Backpacking
		Camping
		Tent Camping
		Trail Camping
Hiking	4	Hiking
Picnicking	3	Picnicking

trends and patterns relevant to state planning efforts. New methods of assessment and the inclusion of qualitative features within the supply and demand analysis process were twists of the planning process. A action-oriented assessment tool, term importance-effectiveness scale was helped to identify planning issues which needed attention both at the state and regional level. Planners, administrators and managers were extensively involved in the planning process throughout the study. New methods for updating the inventory data and including the data within the framework of the state's geographic information system are now underway.

Nevertheless, the success of this document, of course, will ultimately be determined by those who find it useful in their efforts to protect the state's valuable natural resources and by those within other states who may find these methodological approaches helpful in developing their own statewide comprehensive outdoor recreation plans.

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Table 3. Annual activity days of participation in outdoor recreation activities by region.

Activity Group	Berk-shires N=239	Conn Valley N=501	Central Mass N=305	NE Mass N=431	MDC N=591	SE Mass N=478	Cape & Islands N=434	Statewide Total N=2,979
Boating	121,198	105,957	1,068,239	3,013,562	3,263,468	1,671,875	736,855	9,981,154
Fishing	183,223	887,492	547,047	1,903,302	1,185,405	504,109	542,054	5,752,632
Swimming	4,183,347	8,386,884	10,609,246	14,190,175	23,695,679	16,895,278	6,656,804	84,617,413
Bicycling	317,637	2,313,162	1,641,482	2,803,686	6,765,756	2,214,598	1,738,496	17,794,817
Walk-Jog-Run	7,178,747	18,217,824	9,367,163	19,377,796	58,617,170	28,707,035	6,820,252	148,285,987
Camping	13,216	417,171	313,327	455,639	362,828	752,485	28,291	2,342,957
Hiking	138,168	565,588	175,035	880,518	1,058,664	139,182	24,606	2,981,7
Picnicking	46,857	401,126	102,061	197,059	653,091	265,916	173,017	1,839,127
Downhill Ski	390,288	855,736	928,756	2,598,616	3,787,332	1,589,838	210,937	10,361,503
Ice-skating	176,277	551,549	326,510	795,926	1,585,511	1,079,505	141,933	4,657,211
X-Country Ski	108,132	668,544	186,261	795,926	1,436,403	308,915	140,625	3,644,806
Field Sports	132,724	1,169,952	1,211,124	2,291,012	3,882,761	1,774,281	185,440	10,647,294
Golf	87,106	1,113,126	1,627,874	1,960,978	3,733,654	1,499,313	456,467	10,478,518
Tennis	290,154	1,016,855	426,615	2,979,918	5,840,047	1,861,411	610,138	13,025,138

Table 4. Participation rates in outdoor recreation activities by region (percent).

Activity Group	Berk-shires N=239	Conn Valley N=501	Central Mass N=305	NE Mass N=431	MDC N=591	SE Mass N=478	Cape & Islands N=434	Statewide Total N=2,979
Boating	6	10	7	15	11	10	13	11
Fishing	6	9	6	10	4	4	11	7
Swimming	46	47	51	49	46	53	55	50
Bicycling	5	8	9	8	9	7	14	9
Walk-Jog-Run	47	27	26	29	38	32	33	33
Camping	2	10	8	6	3	7	3	6
Hiking	5	7	4	6	5	2	2	4
Picnicking	3	6	3	1	4	2	4	3
Downhill Skii	17	12	12	19	18	13	11	15
Ice Skating	8	8	8	10	8	8	4	8
X-Country Skii	7	10	5	10	8	4	9	8
Field Sports	2	7	9	8	7	5	3	6
Golf	3	7	8	7	7	5	9	7
Tennis	7	6	5	7	11	8	10	8

Table 5. Dissatisfaction with outdoor recreation opportunities by region (percent).

Activity Group	Berk-shires N=239	Conn Valley N=501	Central Mass N=305	NE Mass N=431	MDC N=591	SE Mass N=478	Cape & Islands N=434	Statewide Total N=2,979
Boating	20*	33	17	45	23	17	3	23
Fishing	33*	15	40*	38	18	25*	15	24
Swimming	10	32	30	36	29	20	15	25
Bicycling	0*	29	0*	23	16	27	12	19
Walk-Jog-Run	7	17	22	29	13	10	13	15
Camping	33*	30	40	33*	30	27	50*	33
Hiking	0*	8	25*	46	25	0*	0*	18
Picnicking	0*	23	29*	29*	25	29*	25*	26
Downhill Ski	24	34	24	49	51	67	67	47
Ice Skating	0	60	29	37	10	13	17	24
X-Country Ski	7	7	44*	38	27	40	38	26
Field Sports	0*	0	0	46	20	14	0*	15
Golf	0*	9	27	13	17	8	11	13
Tennis	9	25	14*	19	22	11	31	20

* Sample too small (N<10) to yield meaningful results, presented for descriptive purposes only.

Table 6. Visitation rates to coastal beaches and satisfaction with coastal access by region (percent).

Region In Which Beachgoer Resides	Region Where Beachgoer Usually Travels: NE Mass	MDC	SE Mass	Cape & Islands	Percent Visiting Mass Coast	Percent Satisfied W/ Access to Coast
The Berkshires	12	5	3	79	26	77
Connecticut Valley	24	4	6	66	34	66
Central Massachusetts	18	6	11	65	49	65
Northeastern Massachusetts	72	4	4	21	62	58
MDC	16	31	10	43	54	68
Southeastern Massachusetts	3	9	37	51	50	80
Cape & Islands	1	0	4	95	60	69
Statewide Total	22	10	12	56	49	69

Table 7. Duration of travel time to participate in outdoor recreation activities by region (minutes).

Activity Group	Berk-shires N=239	Conn Valley N=501	Central Mass N=305	NE Mass N=431	MDC N=591	SE Mass N=478	Cape & Islands N=434	Statewide Total N=2,979
Boating	45	20	58	23	45	43	10	45
Fishing	20	18	30	15	30	45	15	34
Swimming	15	15	20	20	20	23	6	25
Bicycling	0	20	30	18	23	10	15	11
Walk-Jog-Run	20	30	15	45	20	15	25	10
Camping	*	85	105	120	120	60	180	109
Hiking	18	15	*	60	30	*	*	54
Picnicking	*	20	*	*	15	25	12	16
Downhill Skiing	60	60	45	120	120	150	180	120
Ice Skating	15	10	10	15	10	10	10	10
X-Country Skiing	20	20	20	30	30	70	20	30
Field Sports	*	13	5	10	10	5	10	10
Golf	*	15	18	20	15	15	10	15
Tennis	15	10	5	10	10	10	9	10

* Sample too small (N<10) to yield meaningful results.

Table 8. Statewide supply and demand analysis.

Activity Group	Demand (act. days)	Carrying Capacity (act. days)	Need (S-D=Need) (act. days)[1]	Deficit Surplus[2]	Dis-satisfied (percent)	Travel Barrier (minutes)	State Need Rank
Resource-Based:							
Camping	42,722	100,920	58,198	57.7%	33.0%	109	9
Hiking	43,915	292,184	248,269	85.0%	18.0%	54	12
Picnicking	59,402	368,295	308,893	83.9%	26.0%	16	11
Sports/Recreation:							
Field-Based Activities	144,190	227,640	83,450	36.7%	15.0%	10	6
Golf	167,881	124,344	-43,537	-35.0%	13.0%	15	2
Tennis	202,074	117,000	-85,074	-72.7%	20.0%	10	1
Water-Based:							
Boating	243,692	210,670	-33,022	-15.7%	23.0%	45	3
Fishing	99,943	199,857	99,914	50.0%	24.0%	34	8
Swimming	2,959,499	4,401,972	1,442,473	32.8%	25.0%	25	4
Winter-Based:							
Downhill Skiing	294,747	454,664	159,917	35.2%	47.0%	120	5
Ice-skating	64,846	105,734	40,888	38.7%	24.0%	10	7
X-Country Skiing	119,406	292,184	172,778	59.1%	26.0%	30	10

1 Positive number indicates amount of surplus in activity uses; negative indicates amount of shortage per design day.
2 Percentage is based on the proportion of current supply; positive percentage indicates surplus; negative indicates a deficit.

Table 9. Planning preferences by region (percent).

Preferences	Berk-shires N=239	Conn. Valley N=501	Central Mass N=305	NE Mass N=431	MDC N=591	SE Mass N=478	Cape & Islands N=434	State-wide N=2,979
Water-Based vs. Land-Based								
Water-Based Facilities	16 (64)	26 (104)	26 (104)	26 (104)	22 (88)	27 (108)	27 (108)	25 (100)
Land-Based Facilities	46 (153)	31 (103)	30 (100)	24 (80)	23 (77)	36 (120)	25 (83)	30 (100)
Equal Emphasis	30 (91)	34 (103)	26 (79)	35 (106)	42 (127)	29 (88)	31 (94)	33 (100)
Maintenance vs. Development								
Maintaining Existing Areas	62 (119)	53 (102)	51 (98)	41 (79)	50 (96)	60 (115)	53 (102)	52 (100)
Developing New Areas	19 (100)	23 (121)	21 (111)	18 (95)	15 (79)	20 (105)	21 (111)	19 (100)
Equal Emphasis	13 (65)	17 (85)	18 (90)	33 (165)	24 (120)	14 (70)	18 (90)	20 (100)
Recreation vs. Conservation								
Recreation Areas	64 (188)	29 (85)	28 (82)	27 (79)	31 (91)	49 (144)	23 (68)	34 (100)
Conservation Areas	14 (44)	39 (122)	36 (113)	33 (103)	31 (97)	26 (81)	4232 (131)	(100)
Equal Emphasis	13 (52)	23 (92)	27 (108)	33 (132)	28 (112)	19 (76)	28 (112)	25 (100)
Other State Planning Issues:								
Issue								
Percent Unaware of State Areas	25 (86)	27 (93)	25 (86)	30 (103)	30 (103)	31 (107)	44 (152)	29 (100)
Percent Dissatisfied with State Areas	7 (78)	13 (144)	15 (167)	8 (89)	8 (89)	6 (67)	69 (67)	(100)
Percent Dissatisfied with Number of Public Campgrounds	13 (108)	12 (100)	14 (117)	11 (92)	9 (75)	15 (125)	11 (92)	12 (100)

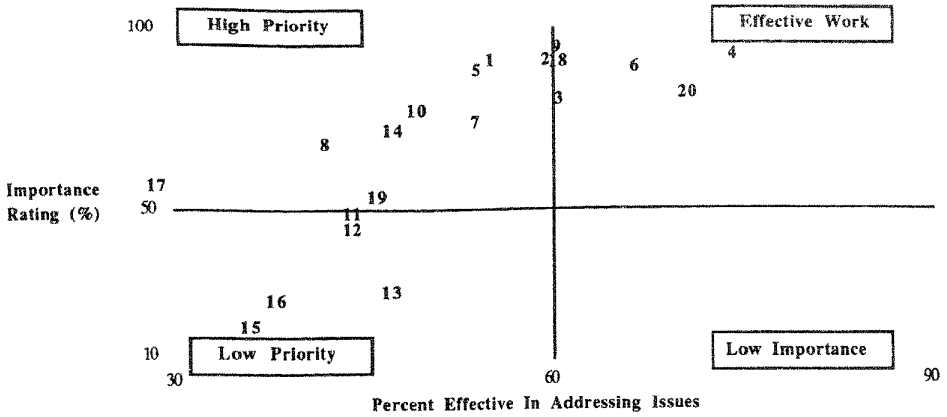
(%) Indexed to statewide total.

Table 10. Supply and demand analysis for Connecticut River Region.

Activity Group	Demand (act. uses)	Carrying Capacity (act. uses)	Need (S-D=Need) (act. uses)1	Deficit Surplus2	Dis-satisfaction Index	Travel Barrier Index	Regional Need Rank
Resource-Based:							
Camping	8,876	12,232	3,356	27.4%	91.2%	87.7%	6
Hiking	8,317	38,533	30,216	78.4%	45.1%	60.1%	12
Picnicking	9,285	66,790	57,505	86.1%	88.5%	108.0%	7
Sports/Recreation:							
Field-Based Activities	17,005	44,436	27,431	61.7%	0.0%	83.2%	10
Golf	15,848	18,150	2,302	12.7%	68.4%	101.0%	5
Tennis	14,780	15,222	442	2.9%	126.3%	152.6%	3
Water-Based:							
Boating	23,347	10,618	-12,729	-119.9%	142.3%	94.7%	1
Fishing	13,427	35,681	22,254	62.4%	62.5%	85.5%	8
Swimming	297,407	251,764	-45,643	-18.1%	127.6%	120.7%	2
Winter-Based:							
Downhill Skiing	21,447	97,080	75,633	77.9%	71.7%	64.1%	9
Ice-skating	7,080	17,376	10,296	59.3%	246.9%	100.1%	4
X-Country Skiing	16,755	38,533	21,778	56.5%	25.7%	41.8%	11

1 Positive number indicates amount of surplus in activity uses; negative indicates amount of shortage per design day.
2 Percentage is based on the proportion of current supply; positive percentage indicates surplus; negative indicates a deficit.
* Sample too small (N<10) to yield meaningful results, presented for descriptive purposes only.

Figure 3. Importance -- effectiveness graph of statewide planning issues.



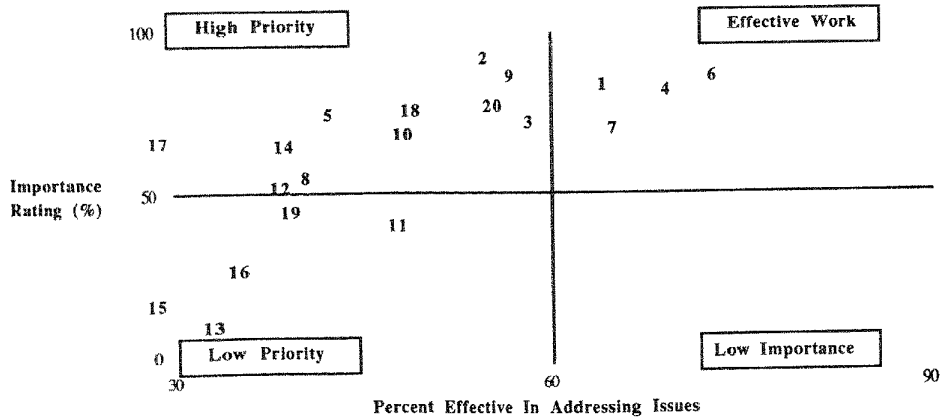
Issues key by grouping and number.

Acquisition and Protection of:
1. Recreation Areas
2. Conservation Areas
3. Cultural Areas
4. Wetlands
5. Scenic Areas
6. Water Supply Areas
7. Wildlife Habitat

Development and Expansion of:
8. Trail Corridors
9. Recreation Bodies
10. Water-Based Recreation
11. Access to Inland Waterways
12. Wetland Recreation
13. Ocean Access
14. Handicapped Access

Other Planning Issues:
15. Provision of Campgrounds
16. Recreation Use of Reservoirs
17. Management or RVs
18. Maintenance of Rec Facilities
19. Recreation Day Care Programs
20. Liability Issues

Figure 4. Importance - effectiveness graph of planning issues for Connecticut Valley Region.



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INTEGRATING ECOLOGICAL & SOCIAL IMPACTS INTO BARRIER BEACH MANAGEMENT [1]

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This paper integrates the findings from ecological and social impact studies on barrier beaches to demonstrate the value of an inter-disciplinary approach to visitor impact management. The ecological research described the magnitude of the impact, while the social research evaluated mitigation strategies that were acceptable to the public. Combining the empirical data from both research disciplines yielded an effective management strategy that would not have occurred had the findings from either discipline been considered separately.

Recreational use may influence the amount and diversity of the vegetation and soil found in a resource, the behavior and populations of various wildlife species, and the quality of the visitors' experience. Each type of impact has its own body of literature and the existing knowledge pertinent to a particular discipline is well documented (Ream 1980, Cole and Schreiner 1981, Shelby and Heberlein 1986). Relatively little attention, however, has focused on integrating the findings across ecological and social research (Kuss, Graefe and Vaske 1989). This failure to integrate the available empirical evidence has limited the application of research data to visitor impact management because natural resource planners must contend with both ecological and social issues; not one or the other. Moreover, ecological and social impacts are often interrelated. Perceptions of ecological disturbance, for example, may influence the quality of a visitor's experience in much the same way as conflicts arising from other user groups.

Although much has been written about the advantages which result from an interdisciplinary approach to visitor impact management and the need to improve the researcher - practitioner relationship, resolution of these issues remains a major stumbling block. This paper seeks to overcome these problems by integrating the findings from previous research on visitor impacts on vegetation (Carlson and Godfrey In press), wildlife (Rimmer and Deblinger In press), and recreationists' behavior and beliefs (Hayward and Marston 1986, Donnelly and Vaske 1989) into a comprehensive barrier beach management plan. All studies were funded by and occurred on properties owned by The Trustees of Reservations in an attempt to better understand these fragile ecosystems and the ever-growing number of visitors who use them. Similarities and differences inherent to the ecological and social impact literature are discussed first.

Differences Between Ecological and Social Research

In general, the differences between the two areas of emphasis center around different research procedures and associated difficulties and limitations. Ecological impacts occur within ecosystems characterized by complex interactions between plant and animal species. Wall and Wright (1977) suggest four factors which limit ecological studies and introduce difficulties in identifying human impact: 1) there is often no baseline data for comparison to natural conditions; 2) it is difficult to disentangle the roles of man and nature; 3) there are spatial and temporal discontinuities between cause and effect; and 4) in light of complex ecosystem interactions, it is difficult to isolate individual components. Some impacts take the form of naturally occurring processes that have been speeded up by human interference (Wall and Wright 1977). In other cases, human disturbances become insignificant when compared to natural fluctuations (Schreyer 1976).

Impacts on wildlife are perhaps most difficult to identify. Research findings are often mixed and animal responses to human intruders are divergent, even in a single species (Ream 1980). Many studies and individual accounts describe avoidance behavior by animals as a result of human interaction, but less research has focused on the actual effects of this behavior. The piping plover (*Charadrius melodus*), for example, can be displaced while incubating eggs by recreationists who venture too close to the nest. The energetic cost of disturbance to the adult, however, has not been measured; nor have the costs of disturbance that result in nest destruction and subsequent re-nesting. Nesting twice is common but may result in smaller, less mature chicks going into their first migration. In addition, very little attention has been given to the relationships between numbers of visitors and wildlife behavior and population variables.

Research on social impacts avoids the problem of multiple species and concentrates on only the human response to other visitors. As a result, many studies can be identified which deal specifically with relationships between use levels and visitor experience parameters. The understanding of social impacts, however, remains

1 This report represents the efforts of many individuals. The authors would like to thank Wayne Mitton, Thomas Foster and Dave Rimmer of The Trustees of Reservations; Paul Godfrey and Lars Carlson of the University of Massachusetts; Robert and Edith Potter and Elliot Surkin. Funding for this project was provided by The Trustees of Reservations, The Island Foundation, The Loomis-Sayles Charitable Foundation and The University of New Hampshire.

incomplete because of the complexity of human values and behavior. In addition, some types of social impacts are difficult to evaluate due to logistical constraints. Displaced visitors who no longer use a given area, for example, cannot be located easily. Psychological adjustments visitors make when confronted with too many people require elaborate procedures which are usually beyond the time and budget constraints of most field studies.

Similarities Between Ecological and Social Research

Despite these differences, there appear to be several general areas where ecological and social research overlap. A recent review of the scientific literature related to visitor impact management (VIM) (Kuss and others 1989) concluded that there are five major sets of considerations that are critical to understanding the nature of both ecological and social impacts:

1) Impact interrelationships
2) Use-Impact relationships
3) Varying tolerances to impacts
4) Activity-specific influences
5) Site-specific influences

1. Impact Interrelationships

There is no single, predictable environmental or behavioral response to recreational use. Instead, an interrelated set of impact indicators can be identified. Some forms of impact (e.g., loss of vegetative cover) are more direct or obvious than others (e.g., displacement of wildlife species or altered visitor experiences), but any impact indicator or combination of indicators could become the basis for a management strategy. To understand how the natural environment, wildlife populations or the visitor's experience in a given area are affected by recreational use, it is necessary to consider a range of possible impact variables.

Ecological impacts. Recreational use of barrier beaches affects soil and vegetation in a variety of ways. The most typical vegetation impacts include direct reduction in plant growth and ground cover needed for dune stabilization. Factors that can contribute to a decline in plant vigor include sand compaction, trampling and erosion (Godfrey and Godfrey 1981).

Impacts of recreation on wildlife can be a direct result of harassment of animals or can occur indirectly through loss of habitat, food supply or productivity. Direct wildlife harassment, includes "events which cause excitement and/or stress, disturbance of essential activities, severe exertion, displacement and sometimes death" (Ream 1979, p. 153). Harassment can be either intentional or unintentional. For example, major impacts result from recreationists in "nonconsumptive" activities such as beach visitors who unknowingly produce stressful situations for wildlife (Wilkes 1977, Ream 1979).

Studies examining the indirect influence of human activity on wildlife behavior and population levels document a loss of habitat and reductions in productivity rates as a response to human interference. Research on shorebirds suggests that disturbing nests causes adults to fly off, leaving eggs vulnerable to predation (Rimmer and Deblinger In press). For young birds, disturbance can lead to premature flight and increased injury and predation (Garber 1972). On barrier beaches, predators sometimes have a greater impact on shorebird population levels than does human disturbance (Rimmer and Deblinger In press).

Social impacts. The presence of other visitors in a recreation setting may directly or indirectly influence a person's perceptions of the experience. Recreational use leads most directly to tangible outcomes like contacts between visitors or impacts on the natural environment (e.g., tire ruts from off-road vehicles [ORVs]). These social and natural impacts lead to a variety of perceptual and behavioral responses by recreationists such as increased crowding, conflicts between users or negative evaluations of the environment. Not all of these indirect impacts will occur in all situations. For example, individuals who visit a barrier beach to be with their friends in a social atmosphere may not be disturbed by the presence of ORVs. On the other hand, visitors who prefer a solitude walk along the beach may find ORVs incompatible with the kind of experience they expected. The intrusion of just one vehicle and the ruts from dune's edge to waterline can disturb the aesthetic values hikers and birdwatchers seek (Noe, Hull and Wellman 1982). The response to a given situation is thus interrelated with the individual's expectations and preferences.

2. Use-Impact Relationships

The relationships between use levels and various impact variables are neither simple nor uniform. Most impacts do not exhibit a direct linear relationship with user density. Use-impact relationships are influenced by several aspects of use intensity and a variety of situational factors.

Ecological impacts. The available evidence indicates that the relationship between use intensities and vegetative cover is curvilinear, with even low use resulting in a substantial loss in the original vegetation (Cole 1982). A major shift in vegetative cover typically follows the initial loss in cover. Delicate and fragile species are replaced by more resistant species (Verburg 1977). The extent of impact is more closely related to inadequate trail design, location and maintenance than to overuse (Helgath 1975). The intensity of damage is primarily a function of site factors and type of use, while the area of damage is a function of the number of users (Bratton, Hickler and Graves 1977).

In general, impacts by barrier beach users take the form of vegetation trampling as a result of pedestrian or ORV use. Although American beachgrass (*Ammophila brevigulata*) can withstand constant climatic pressure at the ocean's edge, it is prone to trampling and easily destroyed (Godfrey and Godfrey 1981). Once areas become devoid of vegetation, erosion due to wind or water can result in dune destruction and eventually a breach in the barrier.

Wildlife endemic to barrier beaches can be affected by pedestrians and ORV users. Shorebirds which nest on or nearby the beach, such as least terns (*Sterna antillatum*) and piping plovers, have become increasingly scarce due to man's usurpation and overuse of beach habitats (Deblinger and Rimmer In preparation). Both species evolved cryptically colored eggs to avoid predators and thus many nests are inadvertently trampled by beach users.

Social impacts. Amount of use affects the quality of the recreation experience, but only through a series of mediating variables (e.g., preferences, expectations, prior experience, etc). The premise that satisfaction should decrease in a direct linear fashion as the number of users increases has not been substantiated (see Table 1 in Graefe, Vaske and Kuss 1984). Instead, research has shown that overall satisfaction may remain high even as rising numbers of users leads to increased contacts and perceptions of crowding. Crowding perceptions are influenced by the number of users present; however, perceptions of crowding can be predicted much more accurately when user density is examined in combination with other individual, situational and activity variables (Graefe and others 1984).

3. Varying Tolerance to Impacts

One of the most important factors affecting use-impact relationships is the inherent variation in tolerance among environments and user groups. All organisms and recreationists do not respond in the same way to encounters with users. Some may benefit at the expense of others who are injured or displaced.

Ecological impacts. Plants and soils vary in their response to impacts. Factors responsible for variations between and within ecosystems are based upon the genetic constitution of the organism, the generic properties of soils, and external factors of the environment. In general, herbaceous plants most resistant to impacts have common morphological and physiological features which allow them to withstand greater traffic pressures. Barrier beaches, however, are typically dominated by grass species such as American beachgrass which has evolved tolerance to withstand natural impacts associated with the ocean but is intolerant to trampling.

The response of wildlife to human disturbance is neither uniform or consistent. Different types of wildlife have different tolerances for interactions with humans. Wildlife that are least tolerant of human intrusion are often the same species whose existence is already threatened by man, such as the piping plover.

Social impacts. Not all individuals are equally tolerant of increasing recreational use. Normative models (Vaske, Shelby, Heberlein and Graefe 1986) have been proposed for identifying tolerance levels acceptable to recreationists engaged in different activities such as ORVs and sunbathing. The normative approach offers a direct means of establishing evaluative standards for visitor impact management. Such standards are applicable, however, only when there are shared values about the type of experience and level of social interaction that should be provided.

Impact norms are "activated" when certain conditions are met (Heberlein 1975). First, individuals need to possess an awareness of the consequences their behavior has on the needs of others or on the physical environment. Second, individuals must accept some responsibility for their actions. The extent to which people are aware of the consequences and ascribe some personal responsibility influences how situations are evaluated (Donnelly and Vaske 1989). Acceptance of rules and regulations regarding ORV use may depend to a significant degree on whether 4-wheel drive users are aware of the problems their actions may have on the environment as well as the experience of other recreationists, and whether they are willing to accept blame for those problems.

4. Activity-Specific Influences

Some recreational activities create impacts faster or to a greater degree than other types of activity. Impacts can vary even within a given activity according to type of transportation or equipment used and visitor characteristics such as party size and group behavior.

Ecological impacts. Different activities may result in little or no modification of the natural environment or produce serious environmental degradation. In general, those activities which allow active physical contact with the environment, those which concentrate use, and those that require vehicular means of off-road travel, are thought to have the greatest impact on plant cover and soils.

Studies examining the influence of human activity on wildlife behavior and population levels document a loss of habitat as a response to ORV use. Research on small animals has found that movement and feeding patterns can be modified by vehicle traffic and roads (Stebbins 1974). Turtle nesting sites, for example, are easily compacted by ORVs and the tire ruts disorient the turtles as they return to the sea. Research on shorebirds also suggests that nesting habitats are easily destroyed by ORV activity (Bart 1977). Other studies (Blodget 1978), however, show that out-of-vehicle activity can be more disturbing to shorebirds than vehicular traffic. In general, birds and amphibians are affected more by indirect impacts such as the modification of the structure of the vegetation than by direct interaction with humans.

Social impacts. The responses of individuals to contacts with others may vary according to the types of activity and behavior that one encounters. An individual may be quite tolerant of contacts with sunbathers and extremely intolerant of contacts with ORV's. The extent to which one type of use impacts another depends upon the social and personal norms visitors use to evaluate the appropriateness of specific behaviors. Method of travel and group size serve as visible cues for determining the extent of perceived similarity between different user types. Differences in the recreationists' intensity of participation, range of experiences and tolerances for lifestyle diversity are all important psychological determinants which influence the acceptability of others. Conflicts result when recreationists with different behavioral standards interact with each other. The extent of conflict is influenced by the degree to which various user groups perceive each other as dissimilar.

Site-Specific Influences

The impacts of recreation are influenced by a iety of site-specific and seasonal variables. Given a sic tolerance level to a particular type of recreation, outcome of recreational use may still depend on the ıe and place of the human activity.

Ecological impacts. Physical factors of the vironment mediate the rate of change induced by creational use. Wet habitats, for example, are more ıickly denuded by trampling than dry areas. Plants ıder stress from other factors such as nutrient and oisture deficiencies may respond differently to impacts ıe to these factors rather than because of genetic lvantages or disadvantages. Plant sensitivity to impacts ıries not only between locations but also within ıcations due to variations in stand density, extent of lant cover, community interactions, soil productivity nd microclimate. Site factors focus on climatic ınsiderations such as temperature and water elationships, elevation, slope and soils. Distribution of ıils and soil depth are influenced by position in the ındform. Soil fertility and productivity are important eterminants to plant establishment, growth and vigor.

Impacts of recreation on wildlife are influenced y environmental and seasonal factors at the site of ıpact. Recreation visitors may produce critical ituations at some times (nesting seasons) and have no ffect on the same species under other conditions. ietting effects appear to be strongly tied to species' ıabitat requirements and utilization. Thus, for example, vhere food is abundant, wildlife tolerance to disturbance nay increase. On the other hand, some wildlife may be especially susceptible in feeding areas. In addition, if vildlife is already under stress from limited food or other environmental conditions, encounters with humans may ıe especially serious. It is well established in the iterature that human-wildlife interactions should be ıvoided at fundamental and critical habitat areas and seasons.

Social impacts. Evaluations of recreation experiences are influenced by the geographical characteristics of the setting (e.g., winding rivers versus ıpen beaches) and by users' perceptions of human-induced impacts on the natural environment. Visitors appear to be more sensitive to clear evidence of other humans (e.g., litter), than to either the mere presence of additional recreationists or the more serious impacts found on site conditions such as eroded, rutted trails. Factors which influence environmental perceptions include: 1) past experiences in the area, and 2) the importance recreationists attach to particular environments.

An Integrated Management Framework

Managing to mitigate recreation impacts requires an understanding of the nature of the impacts and the factors related to their occurrence. The five issues summarized above represent important management considerations regardless of the type of impact -- ecological or social. More than research and scientific information, however, is required for successful management. There appears to be agreement among most researchers and managers that the determination of any visitor impact management strategy requires two separate elements (Stankey 1980, Shelby and Heberlein 1986, Kuss and others 1989). The first involves a description of the relationships between specific conditions of use (e.g., types of use, site factors, amount of use) and the impacts associated with these conditions. The second component refers to an evaluative dimension which incorporates value judgments about the acceptability of various impacts.

The descriptive component is concerned with the observable characteristics of a recreation system. Two types of descriptive data are important: management parameters and impact parameters (Shelby and Heberlein 1986). Anything an agency can directly manipulate is a management parameter. Examples of management parameters include seasonal restrictions on use or the type of use that is permitted. Impact parameters describe what happens to visitors or the environment as a result of visitor use patterns and other management parameters (Shelby and Heberlein 1986). The percent loss of dune vegetation, changes in wildlife density and species diversity, or the frequency of encounters between different user groups are examples of impact parameters.

In examining how the number, type and distribution of people using a given area affect the condition of the environment and the recreation experience, the descriptive component identifies how the system works, but it does not determine how an area should be managed. This determination requires input from the second component of visitor impact management: evaluation. The evaluative component considers the different objective states produced by management parameters in an effort to determine their relative merits (Shelby and Heberlein 1986). For successful implementation, it is important that this evaluation result in a set of standards specifying the type of experience to be provided in terms of appropriate impact parameters as well as the degree of environmental modification acceptable to management.

The above discussion demonstrates that visitor impact management is a relative concept involving both scientific and judgmental considerations. Management programs can be determined when 1) management objectives specify the ecological and social conditions desired in a given area, and 2) research demonstrates the use configurations that will allow conditions to meet the standards selected. Unfortunately, despite the large volume of existing literature, little attention has been focused on meeting either of these conditions necessary for visitor impact management. Hendee and others (1978, p. 180) point out that, "a major shortcoming in most...management plans is the lack of objectives that allow managers to explicitly state the conditions they seek and to measure performance with regard to achieving these objectives." The purpose of this paper is to integrate the descriptive findings from ecological and social studies into an evaluative framework for managing barrier beaches.

Study Site Descriptions

Crane Memorial Reservation (Crane Beach)

The Crane Memorial Reservation, Ipswich, MA. is a 1400 acre coastal property 30 miles north of Boston

consisting of 4 miles of barrier beach as well as uplands and salt marsh. Approximately 400,000 annual visitors use Crane Beach to swim, sunbath, walk or appreciate nature. Use of the property by visitors on a daily basis is virtually unlimited due to large parking lots and small overflow parking areas. These parking lots are located on the inland side of a primary dune system which provides protection from the sea. The property is also used by rare shorebirds including the piping plover and least tern.

Cape Poge Wildlife Refuge and Wasque Reservation

The Cape Poge Wildlife Refuge and Wasque Reservation are located on Martha's Vineland, an island five miles south of Cape Cod, MA. Both properties form the eastern boundary of Martha's Vineyard. Cape Poge is 489 acres composed of 3 miles of barrier beach as well as salt marsh, fresh and brackish ponds and cedar thickets. Wasque is 200 acres and consists of heathland uplands, salt marsh, 2 fresh and brackish ponds and 2 miles of barrier beach. Cape Poge and Wasque are separated by 2 miles of privately owned barrier beach. The two areas provide opportunities for beach related recreational activities such as swimming, sunbathing and fishing, as well as 4-wheel drive usage.

Methods

Ecological Impact Studies

An ecological study to measure and mitigate the impacts of pedestrian traffic on the sand dune systems was conducted at Crane Beach during the summers of 1984 and 1985 (See Carlson and Godfrey In press for complete details of study methods). A series of parallel, permanent transects were established perpendicular to the primary dune. Vegetation cover along these dune transects was measured to assess relative pedestrian impact and subsequent erosion rates (Godfrey and Carlson In press). In addition, vertical and horizontal dune profiles were measured.

Between 1986 and 1989, The Trustees of Reservations instituted a rare shorebird research and protection program at Crane Beach, Cape Poge and Wasque. Impacts to nesting piping plovers and least terns were measured through direct observation and predator population surveys. Phenology of each nest was recorded throughout the season. Reasons for nest failure were deduced, if possible, by locating predator tracks or egg fragments in the sand, locating the closest human activity or by checking the distance of the nest from latest tide lines and potential overwash areas. Productivity was recorded as the number of fledged chicks per adult pair.

Piping plovers occur in pairs rather than colonies making nests difficult to find. Management techniques require that nests be located early in the incubation process. Two types of protection were applied. Small wire-mesh fences were installed around the nest to protect it from predators such as skunks, raccoons, foxes, gulls and crows (Rimmer and Deblinger In press). Outside of these exclosures, symbolic fencing composed of a single strand of twine was erected to eliminate disturbance by visitors. These areas were posted with signs to educate visitors about nesting shorebirds.

Social Impact Studies

A visitor use study was conducted at Crane Beach during July and August of 1985. Visitor were contacted through entrance and exit interviews as well as a mailed survey (response rate = 56%). A total of 839 visitors were contacted using these methods. Survey questions examined respondents experience with the area, their interest in nature related activities, and their evaluations of facilities and management programs (See Hayward and Marston 1986 for complete details of study methods).

Visitor use surveys were conducted at Cape Poge Wildlife Refuge and Wasque Reservation during August/September, 1987 and June/July, 1988 (Donnelly and Vaske 1989). A total of 1079 interviews were conducted during 1987 and 917 in 1988. The two page, self-administered survey contained questions pertaining to visitors: 1) prior experience with the two areas, 2) perceptions of user conflicts, 3) knowledge of impacts of different types of recreational use on wildlife and other aspects of the environment, 4) normative evaluations of the appropriate number of visitors and their impacts on the environment, 5) evaluations of current management practices, and 6) selected demographics.

Results and Management Actions

Vegetation and Dune Management

Vegetation and dune height surveys at Crane Beach indicated that dune areas between the parking lot and the ocean were significantly more impacted than areas north or south of the parking lot. Areas already impacted by foot or vehicle traffic were re-vegetated with beachgrass either transplanted from undisturbed areas at Crane Beach or purchased commercially. Dune systems in proximity to the parking areas were fenced with 3-strand smooth wire fencing, and signs erected designating the areas off-limits to the public due to dune restoration activities. Three elevated boardwalks and one vehicle ramp were constructed to transport ranger's vehicles and the public to the beach without damaging the primary dune. The dunes and plant growth were monitored for two years after implementation of the beachgrass transplantation, dune fencing, boardwalks and vehicle ramp. This follow-up indicated that the management techniques had significantly reduced human impact (Carlson and Godfrey In press).

Findings from the visitor use study (Hayward and Marston 1985) partially supported these management actions. Nearly three quarters approved of the fencing (72%), equally as many (73%) felt visitors should be prohibited from walking on the dunes, and two thirds preferred dunes with beach grass. Less support, however, was found for the boardwalks; only 45 percent of the visitors favored this management technique.

Similar to the recreationists at Crane Beach, the Chappaquiddick Island visitors considered fencing an acceptable method of protecting the dunes. The use of

boardwalks to mitigate human impact showed less support among the Cape Poge and Wasque recreationists (Donnelly and Vaske 1989). Fifty-six percent of visitors who entered the area on foot and 49 percent of the ORV users opposed this management strategy. Boardwalks do reduce impacts to dunes, but individuals at both locations were concerned that they might detract from the natural beauty of the area. It should be noted, however, that the surveys were conducted prior to boardwalk construction. Behavioral observations at Crane Beach after boardwalks were installed suggest that visitors have accepted their presence and enjoy the panoramic views they afford. Follow-up information from Chappaquiddick Island residents, however, indicates that the style of boardwalks developed at Crane Beach would not be tolerated at Cape Poge/Wasque. For these residents, a less obtrusive boardwalk might be acceptable.

Wildlife Management

Protection of least terns from human impact was successful in that no nests were destroyed by recreationists. Unfortunately, most nests and chicks were eaten by predators (i.e. raccoons, foxes, skunks, gulls and crows). Once predator populations were assessed, a fencing technique was developed and implemented to eliminate predation on eggs (Rimmer and Deblinger In press). The fencing at Crane Beach and Cape Poge/Wasque was successful in protecting piping plover nests from human impact and predation. All protected nests were incubated for the full term and 100 percent of the nests hatched.

Results from the visitor surveys at Cape Poge/Wasque supported the shorebird fencing programs. Eighty-three percent of ORV users and 87 percent of pedestrians thought that more fencing should be used to protect rare shorebirds. Overall, visitors to Cape Poge and Wasque were concerned about the area and felt personally responsible for protecting wildlife and fragile dunes (Donnelly and Vaske 1989). When asked whether "managing for wildlife is more important than managing for other uses", 84 percent of the pedestrians and 72 percent of the ORV users said yes.

People Management

Although the visitors felt that Cape Poge and Wasque are currently well managed (93%), over half believed the areas are approaching the limit of the number of people the environment can tolerate. In recognition of this situation, approximately 75 percent of pedestrians and 50 percent of ORV users were willing to reduce the number of their visits.

Beliefs about the presence of ORVs in the area varied according to the visitors' usual method of access. Those who typically gained access on foot viewed ORVs as damaging to the environment in general (82%), the dunes (92%) and to wildlife (87%). This group also believed that 4-wheel drive users are *not* unfairly blamed for wildlife problems and favored higher entrance fees for ORV's. Although the ORV users held opposing views on these issues, 60 percent indicated their vehicles are harmful to the dunes and nearly half felt they harm wildlife.

The ORV users, however, were against a total ban on their activity, but would tolerate some restrictions on their behavior. While only 9 percent accepted the idea of not allowing ORVs at Cape Poge and Wasque, 12 percent felt banning vehicles would be alright if a public shuttle was provided and 18 percent would accept restricting ORV use to Wasque. The highest support (45%) was given for restricting vehicles when the shorebirds are nesting. Over 90 percent of the on foot visitors agreed with this latter management strategy. Interestingly, forty percent of the on foot visitors were against a total ban on vehicles.

The ORV users' sensitivity to environmental / wildlife concerns can be partially explained by their motivations for visiting Cape Poge and Wasque. Less than 10 percent of the ORV users considered 4-wheel driving as their primary reason for their visit. This means that although the ORV users accessed the area using a vehicle, driving along the beach was less important than other reasons for visiting. The vehicle served as a means to engage in a beach related activity, rather than as a primary activity itself.

Discussion

It is apparent that barrier beaches are prone to excessive human impact from pedestrian or vehicular traffic. Although management techniques to mitigate impacts have been developed, their use is not always accepted by the visiting public. By conducting ecological research to define impacts and conducting social research to assess visitors' acceptance of mitigation strategies, the natural resource manager can make decisions that are likely to reduce impacts and be supported by the public.

Evaluations of the ecological and social data at Cape Poge and Wasque suggested that problem issues tended to involve human-environmental relationships rather than human-human conflicts. Four explanations can be advanced to account for the lack of human-human conflicts. First, both pedestrians and ORV users at these barrier beaches shared a concern for protecting the dunes and wildlife populations, and indicated a willingness to modify their behavior to achieve this end. Second, because Cape Poge and Wasque are on an island, these barrier beaches experience relatively low use levels compared to other coastal recreation areas. Third, the visitors' motivations for visiting the areas were similar, irrespective of their method of access. Like the pedestrians, ORV users visited the areas to enjoy the beach, the unique scenery and fishing. The vehicle served as a means to engage in a beach related activity and was not viewed as an end in itself. This similarity in motivations and behaviors among ORV users and pedestrians may have increased the degree to which the two user groups perceived each other as similar. Fourth, although the two groups are in visual contact, they are spatially separated along the beach. This physical separation reduced the amount of direct interaction and thus lessened conflict.

Efforts to reduce human-environmental impacts can involve a number of management strategies. The

construction of elevated boardwalks at Crane Beach now appears to be accepted by visitors and serves as an excellent technique to reverse dune destruction. Survey findings and follow-up interviews at Cape Poge and Wasque, however, indicated that a Crane Beach style boardwalk would detract from the areas' aesthetic appeal. At Wasque, therefore, managers must find a compromise technique that both mitigates impact and preserves natural beauty.

Choosing an appropriate management technique to protect plovers from predators and eliminate disturbance by visitors depends upon nest location and visitor activity. Ecological studies at Crane Beach showed that predators impacted nests more than pedestrians. A metal, predator-proof fence was constructed to alleviate predation of the federally endangered piping plover. To keep the public from approaching the protective fencing, single-strand wire fences with interpretive signs were erected 50 meters around the exclosures. Because only pedestrian traffic is allowed at Crane Beach, this method when combined with visitor education programs proved effective.

When off-road vehicles are allowed in an area, single-strand fences are not as effective or popular. Management techniques for ORV use areas must be designed to physically deter vehicles and their operators. The wooden snowfencing used at Wasque has effectively eliminated ORV traffic from selected wildlife management areas. By restricting use from nesting areas during critical seasons, as opposed to prohibiting use altogether, both plovers and humans can exist sympatrically. Support for these spatial and temporal restrictions is further enhanced when beach closures are kept relatively small and recreationists understand the rationale for the closure.

Although ecologists continue to search for solutions to increase piping plover populations, it is apparent that information regarding visitor attitudes must be incorporated into that solution. At a time when the public's thirst for barrier beaches as recreational sites or locations for summer houses seems unquenchable, management strategies, such as beach closure, that do not include visitor attitude information may be deleterious to wildlife in the long run. Conversely, the combination of visitor education and management techniques that balance preservation with recreation can result in a situation where piping plovers nests can be protected from predators and recreationists, and the visiting public can still enjoy the area.

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ATTITUDES TOWARD THE MANAGEMENT OF ALLEGANY STATE PARK [1]

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Three surveys were conducted of 'publics' interested in Allegany State Park as part of the process to develop a new master plan for the park. This paper summarizes the findings relating to visitation and activity patterns, evaluation of park attributes, and issues of special concern to managing the park.

Introduction

In early 1985 the New York State Office of Parks, Recreation and Historic Preservation (OPRHP) announced its decision to prepare a comprehensive master plan for Allegany State Park. The 65,000 acre four-season, recreation facility is located in Cattaraugus County in southwestern New York State. Allegany State Park, together with the Allegheny National Forest to its south and the Allegheny Reservoir to its west, combine to form one of the largest recreational areas in the eastern United States. Allegany's forests, hills, streams, ridges, valleys, lakes and beaches offer innumerable opportunities for recreation and enjoyment by its 1.3 million park patrons each year. The master plan will address the full range of park management issues, including operations, maintenance, service delivery, infrastructure management, financial control, recreation programming, natural resource management, environmental protection, and historic preservation.

The need for a broad public survey was identified during the scoping process. General public opinion relative to the major resource considerations was seen as a special need because of their implications to the state's stewardship responsibilities. Surveys have shown that the public has strong feelings about these stewardship responsibilities.

Three groups were surveyed for this study--the general public, park users, and the Technical Advisory Task Force. Each has a legitimate claim to a prominent role in the determination of future management plans for Allegany State Park. The general public represents the region surrounding the park. The campers represent a group who make regular and intensive use of the park. The Technical Advisory Task Force represents the various interest groups concerned about the park, although its members also tend to have technically relevant knowledge. This report presents and compares the findings of the three surveys.

This paper summarizes the highlights from these surveys which investigated background characteristics, visitation patterns, activity patterns, importance and value of park attributes, and special issues of concern to Allegany State Park (Palmer 1988). The surveys provide members of the planning team and task force with a balanced perspective of diverse opinions in order to create the most socially responsible master plan for Allegany State Park and its resources.

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Procedure

Survey questionnaires were mailed to a random sample of residents living within approximately 75 miles of the park, visitors who had received an overnight camping permit during the 1982-83 season, and all members of the task force. A total of 933 responses were obtained from the general public, 1019 from the campers, and 84 from the task force. These responses are adjusted during analysis to correct for possible sampling and response bias (Palmer, 1988, p.12).

Background Characteristics

The background characteristics for each group are shown in table 1 along with 1980 Census figures for the region's population. While there are slightly more females in the region, the composition of the camper and general public surveys has slightly more males. The task force is overwhelmingly masculine, however, which is typical among the natural resource related professions. There is only modest variation in the age structure of the three survey groups. They all tend to be more middle-aged than the region's population. Respondents in all three groups tend to live with their spouse, though the campers are more likely to also live with their children. The region's population is predominantly white, though there is a significant black and small Hispanic minority. There is also a small but active Native American community living near the park. The Native Americans are proportionately represented in the two random surveys and are also represented among the task force members. The representation of the black and Hispanic minorities is low in the the public survey, and very low in

Table 1. Background Characteristics as percentage of sample.

Characteristic	'80 Census	Public	Camper	T.Force
Sex:				
Male	47.2	56.2	55.1	86.6
Female	52.8	43.8	45.9	13.4
Age:				
15 to 25 years	17.2	6.0	3.2	0.0
25 to 44 years	35.0	49.0	59.9	53.6
45 to 64 years	30.4	30.7	30.5	33.3
over 65 years	17.4	14.3	6.4	13.1
With whom do you live?				
My spouse		31.3	18.5	38.1
My spouse and children		43.9	67.9	47.6
Relatives		7.1	7.0	1.2
Non-relatives		2.6	.9	1.2
Alone		15.0	6.3	11.9
Race:				
Native American	.4	.6	.3	2.9
Black	6.7	1.8	.2	0.0
Hispanic	1.0	.4	.1	1.4
White	92.0	97.1	99.4	95.7
Education:				
Primary or secondary school	33.7	7.0	3.3	2.4
High school diploma	38.0	25.0	24.2	6.0
Some college or post-HS training	14.1	31.6	32.2	27.7
College graduate	7.1	19.6	20.8	28.9
Graduate or Professional	7.0	16.8	19.7	34.9
Occupation:				
Prof., Managerial and Technical	17.8	34.0	36.0	75.3
Clerical, Sales and Service	34.7	21.6	25.0	4.9
Farmers	.9	1.9	.2	0.0
Crafts, Operators, and Laborers	20.3	14.3	17.2	3.7
Not in labor pool	26.4	28.2	21.4	16.0
Income:				
Under $10,000		10.9	3.8	1.2
$10,000 to $19,000		22.3	16.3	12.3
$20,000 to $29,000		26.6	27.9	21.0
$30,000 to $39,000		20.2	27.6	27.2
Over $40,000		20.0	24.3	38.3

Recreation

There is clear support among all groups for providing basic amenities in the cabins. There is a nearly even split in sentiment among the public and campers over the desirability of developing a pool facility; something the task force is clearly against. Recreational trapping and bear hunting are very strongly opposed by the public and campers, and moderately opposed by task force members. All three groups are clearly opposed to the development of trails for off-road vehicles.

Preservation

There is strong support among all groups for the preservation of significant and unique environmental features such as wetlands, geological features, and rare habitat. While there is also very strong support to classify portions of the park as preserves, it is less extreme among task force members.

Forest Management for Diversity

There is clearly a pattern of greater support for the practice of forestry in the park among task force members than the general public or campers. In particular, the task force supports increasing diversity through cutting trees, while the public and campers indicate strong support for allowing diversity to increase naturally. This division in feeling is particularly evident in the use of vegetation management to improve hunting; a practice supported by task force members and opposed by the public and campers. However, the same general split is evident to some extent in relation to cutting trees for any reason. If it is necessary to cut trees in the park, campers and the public want it done only by state workers while the task force supports the use of private contractors under park staff supervision. The only forest management issue over which there is very strong agreement is that the Allegany State Park forest should not be cut to generate funds for use outside the park.

Oil and Gas Development

The greatest variation in sentiment among the three groups concerns oil and gas development. Campers are clearly opposed to any oil and gas exploration, development or extraction in the park. In contrast, the task force members indicate moderate support for these activities, particularly for park use or benefit. The general public is more evenly divided on the issue of development, although they seem to moderately support specific development used for the park's benefit. All three groups support the investigation of

Table 6. Comparison of groups' mean ratings for special issues and concerns.

	Public	Campers	Task Force
Nuisance wildlife control issues.			
Controlled hunting of bear and raccoons should be allowed when they become a nuisance or threat to park patrons.	6.67	6.26	6.95
The installation of dumpsters and increased public awareness should be used to help control nuisance raccoon over-populations.	7.59	7.46	7.39
Trapping of raccoons should be allowed when they become a nuisance or threat to park patrons.	6.33	5.82	7.26
Trapping of beaver should be conducted to control:			
• Flooding of buildings and roads.	5.96	5.49	7.25
• Adverse impact on forests and trout streams.	5.77	5.37	6.83
Trapping should not be conducted in the park under any circumstances.	3.95	4.53	2.90

Table 6 continued.

	Public	Campers	Task Force
Recreation issues.			
Trails for trailbikes and ATVs should be developed somewhere in the park.	3.67	2.42	3.01
Pool swimming should be developed in addition to the park's two existing beaches.	4.94	5.10	4.20
Trapping should be permitted as a recreation activity.	2.64	1.94	4.75
Hunting of bear should be allowed as a recreation activity.	2.80	2.18	4.44
Amenities, such as electricity, running water and separate sleeping areas should be provided in cabins.	6.29	6.28	5.89
Preservation issues.			
Portions of the park should be classified as preserves where any changes that occur are primarily the result of natural processes or event.	7.96	8.18	6.93
Significant and unique environmental features should be preserved (e.g. wetlands, geological features, rare or endangered habitats).	8.26	8.52	8.11
Preserve areas are not needed in the park.	1.92	1.74	2.42
Forest management/diversity issues. One option is to cut trees in the park to develop greater diversity (type and extent of plant and wildlife species and habitats). Diversity will increase naturally but it may take hundreds of years.			
Diversity should be allowed to increase naturally.	6.21	6.73	5.10
Diversity should be increased by cutting trees.	4.07	3.66	5.83
Diversity is not important to my recreation.	4.81	4.54	3.84
Controlled cutting of trees should be conducted to:			
• Improve hunting.	3.22	2.68	5.49
• Improve wildlife observation.	5.73	5.43	6.44
• Improve bird watching.	5.13	4.91	6.27
• Improve trails.	6.09	5.98	7.12
• Improve scenic vistas.	6.03	5.62	6.89
• Provide firewood for park patrons.	4.21	4.15	5.00
• Provide wood for facility rehabilitation in state parks.	5.26	5.27	6.34
• Generate money for state park.	4.78	4.14	5.44
• Generate money for public purposes.	2.83	2.18	2.58
If trees are to be cut, they should be cut by:			
• Commercial contract under the supervision of park staff.	4.50	3.65	6.00
• State park workers only.	6.17	6.70	4.75
Oil and gas development issues. Subsurface rights to the oil and gas resources below Allegany State Park are owned by the state and private interests. Development of these resources may be accompanied by certain environmental disruption.			
The state should develop these resources to:			
• Heat buildings within the park.	5.63	4.87	6.02
• Generate revenue for park operations and development.	5.30	4.49	5.89
• Generate revenue for other public purposes.	2.64	1.98	2.67
There should be no oil and gas exploration, development or extraction in the park.	5.24	6.12	4.45
The state should consider acquisition of privately owned subsurface rights under park land.	5.71	5.88	6.17

Note: Ratings are on a scale ranging from (1) strongly disagree to (9) strongly agree.

Importance and Value of Park Attributes

Importance ratings

The mean importance rating for the 20 park attributes and their rank by each group are listed in table 4. Overall there is a high degree of similarity among the three groups.[1] The few differences are: the much greater importance given overnight facilities by campers; the greater importance of safety among the general public; the greater importance of staff courtesy, scenic quality and nature interpretation among the task force members, particularly in comparison to the campers.

Table 4. Mean importance ratings for state park attributes.

	Public		Camper		Task Force	
Attribute	Rating	Rank	Rating	Rank	Rating	Rank
Maintenance	8.53	1	8.61	2	8.28	2
Water condition	8.53	2	8.49	3	8.35	1
Natural park environ.	8.30	3	8.65	1	7.76	4
Safety	8.14	4	8.23	6	7.44	7
Courtesy of staff	8.10	5	8.15	7	7.79	3
Law and order	8.05	6	8.13	8	7.34	8
Seeing wildlife	7.97	7	8.36	5	7.74	5
Scenic	7.91	8	7.98	10	7.57	6
Outdoor activities	7.88	9	8.05	9	7.32	9
Trail opportunities	7.25	10	7.64	12	7.06	11
Solitude	7.24	11	7.68	11	7.01	12
Overnight facilities	7.08	12	8.47	4	6.99	13
Socialize with friends	7.04	13	7.42	13	6.33	14
Nature interpretation	6.89	14	7.07	14	7.14	10
Concessions	6.62	15	5.78	16	5.70	17
Handicapped access	6.58	16	5.87	15	6.02	16
Fishing	6.05	17	5.62	17	6.30	15
Passively watch people	5.53	18	5.32	19	4.46	20
Organized programs	5.07	19	5.56	18	4.56	19
Hunting	4.05	20	3.23	20	5.02	18

Note: Ratings range from (1) very unimportant to (9) very important.

Dollar values

The mean amounts each group would invest from a total of $100 to assure the quality of these park attributes is presented in table 5. Again, there is a very high overall similarity among the three groups.[2] Among the more highly valued attributes, the few differences are: the general public's emphasis on safety; the camper's emphasis on overnight facilities; the task force's emphasis on the natural park environment, particularly in comparison to the general public.

[1] The Spearman rank order correlations are: general public and campers (r = .926), general public and Task Force (r = .953), and campers with Task Force (r = .881). All values are significant beyond the .001 level of probability.

[2] The Spearman rank order correlations are: general public and campers (r = .914), general public and Task Force (r = .877), and campers with Task Force (r = .941). All values are significant beyond the .001 level of probability.

There seem to be more differences among the less val attributes. Wildlife observation is valued much more hi by campers than by the task force or general public, and fishing and hunting are given much greater values by the force than by the other two groups. The lowest values f trail opportunities, nature interpretation and solitude given by the general public and the highest by the task force. The general public values concessions much highe than the other two groups. Campers placed a lower value handicapped access than the other two groups.

Table 5. Mean valuation for state park attributes.

	Public		Camper		Task F
Attribute	Value	Rank	Value	Rank	Value
Maintenance	15.09	1	13.94	2	13.12
Safety	11.13	2	8.63	5	6.25
Overnight facilities	8.84	3	15.15	1	8.84
Law and order	8.60	4	8.76	4	6.25
Natural park environ.	8.07	5	9.02	3	9.55
Water condition	7.98	6	6.96	6	7.03
Outdoor activities	5.18	7	5.19	8	5.82
Seeing wildlife	4.72	8	6.60	7	4.71
Handicapped access	4.52	9	2.91	12	4.69
Fishing	3.69	10	3.44	10	5.62
Scenic	3.59	11	3.10	11	4.03
Concessions	3.19	12	1.57	17	1.62
Trail opportunities	2.98	13	3.61	9	5.83
Courtesy of staff	2.14	14	1.43	18	1.89
Hunting	2.14	15	2.08	15	4.87
Organized programs	2.04	16	1.79	16	1.14
Nature interpretation	1.97	17	2.66	13	3.96
Solitude	1.88	18	2.59	14	3.08
Socialize with friends	1.54	19	1.39	19	1.52
Passively watch people	.57	20	.31	20	.40

Note: Values sum to $100.

Special Issues and Concerns

The rating from each group are compared in table 6 f wide variety of special issues and concerns. They are divided among five management oriented topics: recreatic nuisance wildlife control, preservation, forest manageme for diversity, and oil and gas development.

Nuisance Wildlife Control

While recreational trapping is not supported, there agreement that trapping should be used as one means to control nuisance wildlife. This extends to bear, raccoo and beaver, though the sentiment is obviously not as str and more general than extreme among the public and campe The task force respondents indicated much stronger suppo trapping, especially in the case of beavers, than the ge public and camper respondents. Very few campers showed strong support for beaver trapping. This may be in part because watching beavers in a popular activity among cam other park visitors and the public at large. All groups indicate greatest support for educating the public as a to avoid nuisance wildlife problems. It is reasonable t interpret this to mean that hunting and trapping should used only after other means have failed.

the camper survey. This may be due to a general lack of interest both in Allegany State Park and in surveys in general.

There is a clearly hierarchical relation among the sample groups as one moves from the regional population, to the public survey, the campers and finally the task force members. Moving through the groups in this order, they tend to have more education, professional occupations and higher incomes. Over 70 percent of the region's adult population is not educated beyond high school. Respondents to the general public survey have substantially higher average education and the camper respondents are higher still. Over 60 percent of the task force members are college graduates. Respondents to the public and camper surveys are also more likely to hold professional, managerial or technical positions; they are less likely to be employed as clerks, craftsmen or service personnel. The task force members are predominantly professionals, as expected from a technical advisory group. Income reflects these differences in education and occupation.

Visitation Pattern

Experience with the park is presented in table 2 for the general public respondents, those from the general public who had visited the park, the camper respondents, and the task force members. Approximately 90 percent of the residents in the region appear to be aware of the park. Among those who visit the park, repeated visitation can be expected; almost all campers are repeat visitors. Among those from the general public who have visited the park, over 40 percent had been in the past year, and an additional 30 percent within the past five years. Over 75 percent of the campers and task force members had visited the park in the past year. Approximately 70 percent of the public visitors and task force members are day users, while the campers are predominantly overnight users. The length of stay among the public visitors and task force members tends to be for a couple of nights or less, while the campers tend to stay for a week. Overall, visitors from all three surveys were very satisfied with their recreation experience at the park; very few expressed any sort of dissatisfaction. The campers are particularly satisfied with 40 percent giving their experience the highest rating possible.

Table 2. Experience with Allegany State Park.

	Public			
Experience	Full sample	Visitors only	Camper	Task Force
Familiarity with Allegany State Park:				
Unaware of the park.	8.4	—	—	—
Heard of, never visited.	26.7	—	—	4.8
Visited once.	9.7	14.9	2.9	7.1
Visited several times.	55.3	85.1	97.1	88.1
How long ago was your last visit?				
Within the past year.	27.4	42.5	76.3	78.3
2 to 5 years ago.	19.6	30.3	23.7	10.8
Over 5 years ago.	17.6	27.3	—	6.0
Never visited the park.	35.4	—	—	4.8
Do you usually visit the park as a:				
Day user	43.6	69.1	6.0	72.0
Overnight user	19.5	30.9	83.8	23.2
Both are typical.	—	—	10.2	—
Never visited the park.	36.9	—	—	4.8
How long do you normally stay:				
One day or overnight.	47.2	74.1	.4	73.2
2 to 3 nights.	9.6	15.0	25.6	18.3
4 to 6 nights.	4.5	7.0	25.1	0.0
Over 6 nights.	2.5	3.9	49.0	3.7
Never visited the park.	36.2	—	—	4.8
Were you satisfied or dissatisfied with your recreation experience at Allegany State Park?				
Very satisfied (9)		25.0	40.8	19.0
Satisfied (8 to 6)		57.2	47.1	60.7
Neither sat. nor dissat. (5)		11.5	5.0	15.2
Dissatisfied (1 to 4)		6.3	7.1	5.1
Number of respondents:	933	606	1,019	84

Notes: All values are percents of group investigated.

Activity Patterns

Information about activity patterns for the public and task force respondents cames from an open ended question concerning 'favorite outdoor recreation and leisure activities,' while the camper survey asked about participation in specific activities 'while visiting Allegany State Park.' Recognizing these limitations, there remains some value in comparing patterns of participation.

The comparisons in table 3 of outdoor recreation and leisure activity preferences for respondents to the three Allegany surveys are evaluated in the context of a recent report to the President's Commission on Americans Outdoors (Marketing Opinion Research, 1986). That report determined that there are six natural clusters of activities that tended to be done together: (1) observing nature, (2) water sports, (3) fishing, hunting and horsepower, (4) spectator outings, (5) winter sports, and (6) ball games. Activities mentioned by the three respondent groups from the Allegany surveys were found to cluster in a similar way, generally supporting the national report's findings. However, a seventh cluster was added to the Allegany study in order to accommodate several strongly associated trail activities. Both the national and Allegany studies corroborate the concept that individuals who do one or more of the activities of a cluster are more apt to do other activities in the same cluster than to do other activities. For instance, people who use ORV's are very likely to be hunters, and people who camp are very likely to be bird watchers. This tendancy of activities to cluster naturally forms a framework that mitigates the problems associated with comparing the open and closed forms of the activity questions. A respondent can be associated with an activity cluster after indicating preference for one activity in the cluster.

In spite of the problems of comparability, the prominent role of 'observing nature' activities in all three Allegany surveys is noteworthy. While these values are much higher than that for the nation, it is compatible with other findings from the Allegany surveys about the importance of the natural environment to the respondents. Camper and task force respondents are much more likely to hunt and fish than either the national or Allegany public surveys. The camper survey also shows especially high participation in water and trail sports compared to the other three groups. The general public and task force surveys indicate particularly low participation in spectator outings and ball games, possibly because the open ended question they answered did not suggest these as appropriate responses within the context of an Allegany State Park survey.

Table 3. Percent participation in outdoor recreation and leisure activity clusters.

	Allegany Surveys			
Activity theme	Public	Camper	Task Force	National
Observing nature	76.5	99.7	84.0	31
Water sports	64.8	88.9	67.9	48
Trail sports	59.9	91.9	60.5	—
Fishing and hunting	38.4	60.5	58.0	37
Spectator outing	19.2	98.8	9.9	76
Winter sports	17.1	18.2	29.6	11
Ball games	9.4	43.9	6.2	41

Note: The activity clusters and national values are adapted from a recent study for the President's Commission on Americans Outdoors (Marketing Opinion Research, 1986).

acquiring privately owned subsurface rights and oppose the development of these resources to generate revenue for projects outside the park.

Conclusions

The master plan for Allegany State Park must deal with a number of serious policy conflicts which are not easily resolved through technical evaluation of the park's present and past use patterns or an assessment of its natural and cultural resources. Such conflicts deal with issues surrounding the broader purpose and mission of the state park system. The mission statement was originally drafted by the Strategic Planning and Review Committee (SPARC) and was adopted on January 12, 1987 by Orin Lehman, Commissioner, OPRHP.

> The mission of the Office of Parks, Recreation and Historic Preservation is to provide safe and enjoyable recreational and interpretive opportunities for all New York State residents and visitors and to be responsible stewards of our valuable natural, historic and cultural resources.

The principles that guide the implementation of OPRHP's mission are:

1. Commitment to people. OPRHP is committed to serving and protecting the public to the best of its ability, with courtesy and respect.

2. Commitment to preservation. State Parks and Historic Sites are unique and irreplaceable assets. OPRHP is committed to wise acquisition, planning and, where appropriate, development; timely and professional care and maintenance; and a responsibility to future generations in whose trust the state's resources are managed.

3. Commitment to service. The availability of recreational, cultural and educational opportunities to all is vital in today's society. OPRHP is committed to equal access and outreach to all segments of our society, recognizing individual needs and interests. OPRHP is committed to safety, creativity, and accountability in providing recreational, historic and cultural services.

The surveys discussed in this report represent an attempt to search out and compare the larger community's perspective on the issues confronting the Allegany State Park planning effort. Public meetings and citizen task forces are not totally satisfactory for this purpose since they tend to draw from narrowly focused subgroups with very specific concerns. This focused knowledge and perspective has advantages in encouraging vigorous discussion and improving insights when properly stratified. Yet there remains the obligation to also gauge the park's purpose and benefit as seen by the broader public.

For comparative purposes, a survey of the general public was complemented by surveys of park campers and task force members. The results of the general public and camper surveys were remarkably similar in their perspective. The most distinctive differences were observed between these two groups and the task force group with its highly selective makeup. The communality was still substantial among all three groups. For instance, the ranking of the dollar valuation of twenty park attributes was similar. The same six attributes were ranked highest by all three groups, although they were ordered differently. The importance ratings of these attributes was also very similar.

Even among the special issues and concerns there was a great deal of agreement among the three groups. All expressed their concern for the park's special natural assets by recognizing the importance of setting aside preserve areas where changes would occur primarily through natural processes. Each affirmed the principle that greater natural diversity is important to the general quality of the park experience. All three would also like to see greater public ownership of subsurface land rights.

There is a general agreement for many of the park management issues as well, particularly as they relate to recreation and control of nuisance wildlife. Greater divergence of opinion is evident on questions of mechanisms for managing or protecting resources and bringing about diversity. Most often it is the task force which is out of sync with the other two groups. The task group is more willing than are the others to accept more intensive levels of management in order to achieve immediate recreational objectives or generate less restricted revenues. Apparently the general public and camper respondents perceived the importance of the park's resource and their stewardship responsibility to future generations as too momentous to be trusted lightly to even the most well intentioned administrative processes.

It is important that the task force, the park's technical staff, and the final decision makers reflect on the above differences in recommending and establishing new directions and courses of action for Allegany State Park. Greater diversity and expanded resource preservation are seen by the general public and park users as important stewardship responsibilities, while recreation enhancement, resource extraction, and management for revenues are not generally found acceptable. It may be necessary to develop special resource protection mechanisms that better reflect this public emphasis.

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INVENTORY AND MANAGEMENT OF TRESPASS RECREATION USE AT UPPER DELAWARE SCENIC AND RECREATIONAL RIVER

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ABSTRACT - Recreational trespass on private lands within the Upper Delaware Scenic and Recreational River, located along the eastern border between Pennsylvania and New York, prompted this survey of recreational trespass sites. The National Park Service has been mandated to manage river recreational use within its boundaries but land ownership shall remain predominantly private. This survey was conducted to document the number and distribution of river recreation trespass sites and to recommend appropriate management actions to minimize trespass use.

Introduction

The Upper Delaware Scenic and Recreational River was established by the United States Congress, in part, to provide for increased river recreation opportunities. However, their intent, embodied in the River Management Plan (National Park Service 1986), is that the lands adjacent to the 73 mile river segment shall remain predominantly in private ownership. This river segment is one of the most outstanding recreational canoeing rivers in the Northeast, attracting over 163,000 trips in 1986. Such heavy recreational use produces significant benefits to local economies but also entails certain costs, including the subject of this report, recreational trespass on private lands.

This paper reports results from a comprehensive survey of trespass river recreation sites and access trails. Survey objectives were to document the number and distribution of trespass recreation sites and access trails, describe the type and extent of environmental impacts, and recommend appropriate management actions to minimize such use and impacts.

Methods

Field work for this survey was conducted between August 15-30, 1986. Inventory and environmental impact assessment information was collected on trespass recreation sites and river access trails exhibiting visible vegetation disturbance along the Delaware River from Dillontown, PA to Millrift, PA, a distance of 67.2 river miles. For comparison purposes, all canoe accessible commercial campgrounds and all roads extending to the river were also inventoried. All survey work was conducted by canoe.

Recreation sites were defined as areas adjacent to the Delaware River where recreational activities (camping, picnicking, rest stops) have caused obvious vegetation disturbance, such as the flattening or removal of vegetative cover and exposure of soil. Commercial campground sites were excluded. Many of these sites are the result of recreational trespass, some sites may be used with the permission of property owners, and a very small number may be located on public lands. Sites were numbered and mapped on U.S. Geological Survey topographic maps (scale 1:24,000).

Assessments for a number of impact parameters, including site size, ground cover, soil erosion, tree damage, fire sites, and site visibility from the water were also made for each site. These assessments consisted of estimates or simple counts; a related scientific study of a sample of sites utilized more detailed measurement procedures (Marion and Cole 1987;Cole and Marion 1988). See Marion (1988) for a more complete presentation of the methods and results included in this paper.

Access trails were defined as foot paths which allow access from public and private roads to the Delaware River and exhibiting obvious vegetation disturbance. As with recreation sites, many of these trails are the result of recreational trespass, some may be used with the permission of property owners or are from commercial campgrounds, and a very small number may be located on public lands. Trails leading directly to a private residence were excluded. An assessment was made on the extent of soil erosion associated with each access trail.

Commercial campgrounds and access roads were also inventoried for comparison purposes. Commercial campgrounds were defined as privately owned land immediately adjacent to the river where camping is permitted on a fee basis. This definition includes traditional campgrounds as well as undeveloped areas lacking any facilities. Access roads were defined as paved or unpaved roads which permit direct vehicular access to the Delaware River.

Survey Results

Number and Distribution of Sites and Accesses

The number and distribution of recreation sites, campgrounds, trail accesses and road accesses are presented in Table 1. The survey located 134 recreation sites within the Dillontown, PA - Millrift, PA river segment. This figure is conservative because lightly used sites or land-accessed sites would lack or have faint trails, and thus may have been overlooked. The majority of sites (122) were located in the lower stretch of river between Narrowsburg, NY and Millrift, PA (32 river miles). Only 12 sites

were located in the upper stretch between Narrowsburg, NY and Dillontown, PA (35.2 river miles). However, even within the Narrowsburg to Millrift segment the density of sites (number/river mile) was quite variable, for example, ranging from 0.1 sites/mile between Long Eddy and Callicoon, NY (11.7 miles) to 6.7 sites/mile between Lackawaxen, PA and Barryville, NY (4.5 miles). The riverwide average was 2.0 sites/mile. Approximately three quarters of the sites were located on the Pennsylvania side of the Delaware, most likely due to the close proximity of roads and subsequent lack of land along much of the New York side.

Table 1. Number and distribution of recreation sites, campgrounds, trail, and road accesses by river segment.

River Segment	State PA	State NY	Totals No.	Totals No./mi.
	--No.--			
Dillontown-Narrowsburg				
Recreation Sites	4	8	12	0.3
Campgrounds	3	6	9	0.3
Trail Accesses	22	48	70	2.0
Road Accesses	5	9	14	0.4
Narrowsburg-Millrift				
Recreation Sites	95	27	122	3.8
Campgrounds	0	16	16	0.5
Trail Accesses	3	42	45	1.4
Road Accesses	5	18	23	0.7
Dillontown-Millrift				
Recreation Sites	99	35	134	2.0
Campgrounds	3	22	25	0.4
Trail Accesses	25	90	115	1.7
Road Accesses	10	27	37	0.6

Twenty-five campgrounds were identified, 16 of them in the lower river segment. The majority (88%) were on the New York side of the river.

The survey found 115 trail accesses with a riverwide average of 1.7/mile. The majority of these (78%) were on the New York side of the river, typically providing access from Route 97 or from commercial campgrounds to the river. Many more infrequently-used foot traffic access routes undoubtedly exist. Such routes, which lack a permanently discernible pathway, could not be identified by this survey. Although there were somewhat more access trails in the northern river segment (70 - mostly associated with campgrounds), the density of access trails was much more evenly distributed than that of recreation sites.

Thirty-seven road accesses to the river were identified, 23 of them in the lower river segment. These were fairly evenly spaced throughout the segment with the majority (73%) on the New York side of the river.

One potential factor explaining the current number and distribution of trespass recreation sites is the number and distribution of commercial campgrounds. Larger numbers of recreation sites might be expected in river segments which lack commercial campgrounds. However, comparisons of recreation sites and campgrounds per river mile for 11 smaller river segments lends limited support for this hypothesis. The Narrowsburg to Tusten, NY and Mongaup, NY to Millrift, PA river segments both lacked campgrounds and had larger numbers of recreation sites, 24 and 10 sites, respectively. However, other river segments with campgrounds had even larger numbers of trespass sites. For example, the Lackawaxen, PA to Barryville, NY segment had 7 campgrounds but 30 recreation sites. Other factors explaining trespass recreational use will be described in the Discussion section.

As with recreation sites, one factor explaining the current number and distribution of trespass access trails is the number and distribution of access roads. Larger numbers of access trails might be expected in river segments which have few or no access roads. As above, this was generally not indicated in comparisons for 11 smaller river segments. Segments with a high density of access trails, such as the Cochecton to Narrowsburg, NY segment with 4.6 trails/mile (39 trails), typically had a fair density of roads also, 0.6 roads/mile (5 roads). However, not all river access roads are open to public use, many are on private land. In addition, many trails were associated with campgrounds, providing river access from individual campsites in spite of nearby road accesses. Other trails are created by fishermen seeking access to specific river banks rather than places for launching boats.

Environmental Impacts

Observations revealed that recreation sites are used by both recreational boaters and land-based fishermen for lunch sites, rest stops, and overnight campsites. Approximately half of the sites appeared to receive low levels of use, as indicated by their small size, vegetated condition and faint access trails. Results from assessments of environmental impacts on the trespass recreation sites are presented in Table 2.

Recreation sites ranged in size from 200 ft^2 to 12,000 ft^2, with a riverwide average of 1,840 ft^2. The majority of the sites were small, 88 sites (66%) were less than 2000 ft^2. Twelve sites (9%) were over 4000 ft^2.

In general, sites receiving low levels of use typically retain a groundcover of herbs or grasses. As use increases plant cover is reduced or lost and organic litter such as leaves or pine needles are exposed, except in areas where frequent flooding removes these materials. Further trampling leads to the pulverization and

subsequent loss of these organic materials and the exposure of soil. Recreation sites representing each of these situations can be found along the Upper Delaware.

Approximately 41 sites (34%) had groundcover consisting of vegetation or vegetation and litter and can be considered to be in "good" condition. Approximately 45 sites (36%) have either exposed soil or organic litter and exposed soil and can be considered to be in "poor" condition. Many of the sites examined appeared to have been used more heavily in the past and evidence of vegetation recovery was apparent. However, vegetation can be trampled and lost on a site much faster than it can recover so complete recovery will not occur on sites unless nearly all use is eliminated.

Once the protective ground vegetation is lost from a site, soils begin eroding from foot traffic, rainfall and river flooding. The majority of sites (60%) had no or low levels of soil erosion (Table 2). Twenty-two sites (16%) were classified as having high levels of soil erosion as exhibited by exposed tree roots or trail gullying. The most severe soil erosion problems occurred on river access trails, which frequently traversed steep river banks.

Table 2. Environmental impacts on recreation sites.

Impact Parameter	Recreation Sites Number	Percent
Site Size (ft^2)		
0-999	62	46
1000-1999	26	20
2000-2999	23	17
3000-3999	11	8
4000+	12	9
Groundcover		
Vegetation	28	23
Litter	19	16
Soil	26	21
Vegetation/Litter	13	11
Vegetation/Soil	17	14
Litter/Soil	19	15
Erosion		
None	12	9
Low	68	51
Moderate	32	24
High	22	16
Tree Damage		
None	16	18
Low	27	29
Moderate	26	29
High	22	24
Fire Sites		
None	2	1
One	91	69
Two	23	17
Three	12	9
Four+	6	4

Damage to trees from recreationists consisted of broken or cut branches, nails, carved initials, and axe scars. Over 50 percent of the sites were classified as having moderate to high levels of tree damage. Trees had also been felled on a number of sites. This is a fairly high level of tree damage compared to the extent of impacts noted for other parameters.

Only two recreation sites lacked fire sites, indicating that nearly all of the sites are at least occasionally used for overnight camping. The majority of sites (68%) had one fire site while 18 sites had three or more fire sites. Studies elsewhere have shown that fire sites represent a significant ecological impact because fires cook and sterilize the soil. Such impacts have a long-lasting effect and take many years to recover.

Discussion

The results of this survey indicate that a large number of trespass recreation sites and access trails exist within the study area. The majority of recreation sites occur to the south of Narrowsburg, NY while access trails are more evenly distributed between the upper and lower segments. Before addressing potential solutions to these problems, an examination of their likely causes is in order. The selection of appropriate and effective solutions must be based on a clear understanding of why recreationists use these sites and trails.

Why do visitors use recreation sites? One reason is that boaters require places where they can stop during their trips to rest, stretch, eat, and perform other biological functions. At the current time the number and distribution of appropriate stopping sites is inadequate to meet these needs. Another common use of these sites is for overnight camping by boaters and bank fishermen. Many of the recreationists using these sites may be unaware that the majority of the river bank lands are privately owned. Those who are aware may presume that the landowners do not mind their use of the sites unless the land is posted against trespassing. Some recreationists may be using these sites for camping because they are seeking solitude and wish to avoid crowded or noisy campgrounds. Others may be unaware of the locations of river-accessible campgrounds or fail to plan their trips around the locations of these campgrounds. Some may consider campgrounds to be too expensive. Finally, some campgrounds will permit only those recreationists who rent boats from their liveries to camp on their lands.

Why do visitors use access trails? Access trails are often used for launching boats, typically because the existing distribution of public boat accesses limits flexibility in planning shorter river trips. Most road accesses to the river are on private land and many are not

open to the public. Trail accesses are also used by fishermen to gain access to the river for bank fishing. Finally, trail accesses, particularly at campgrounds, provide access for viewing or hiking along the river.

Management Recommendations

As directed in the Final River Management Plan, the National Park Service, in cooperation with the Upper Delaware Council (comprised of representatives from bordering towns, townships, states, and others) has primary responsibility for river recreation management. The Management Plan recognizes that over 95 percent of the land adjacent to the river is owned by private landowners and directs all management agencies and the public and private sectors to promote respect for and protect riparian landowner rights. The Plan further states that trespassing, illegal camping, and other conflicts exist between river users and riparian landowners, and that these problems are real and must be resolved.

The resolution of these problems will not be an easy or straightforward process. The author strongly feels that the diversity of causes contributing to trespass uses will necessitate the implementation of a coordinated program of management actions which specifically address the causes, rather than reliance on any single action. The following management recommendations are directed toward achieving the goal of eliminating recreational trespass use of private lands.

Law Enforcement

Trespass and littering violations are the responsibility of local law enforcement officials. The National Park Service provides financial assistance to local governments annually to enhance their law enforcement capabilities relating to river recreational use, including trespass. The effectiveness of law enforcement efforts to reduce trespass camping are limited, however, by the remoteness of many of the recreation sites, the size of the area requiring patrol, the nighttime nature of much of the trespass use, and the difficulty of communicating laws and information to a constantly changing recreation clientele. Expansion of current law enforcement activities is probably not an efficient method for reducing recreational trespass. Law enforcement efforts should continue but should not be regarded as the sole or permanent solution to the trespass problem.

Visitor Education

Additional efforts are needed to better inform recreationists of: a) the predominantly private ownership of river bank lands and the need to respect landowner rights, b) the environmental and social impacts associated with their recreational activities, c) laws, regulations, and the potential consequences of trespassing on private lands and littering, and d) the locations of appropriate public and private rest/stop, camping, and river access areas and the types of services and facilities at each. The existing National Park Service visitor education program should be expanded with the goal of conveying information regarding the topics above to all river recreationists. A variety of dissemination methods should be employed, including information in all visitor-oriented river maps, brochures, and newspapers; National Park Service visitor centers, information kiosks and personnel responsible for visitor contact; canoe livery personnel; local businesses selling fishing licenses; bulletin boards at river accesses; campgrounds and camps in the area; and signs along the river.

In particular, cooperative efforts with commercial canoe liveries should be expanded for disseminating information to river recreationists. This approach could be highly effective because while few river recreationists currently have personal contact with the National Park Service, most river recreationists have contact with commercial liveries through boat rentals and campgrounds. It is also recommended that the current river maps be revised to include all the information listed under points a) through d) above. Such maps should be distributed to all river recreationists through the dissemination methods listed above.

Many riparian landowners have posted their land against trespass. While trespass signs appear to be an effective deterrent, it is the author's opinion that such signs have created a negative visual or aesthetic impact in some areas where they are nailed to virtually every river bank tree. A mechanism for requiring the use of standardized trespass signs (preferably symbol-oriented) should be investigated. A new "ASK Permission" landowner relations program, sponsored by the New York State Department of Environmental Conservation, should also be evaluated for adoption. The "ASK Permission" program provides signs and educational materials which inform recreationists to show respect for private property by asking first and to follow advice about how to behave on private property. Standard "ASK Permission" signs could be made available for any landowners wishing to participate in the program.

Visitor Facilities

Perhaps the most important causal factor for recreational trespass is the current deficiency in both the number and distribution of appropriate rest/stops, camping areas, river accesses and associated service facilities. Provision of such areas and facilities should eliminate most of the current needs for recreationists to trespass on private lands. The

River Management Plan recognizes and discusses the needs for additional river accesses and facilities. In many instances such facilities and other visitor services could be provided through cooperative agreements between commercial interests and the National Park Service and/or local governments. This report provides valuable information regarding the number and distribution of recreation sites and trail accesses as evidenced by current users. Such information could be of value in planning for the development of future facilities.

Trash and Site Management

Trash resulting from recreational trespass is also a significant problem. This has led to agreements between the National Park Service and local communities for financial assistance in operating trash pickup programs along the river. Such programs appeared to be effective only for the more visible and heavily used sites; less visible and infrequently-used sites were often overlooked. In addition, to keep sites clean the frequency of trash pickup would most likely need to be weekly (preferably immediately following weekends). As above, managers should place their primary emphasis on addressing the causes of the problem: an inadequate number of river rest/stop areas with trash receptacles and underdeveloped ethics relating to littering on the part of the visiting public. A program requiring outfitters to provide litter bags with each rented canoe might also be implemented and evaluated for its effectiveness.

Limited site management and rehabilitation might also be effective in reducing the amount of trespass camping. For example, trash pickup personnel could be instructed to scatter all fire rings. Recreationists are much more inclined to camp on sites which "look" like campsites, as evidenced by the presence of fire rings and bare soil. Additional site rehabilitation, such as scattering leaves and pine needles, dead limbs and rocks over the site might also be considered. Such work would probably be most effective on lightly rather than heavily used recreation sites.

Research

Additional research to more thoroughly document and evaluate the causes for recreational trespass could be beneficial. As discussed earlier, appropriate and effective management programs must be based on a clear understanding of the underlying causes of recreational trespass activities. Research to identify and evaluate the most effective methods for communicating information to river recreationists may also be useful. Finally, it is recommended that a survey of the number and distribution of river recreation sites and access trails be repeated every 3 to 5 years for the purpose of evaluating the success of management programs. If information on the type and extent of environmental impact at each location is also deemed necessary, some additional research would be needed to develop appropriate standardized procedures. Such a system could be modeled after a similar recreation site impact assessment and monitoring system which has been developed and implemented at the neighboring Delaware Water Gap National Recreation Area.

Conclusion

The United States Congress, in establishing the Upper Delaware Scenic and Recreational River, directed the National Park Service to pursue a new approach in recreation resource management. One in which the lands within the established boundaries are to remain almost entirely in private ownership. Management of the area's natural and cultural resources and recreational use will be achieved through cooperative management efforts between the appropriate Federal agencies, the National Park Service, and State and Local Governments. Given such an arrangement it is perhaps unavoidable that a certain amount of recreational trespass use will occur.

This survey documents the current number and distribution of recreational sites and accesses along the Delaware River. It is clear from the survey's results that recreational trespass is widespread and that in some areas localized but significant environmental impacts are occurring. A number of factors contribute to the recreational trespass problem, although lack of appropriate accesses and facilities and knowledge of existing accesses and facilities are perhaps the major causes. Reliance on programs which do not address the underlying causes of the trespass problem, such as expanded law enforcement efforts, are not an effective or permanent solution. Instead, a coordinated program involving law enforcement, visitor education, visitor facilities, trash and site management, and research are recommended for the resolution of this important issue.

The recently completed Final River Management Plan for the Upper Delaware recognizes and discusses in some detail the recreational trespass problem and presents effective solutions for each of the categories listed above. The findings of this survey reaffirm the need for and appropriateness of these proposed solutions. The recreational trespass problem is unlikely to lessen until such actions are implemented.

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PARK USE RELATED DATA RECORDING: A NEW DIRECTION FOR THE CANADIAN PARKS SERVICE

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The purpose of this paper is to introduce a new method of describing data using Data Variables. Their use will facilitate accurate definition of data, and thus facilitate methodologically sound automation of data collection and open the way to more effective use of data.

BACKGROUND

Past and Present Data Recorded

Historically, there have been limitations associated with park use related data collection methods of the Canadian Parks Service (CPS). For example, there has been a necessity for manual processing of data which has consumed significant amounts of staff time in the field. With over a hundred locations where personnel collect data on over 3000 offerings to the public, there has been a lack of a standard vocabulary in data collection so that information reporting and sharing has not been facilitated. These factors pointed to the need for an improved method of data recording.

Another limitation resulted from the "traditional" units of count used by the CPS. These units date back to the late 1960's. The first units of count were people, groups and vehicles. By the mid 1970's, campground use was recorded in person-nights and in party-nights. For a typical campground, it was reasonably clear what was being counted. However, some campgrounds record site-nights sold which is not always the same as the number of parties camping! By the late 1970's, other units of count such as contacts for interpretation, boats, lock movements and bridge swings for canal statistics were being reported. By the mid 1980's, 21 different units of count were being used. Another 15 or so were implicit in data processing routines and were identified in work to allow user access to the mainframe data. Examples of the units of count recorded at parks, sites or canals (in 1986) are shown in table I.

Table I. Units of Count Recorded at Parks or Canals in 1986

persons	occurrences-occasions
vehicles	person round trips
groups	person days
person-nights	group days
party-nights	party days
attend-visits	T-off groups
contacts	requests
boats	number of days
lock movements	number of days over 90% capacity
bridge swings	largest count for a period
water lockages	current capacity (annual)
sailboats	quasi capacity (based on a percentile in some unit that was counted)

Problems Associated with Units of Count

As information requirements for the CPS became increasingly important in budget and project approval, more systematic and credible data by event, by hour, by day, and by month were needed. Conservatively, interpretation and visitor services staff at the more than 100 National Parks, Historic Sites and Canals record thousands of use statistics per day over a period of several months. Over 250 locations such as gates and campgrounds record 1 to 10 (or more) statistics which are used to report daily or other statistics to field, region or headquarters. Most locations record hourly and event data for 5 or more months of the year while many report a variety of statistics for 12 months of the year.

As the number of units of count increased, certain problems became more and more obvious. First, the units of count being used were not descriptive enough. For example, visitor reception centres (VRC's) record "people per day". Depending on the park, or the VRC within a park, these data can refer to people entering, people talked to by staff, people viewing an exhibit, or simply people seen in the VRC. Those collecting the data have, on occasion, not been given enough information on what to record to really be sure what they were supposed to record.

Uncertainty on what was recorded creates a problem for those who use data. Users have too often been unsure as to exactly what data really were reported, and unsure as to what exactly was reported on. That is, they are unsure as to what the data mean. This problem becomes worse as field data are "rolled up" for regional use, and these in turn are "rolled up" for headquarters use. By the time some data reach headquarters, they have lost much of their meaning and a fruit cocktail of units of count remains!

Another matter is that some units of count that have been used are not very relevant for effective management. Units of counts that field have been asked to collect have not, in some cases, included units of count that a park superintendent wanted to use. Thus, a park is placed in the position of having to collect data for region and/or headquarters, while not having the time or resources to collect data which the managers of a park may feel are important to the park. For example, recording the total number of people who use a golf course by day or use a gate by day is not of much use for management. Instead, T-off for the front 9 by hour or gate entries requiring permits to be sold may be relevant to managing. Data closely related to the T-off statistic can even be captured by an automated cash register if seasonal pass-holders' use of a facility is recorded as a "zero cash" fee entry.

A third factor in relation to use data is that parks (and even regions and headquarters) did not have easy access to the information they passed on to be processed. Much time was spent by parks gathering, recording, organizing data and by others publishing data. Parks, however, often could not use data published for their own purposes. Often, region or headquarters did not publish the table or statistic needed for operational planning or capital planning though many statistics that were not needed were published or, at least, available in printouts "in case" they were needed. Accessing data to prepare special tables too often has been too costly both in person power and dollars, or too slow for there to be any reason to proceed with the undertaking. Furthermore, too often parks have not had time to use or even keep in usable shape the original data they have recorded.

So, data problems have led to the development of a system which supports the needs of the CPS and use the limited resources the Canadian Parks Service can allot in the 1980's.

A METHOD TO DEAL WITH THE DATA DEFINITION PROBLEM

The preceeding has not highlighted the "two sides" of data - 1) what to record, and 2) what data are recorded for. This dichotomy is discussed in this section. However, one should remember the point made above that historically, there were problems with data at headquarters and regions because one did not know exactly, in some cases, what was counted, for what it was counted, how it was counted or for what purpose.

The Use of Dimensional Analysis to Clarify Data

The reader may remember from their physical sciences background the term dimensional analysis. when one learned about velocity, one had dimensions of feet or metres per second. one then learned that acceleration was in feet or metres per second square. whether in chemistry or physics, dimensional analysis is a very powerful tool in examining the results of an equation to see if what is being done makes sense. the examination may only be at the level of determining whether energy conversion units are being used correctly or it may be more fundamental in terms of checking to see if a formula is remembered correctly.

What dimensional analysis really refers to is seeing that one does not add things together which, in terms of their "dimension", should not be added or that if things are being multiplied together the units "cancel" in such a way that the answer has the appropriate units. one does not readily accept the logic of adding 3 feet to 1 metre and getting 4 metres or 4 feet. Unfortunately, in the social sciences, adding or multiplying numbers together without considering what they actually measure, in fact, not knowing what they measure, is almost a way of life.

For those readers who don't see the issue or may feel that the points made in the preceeding paragraph are an exaggeration, some illustrations clarify the point of view from which these comments are seen to be justified. Consider, for example, the situation where a parks and recreation organization monitors the use of a beach or pool by recording the number of users each hour. Frequently, such use would be recorded with a unit or dimension of "people". What does the organization call such figures when they total them by day? Or when daily figures are totalled by month? Unfortunately, sometimes the answer is simply expressed in "people". However, unless the pool or beach area is emptied every hour and only "new people" are allowed in, the unit of people is a questionable designation for the total. If the pool or beach area is cleared every hour and people are allowed back in, without raising a question as to whether the same people come back in or not, one can record "entries/hour" and for the day can total "entries". These "entries/hour" or "entries/day" are valid but are still readily subject to misinterpretation. For a pool that is cleared every hour or a park where 75% of entries are reentries (same day), the situation is different for many purposes than if only 10% are reentries. This, for example, has an effect on permit sales and on responses to short surveys which are mainly done upon first entry.

Whether a pool or park theater is cleared or not, one management issue is the amount of "service" provided. "Entries by hour" may reflect the number of cash register staff required to process people (or may not, on 75% reentry as cited above), but will generally not reflect well how much a pool or park theatre is used. For example, if one counts once an hour, and gets the average number of people in the pool for that hour, pool use or consumption is reasonably reflected by reporting hourly use in "person hours". "Person hours" is a unit that can be totalled, and hourly figures can be recorded in "person hours per hour". A daily total in "person hours per day" can then be obtained, and has a clear meaning. Hourly figures of staff hours required and visitor

hours of service give a profile of "effectiveness", if "person hours" of service to users per hour is divided by "staff hours" required for the same hour.

The reader may find it interesting to think about the fact that in most statistical packages, numbers can be added with impunity without considering what units they are in. When one establishes an entity-relationship model for a database as described below, and starts to deal with the matter of creating totals, it is readily recognized that a report can show totals for data with the same impunity as with a statistical package. However, report totals do not generally exist as data in a database. Technically, exist as machine readable numbers in a "report". If the totals are to be kept, a conscious decision must be made about whether to keep them in an entity set (i.e. table) with non-total information, or to keep them in some other entity set (i.e. table) reserved for numbers that, for example, have the same dimensions as the totals. Regardless, the "report" numbers and "updates" with codes that indicate where to store these numbers in a database must be entered.

Actually, a variety of alternatives for keeping totals separate from the numbers they come from exist in EDP (Electronic Data Processing) systems. They exist both within statistical packages like SAS (Statistical Analysis System) and in terms of the way in which one can handle these elements in preparing one's database. When using the "proc mean" command in SAS, totals of data are placed in a separate dataset from the one from which the totals were formed. One must make a conscious decision to combine datasets. If this is to be done, the units of a total need not be confused with the units of a number that had been totalled. When using a "proc summary" command in SAS, tables are created in a very general way where univariate, bivariate, trivariate data, which can be, for example, totals or maximums are uniquely recognized. What unit a number has is explicitly identified by variables that indicate what multi-variate combination has been totalled or otherwise "manipulated". What is done may not be "theoretically" appropriate or valid, but at least, results are flagged.

From the above, one can see that traditional statistical packages such as SAS do support the recognition and tracking of the "dimensions" of numbers as certain processing occurs. Misuse of information sometimes, possibly most often, arises because people fail to realize that there is a problem. Functions that allow one to take the maximum of maximum values or the minimum of maximum values are available in computer statistical and other programming languages. However, these are not widely used outside a relatively small circle of professionals trained in operations research or business practices, where min-max or maxi-min principles for looking at procedures, processes, or loading are appropriately used. Use of these is covered as an integral part of quantitative training.

Training in statistical or social science methods reduces problems such as, for example, people taking the maximum number of people present during a day and computing total maximum attendance during a month by adding maximum values. However, people still add or average means, modes, maximums and other numbers with no appropriate consideration of how, or if, this should be done. It obviously can be and is done.

Anyway, being able to treat maximums, minimums, dollars, total, days, hours, picnic tables occupied, and a variety of other matters as dimensions in parks and recreation data is one item that this paper addresses.

The ERA Model: An Approach for Understanding Data

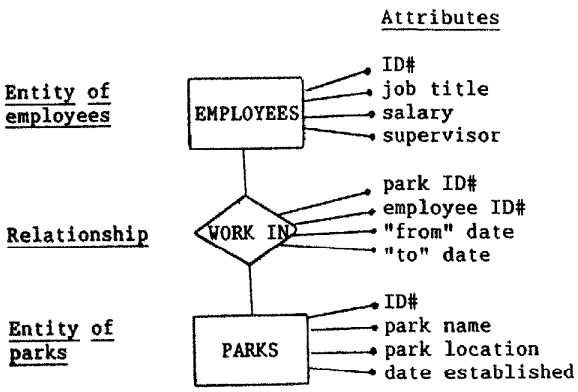
A model provides a description or analogy to help visualize the organization of a concept or idea. A data model describes a possible way that data could be organized. From another point of view, a data model for a real system presents one way that the user can visualize data to be organized for the purposes of using the data. So in a real-life situation, a data model provides the basis to develop an application and using it once it is developed. The data model developed allows consideration of factors such as ones ability to solve specific problems, produce reports or answer queries. The efficiency of the final application from a user point of view, and the user skill level required to use the system can thus be influenced.

The type of data model used to organize the Canadian Parks Service socio-economic database is an Entity-Relationship-Attribute (ERA) model. Just as a filing system can be explained in terms of cabinets, drawers, folders, dividers and a card system, the ERA model can be explained in terms of similar critical elements. In the case of an ERA model, the basic building blocks are entity sets, relationships and attributes (Figure 1). Entity sets refer to groups of "things" (e.g. employees, parks, campgrounds, projects). Each entity set contains entities or records of information about, for example, the facility/assets or geographic location, and these are defined by attributes or variables. Attributes are characteristics of the entity set items. Examples of attributes for an entity set called "park employees" may include the employees' identification number, their job title and salary.

In ERA models, relationships exist between entity sets and can exist between items in an entity set. Relationships between entity sets indicate how the entity sets are connected or related. Relationships between items in an entity set are used to define hierarchical ("parent-child") relations. For example, in an "activity" entity set, the item "canoeing" may be further distinguished as "whitewater canoeing" or "flatwater canoeing". This is called a reflexive relation.

Figure 1 below shows how part of the PURDS database is pictured in an ERA model. One sees how a user may visualize parts of the database set up in terms of entity sets, attributes and relationships. In this example, the relationship "work in" describes which employees worked in which parks and when.

Figure 1. Diagram of a simple ERA model



The PURDS Data Model: A Brief Look

Figure 2 illustrates by means of a Venn diagram, how different functions or groups within the organization potentially share information. Overlapping information requirements can be met by a park use information database addressing the interests of various decision-making and/or controlling groups within the organization. An ERA model facilitates structuring data so that the interests of these various groups are integrated.

Figure 2. Venn diagram

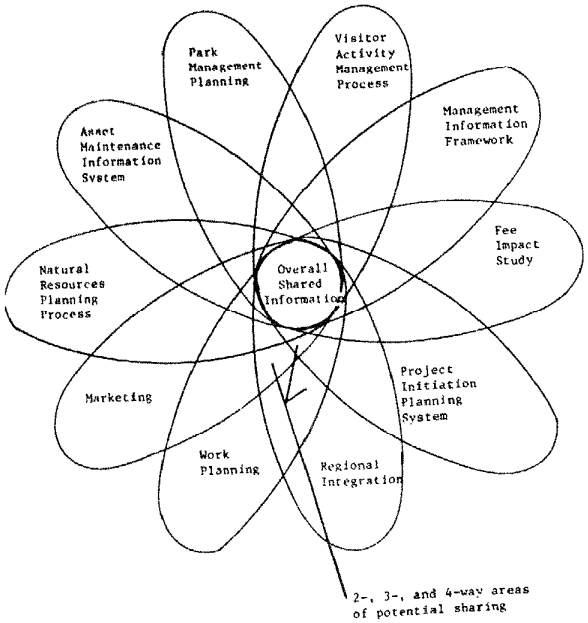
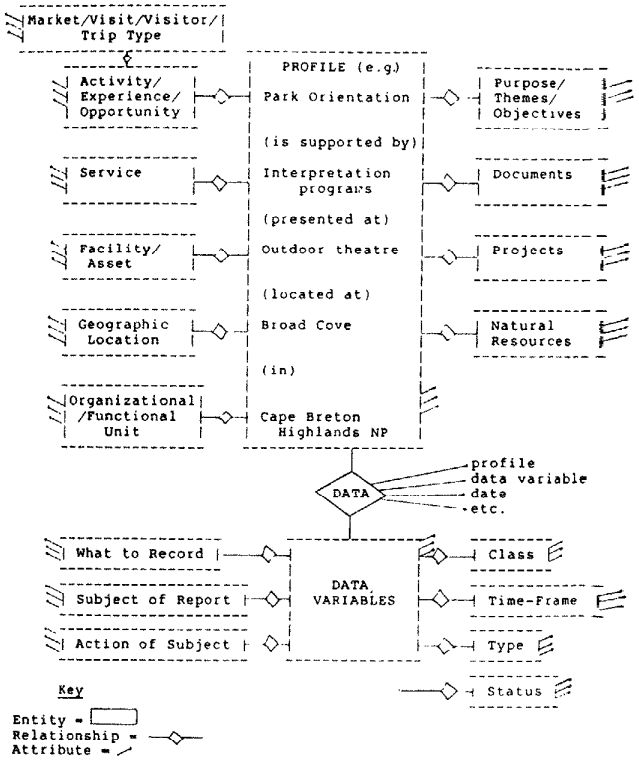


Figure 3 provides a simplified graphic presentation of the ERA model used by the Socio-Economic Branch for the Park Use Related System (PURDS). The various entity sets shown in this figure are "open-ended" and new information can be added to each entity set as necessary. Data from different functions in these entity sets can be used by other functions in the organization when creating profiles and data variables. How data, for example, on facility/assets gets into a PURDS data model entity set or is updated is not a conceptual issue, but rather a design and implementation issue. Still, the information stored in the entity sets identified makes it clear that it might be desirable and relatively easy to share data between functions.

Figure 3. PURDS data model



In this data model, Profiles and Data Variables are the "key" entity sets, at least for the Socio-Economic function. They are only discussed briefly here with a focus on data variables, but the reader may refer to the document entitled, "A Socio-Economic Data Model - Concept Paper", for detail.

The Profile entity set combines information about the organizational infrastructure of the CPS. Profiles generally show what is being done and where by combining information on visitor activities, park services, park facilities and assets, geographic location, etc. as shown in Figure 3.

Data Variables specify what data is recorded. They were developed to overcome problems identified over a 15 year period during which "units of count" were used. Data variables have also been developed to provide a responsive and flexible way of meeting needs of field, region, or headquarters to record virtually anything, often much more effectively in the past.

Figure 4 displays the way in which the types of information which combine to create a data variable are presented on a computer screen. It is the structure of the Data Variable within the PURDS data model which enables sets of standard data descriptions to be used. By referring to Figure 3, one can see that Data Variables, like Profiles, are created by combining information from a number of entity sets which are discussed in greater detail below. Because of this combination and the fact that the data sets combined are "open-ended", an endless list of Data Variables can be generated. However, Data Variables used across the organization can easily be standardized, while permitting those parks collecting "anomalous" data also to incorporate their data into the data model.

Figure 4. Example of a Data Variable Screen

```
.............................................
VARIABLE NUMBER:     1  TYPE: N (A)LPHA (N)UMERIC

WHAT TO RECORD:*     1 observed number of

SUBJECT OF REPORT:* 4 picnic tables

ACTION OF SUBJECT:* 9 occupied

CLASS:  P  TIME-FRAME:* 3 between 1130 and 1300

STATUS: A  (H)ISTORIC (S)YNONYM (A)LLOWED

PARENT:

GENERAL CATEGORY 1:  instant counts
GENERAL CATEGORY 2:
GENERAL CATEGORY 3:

F1-SEARCH F2-ADD F3-MODIFY F4-DEL F5-COMMENT
F9-RETURN F10-HELP
.............................................
```

Finally, a great deal of information that is not part of Profiles or Data Variables which is relevant to decision-making and management planning processes is is also shown in Figure 3. Management relies on a variety of information such as the themes and objectives of services, past decisions taken with respect to supporting activities as defined in documents, projects, etc. The choice has been to classify all these latter types of information as Support Information in the data model.

THE DATA VARIABLE CONCEPT: FORMATION OF A NEW DATA RECORDING CONCEPT

The Case for Data Variables

As stated earlier, this paper primarily deals with one critical aspect of having better data. As implied, a form of dimensional analysis as used in the physical sciences is needed for better data to be recorded by the CPS, and for better social science data collection and analysis in general. This is to correct the problems inherent in ambiguous data recording. As discussed below, Data variables offer a mean of clearly specifying what data are recorded. "Data Variable" is just a term adopted for the specification of data presented here.

The creation of Data Variables is not intended to be a "make work" project. The underlying goal of defining Data Variables is to force those requesting data and those collecting data to specify exactly what it is that they want or are recording, and decide whether this data is really necessary and what they really what to collect. In many instances, certain data are being collected simply because they have traditionally been collected. Hopefully, the use of this new system of data recording will help to reduce the amount of data recorded to that which is essential to good management.

Criteria for Defining Data Variables

Data Variables must be defined using the attributes introduced previously (Figures 3 and 4). A value for each data variable attribute must be identified without exception. This is to ensure that the definitions are standardized and that attributes important to one individual are not omitted by another in the name of expediency. The presence of all attributes of a Data Variable also ensures that cross-references between Data Variables can be made using any given attribute.

Data Variables are made up of three main attributes which include "What to Record" (a qualifier), the "Subject of Report" and the "Action of the Subject". Examples of Data Variables include:

- Total number of persons entering VRC per day;
- Maximum number of picnic tables occupied between 11 a.m. and 1 p.m. monthly;
- Name of superintendent from September 1985 (until another is specified).

In addition, the type of data, its class and recording time frame, its status, its parent and general categories must also be specified.

The following headings provide some detail on individual attributes of Data Variables. These are described in the order in which they appear on the computer screen shown in Figure 4.

Variable number. The variable number

provides a code for the Data Variable which is unique. This ensures integrity of the Data Variable database over time because the codes used here are not dependent on codes used in other databases. The variable numbers or codes are simply sequential numbers that begin at number 1.

Type of data. Data include both number information, called numeric data, and alphabet or text information which are referred to as alphameric data. Numeric data are numbers, and include what are normally thought of as counts in relation to some unit such as people, vehicles, and presentations. Alphameric data relate to text or descriptive information such as staff persons providing services, what the weather conditions are, or any other "word" information which is not captured in numbers.

What to record. This qualifier is used to provide a description of the data collected on a particular subject. Examples of this qualifier include the total number, average number, observed number, maximum number, fee in dollars, and unit cost. It is the first component of the Data Variable.

Subject. The second component is the "subject". This refers to the item or subject being counted or recorded. Examples of subjects include persons, vehicles, garbage bags, boats, sites, and dollars.

Action of subject. This component describes, as the title suggests, the action that the above subject "was engaged in" resulting in the data being collected. Examples include entering, present at the end of an interpretation program, completing a guided walk, mooring, paying for a campsite, or being chief of visitor services.

Class and recording timeframe. For Data Variables, one must also specify a class and recording time frame in relation to data collection. These specify the time recording "framework" against which the data must be recorded. There were five classes in use of as of the November 1988. Plans to include questionnaire data, computation formulae, and parameters of forecast equations may mean up to 8 classes in the near future.

Event data is one class of Data Variables. This refers to data which is collected on an occasion or event which repeats, has a duration and has a theme. This is data collected in relation to an event such as an interpretive program. The related time frame, in this case, is the date and time the event is held or offered. Some examples of Event Data are:

- Average number of Persons present at the end of service presentation as recorded for date/time;
- Name of the staff person conducting a guided walk as recorded for date/time.

Non-patterned data are data which apply to extended periods of time but which change periodically. These data are recorded infrequently or irregularly, and are not related to a specific event. Generally, these data are recorded only when they change. As with Event Data, the recording time frame for Non-Patterned Data is the date and time the data are recorded. Some examples of Non-Patterned Data are:

- Cost of setting up an exhibit as recorded for date/time;
- Name of the individual who is superintendent of a park as Recorded for date/time.

Patterned Data are recorded on the basis of a specific time pattern. In this case, the recording time frame identifies each time period during which an observation is to be taken on a given date. Examples of Patterned Data are:

- Estimated number of parking spaces occupied as recorded at some random time between 10:00 and 11:00 hrs.;
- Statement of Weather Conditions as recorded at some random time between 11:00 and 13:00 hrs.

Sequential Data are recorded in a sequence such as every 15 minutes, every hour, and every day. The recording time frame defines the time sequence which observations are to be taken. Examples of Sequential Data are:

- Total number of persons entering turnstile of a pool as recorded hourly;
- General comments of visitors on adequacy of a service provided as recorded by a Visitor Services Staff Person for her/his shift.

Periodic Data were first introduced in the summer of 1988. These are a special type of Sequential Data. Periodic Data refer to data which are sequential (e.g. a day, week, or year), but repetitive subsequent time periods. For example, the percentage of traffic that is considered as visitor vehicles may be specified for spring, peak season, fall and winter. The four values specified are four periods which repeat yearly and for which one may use the same proportions from year to year because each remains relatively constant, once defined. Similarly, monthly data can be considered as periodic data from year to year if they repeat from year to year. There are many possible combinations which are useful to managers. Hourly periodic data can reflect varying workload or traffic during the day. In this case, often the data would be for weekdays, Fridays, etc. In any case, the need for periodic data has been identified, and the concept is being refined further.

Status. Status designates whether an entity set is current, filed in archives or identified by a different name somewhere else in the database. A current entity set is referred to as "Allowed" and can be updated (i.e. added to, modified, etc.). An entity set file in archives is referred to as "Historic", and cannot be updated. It is there only for

reference purposes. "Synonym" is used to describe an entity set which is also described elsewhere from a different perspective, and enable the two entity sets to be recognized as one.

Parent.The term "parent" refers to a type of relationship found among items within an entity set. For example, a "parent" activity such as camping could be subdivided into more specific "child" activities such as tent camping, trailer camping, or RV camping. These superior/subordinate relationships are referred to as reflective and they enable meaningful classification of items within an entity set.

General categories.Each entity set has three General Categories which provide further descriptive information on entities and also enables combinations of items with a common theme. For example, a general category for activities might be "VAMP Classification" under which activities would be classified as either land-based, water-based, or land and water-based.

DISCUSSION

Due to the problems related to data recording initially discussed, it was necessary to develop a new data recording system. The Data Variable concept is flexible enough to accommodate a wide range of units of count including some which may have previously been considered "anomalies" because they were very park specific. Regardless, "standard" data variables which can be used across the park system can be defined using Data Variables.

This new way of thinking provides more precise data since but there are cases when Data Variable definitions will be over 100 characters in length. This clarifies the logic in setting up the computer screen as seen in Figure 4.

Having long Data Variable names is a problem when individuals have to "recall" Data Variable numbers or descriptions precisely on a regular basis. However, automation (i.e. via computers) and a common database of shared definitions and definition components facilitates the use of Data Variables. This does not imply that the rigorous structure of Data Variables will make it in the popular press. Depending on the context, for example, "visits" in conversation or press will still be referred to as "visits". The important factor is that somewhere in the database this term will be defined according to the Data Variable structure and can be accessed quickly from a computer terminal when detail or clarification is necessary. Of course, given the amount of information contained in each Data Variable, this task would not be feasible manually.

On another matter, the job of creating Data Variables for a park may appear tedious at first glance. However, once the majority of these are established nationally, only a few Data Variables may need to be added in parks in subsequent years. Also, headquarters, by working with some parks, will assist in the development of "standard" Data Variables for all parks as well as assist field in the development of park-specific Data Variables.

CONCLUSIONS

The Data Variable concept does not stand alone. It is a part of a larger data model. This Data Model creates a structure for a computerized database which is cross-functional and appropriate to different levels or management groups within the Canadian Parks Service. A paper entitled "A Socio-Economic Data Model: A Concept Paper on an Entity-Relationship-Attribute Model for Environment Canada/Parks", discusses the Data Model in greater detail. As previously noted, the Data Model can be viewed as a computerized filing cabinet for park use data. The Data Variables simply describe the information contained therein. It is a way to ensure that everyone can access a particular reference in the filing system. The model also provides references to other filing systems.

A number of advantages inherent in the use of Data Variables have already been alluded to. As referred to previously, the meaning of data collected may be clear to the person who is actually recording observations, but others may have difficulty interpreting the data. Knowing what data really are is significant to management. Introducing a standard Data Variable syntax and vocabulary in relation to socio-economic data is facilitated within the context of the Data Model.

The Data Model and Data Variables are both open-ended enough to incorporate various users needs, and definitive enough to ensure that data and reporting objects are identified using a fairly rigid syntax and a controlled vocabulary. Transfer of information is supported through a standardized vocabulary which can be readily shared by field, regions and headquarters. This increases the potential for use of data in the various management planning processes.

Consistent and correct aggregates of data are the result of understanding what data mean. Data Variables with appropriate "dimensions" (i.e. descriptions) can be identified as usable for sums, maximums or other mathematical operations. In this context, Data Variables with slightly different definitions may also be "combined", but at least the analyst will know if "apples and oranges" are being compared or "added". Using Data Variables targets to eliminate guess work or assumptions made with regards to what data actually are.

With a standardized vocabulary and explicit statements of what data are to be recorded for, when and how, the quality of data collected can be improved and the transfer of information is facilitated. At the same time, the potential for data use by various levels of the organization including field, region, headquarters and management planning groups is substantially increased.

Throughout this paper, the need for a new way of identifying data to be or being collected within the organization has been the issue. Many of the previous limitations and difficulties associated with data collection and analysis methods can become a thing of the past with the use of Data Variables. More effective and efficient use of data is the goal.

V I M D E X: AN INDEX OF VISITOR IMPACT MANAGEMENT REFERENCES [1]

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This paper describes a menu driven bibliographic database (VIMDEX) containing 2714 references related to visitor impact management. The database was analyzed in terms of the form of publication, title dispersion, subject dispersion and time characteristics of the 2714 references and the 9221 citations listed in a sample of 629 referenced documents. Results indicated that the recreation impact/carrying capacity literature is a dynamic, interdisciplinary field characterized by a great diversity of subject areas and a high level of title dispersion among many journals and publication outlets. The literature continues to experience rapid growth and development which contributes to a relatively high rate of obsolescence indicated by a half-life of only 4.39 years.

Recreational use of natural areas can have a variety of direct and indirect consequences for both the natural environment and the character of the visitor experience. Even low levels of use have been shown to directly disrupt the amount and type of vegetative cover, reduce wildlife populations' feeding and breeding habitats, or alter the quality or nature of the recreation experience. Indirect impacts associated with these changes may result in the displacement of sensitive species and/or user groups by those more tolerant of varying amounts and types of use.

Efforts to document, describe and evaluate recreation impacts have generated a large and diverse body of literature over the past three decades. Much of this literature fits under the generic label "carrying capacity," and is concerned with determining the number of users that can be accommodated by a given area without loss in the quality of the natural environment and/or visitor experience. This literature includes a variety of types of documents. Scientific reports and papers serve to document recreation impacts and factors affecting their incidence and severity. Popular articles convey this knowledge to the general public. Management related articles attempt to provide a framework and/or guidelines for application of this understanding to the planning and management of recreation resources.

In an interdisciplinary field such as carrying capacity, the scholarly community is often overwhelmed with the exponential growth of scientific and creative activity. Important research can go unnoticed because researchers and practitioners are unable to keep pace with the avalanche of new literature. Readily available information, even if of lesser quality, tends to be utilized more frequently (Goldman 1979).

To compensate for this growth pattern, the scientific community must assume greater control of its own literary output. Organizations in both the public and private sector, who continue to expend large sums of money and considerable scholarly talent to optimize publishing efficiency, need to work towards controlling the flood of scientific information by means of comprehensive and timely abstracting and indexing services. Such information should be made available promptly and efficiently to all who need it.

VIMDEX

VIMDEX is a software tool for meeting this practical need. This menu driven bibliographic database was compiled for the National Parks and Conservation Association as part of a comprehensive effort to understand and apply the existing literature dealing with recreational carrying capacity. It represents one component in a series of products resulting from the project. Other reports in the series provide a review and synthesis of the literature (Kuss, Graefe and Vaske 1989) and outline a framework for managing visitor impacts (Graefe, Kuss and Vaske 1989).

The literature compilation extends and updates previous summary articles and bibliographies that examined related topics, such as Cole and Schreiner's (1981) annotated bibliography on soil and vegetation impacts and Ream's (1980) bibliography dealing with the impacts of recreation on wildlife. This effort also differs from previous studies in that bibliographic materials in this project were compiled in the form of a citation index.

A citation index is a list of references in which each reference is comprised of bibliographic and classifying information (e.g., author, title, form of publication, subject area), as well as a list of publications or communications that are cited within the referenced document (Lipetz 1961). For purposes of clarity, the original bibliographic entries in the index are called references and the publications cited within the original documents are referred to as citations. References are thus the basic unit of analysis and citations are one of the fields of data recorded for each reference.

Researchers in many disciplines rely heavily on footnotes and bibliographic information accompanying articles as primary aids in their own research (Appel and

1 Support for this project was provided in part by the National Parks and Conservation Association, Washington D.C.

Gurr 1964). A citation index systematically identifies information that is most meaningful to scholars, researchers and practitioners. Citation indexing can assist scholars and researchers in their bibliographic searches; practitioners in identifying the most widely used and respected methodological and theoretical literature; and librarians / professional literature depositories in the selection of literature appropriate to their clients' interests.

The most beneficial type of index records and arranges *all* references in a body of literature for subsequent information searches and analyses (Lipetz 1961). Indices created to date, however, have primarily relied on the articles and citations of a few source journals, thereby providing an incomplete picture of their respective fields. VIMDEX illustrates the universal, practical, and as yet unaccomplished task of index compilation, computerization and analysis of a substantial body of literature. The intent is to empirically define the historical structure, boundaries and trends of the carrying capacity literature.

The Menu System

The initial version of the database was developed on a mainframe. The present PC based version of the menu system runs on any IBM compatible microcomputer with 256K of memory, DOS 2.0 or later, and a harddisk. VIMDEX uses approximately 3 megabytes of disk space; 2.7 for the database and 300K for the menu system.

The conversion of the database into the DOS environment and the development of the menu interface resulted in advantages that are difficult at best to achieve on a mainframe. Non-technical users are afforded a simple, easy to use method of identifying manuscripts that are not widely disseminated (e.g., technical research reports, dissertations, theses and conference presentations), as well as the more common sources of scholarly activity (e.g., journal articles, books, monographs).

The menu system was designed with the user in mind. The range of available user choices (menu names) is displayed in a horizontal menu bar at the top of the screen. When the user selects a menu name, a list of menu items appears in a drop-down menu directly below the menu name. Selection of a menu item either: 1) produces a dialog box requesting typed user input [e.g., an author's name to search for], 2) displays a dialog box containing a list of available choices [e.g., a list of publication types] or 3) executes a command [e.g., undo last search]. Each of these features provides users with a straightforward method of selecting their desired activity. The bottom portion of the screen displays a line of help information to assist the user in this process and identifies what searches have been performed. Results of a search are displayed in the middle of the screen.

VIMDEX allows users to perform literature searches on any combination of desired choices (e.g., all journal articles published by a given author during a specific year related to social impacts). Because the software is mounted on the individual's PC, the user can explore numerous search strategies, avoid the costs of connect time to a mainframe, immediately display the results of a search on the screen, print the results on paper for later viewing, or save the results to a file. This latter option is particularly useful to researchers who want to incorporate the list into the "literature cited" sections of their own manuscripts.

For individuals using 386 or 286 based PCs, the initial search of VIMDEX's database takes less than a minute. Because not all users have access to these technologies, VIMDEX was built around the concept of a *progressive search*. In the first pass at the database, all references are checked against the user specified search criterion. Subsequent searches are based on the set of references produced by the previous search. This approach improves the speed of examining alternative scenarios for all users, regardless of the technology available to them.

The Database

VIMDEX currently contains 2714 references related to visitor impact management. The references represent the major subdivisions of the existing carrying capacity/impact literature: social, soils/vegetation, wildlife, water resources, management related issues, and bibliographies.

Because of the scope of the carrying capacity literature, the selection criteria for references in the bibliography were not limited to any given discipline or type of publication. Books, scientific and popular articles, policy documents and management related papers were included.

Standard bibliographic information was recorded for all references in the index (e.g., author, date, title, source of publication, etc.). In addition, the citations within references were analyzed for a sample of 629 references (approximately one-quarter of all references). The sample was comprised of those publications considered to be readily available and widely distributed (e.g., refereed journal articles, book chapters, national proceedings, monographs, annual reviews). The sampling of references from the complete bibliography for citation analysis produced a representative, yet manageable number of references. For all citations in the sampled references, the author's last name and the publication date of the citation were coded. If the citation was not already listed as a reference, but dealt directly with carrying capacity or visitor impacts, the citation was added to the bibliography. Including the citation field thus served as a useful means of cross referencing the index for completeness.

The analysis of citations was based on a total of 9221 recorded citations. These citations were categorized into three distinct types: *principal citations* (i.e., citations to indexed references) which accounted for 30.7% of all citations; *disciplinary citations* (i.e., publications from a parent discipline, such as biology or sociology) which accounted for nearly one-half of all citations; and *reference citations* (i.e., reference materials, such as handbooks or master plans) which accounted for only 21.1% of all citations.

Some authors cite extensively from a source and refer to it many times, whereas others are more

restrained. To overcome the potential bias created by these differences among the authors, a specific citation was counted only once for each reference and not according to the number of times it was cited within the article.

Descriptive Analysis

The remainder of this paper summarizes highlights from the analysis of the VIMDEX database. This summary focuses on the type of publication, journal dispersion, subject dispersion and rate of obsolescence of the carrying capacity literature.

Type of Publication

The results of scholarly research are disseminated in various formats. Publication as a refereed journal article is common for specific research efforts, while more extensive treatments of a subject are usually published in the form of monographs. Serials and monographs, however, are not the only forms in which the results of scholarly research are communicated. Research/technical reports, dissertations, theses, annual reviews, reference books, presentations, conference proceedings, and other reference compilations represent other forms of data dissemination. The distribution of publication types for references and citations on carrying capacity are presented in Tables 1 and 2.

Table 1. Distribution of References by Form of Publication

Form of Publication	Number of References	Percent
Periodical/Journal	1049	38.6
Technical/Research Report	626	23.1
Proceedings/Symposia Transactions	498	18.3
Book/Chapters	186	6.8
Dissertation/Thesis	170	6.3
Presentation/Seminar	90	3.3
Unpublished Document	53	2.0
Annual Review	24	.9
Monograph	18	.7
TOTAL	2714	100.0

As in other disciplines, journals and other periodicals occupy the pre-eminent position in the literature on recreation impacts and carrying capacity. Roughly 40% of all indexed references, and an equal percentage of all citations, were periodicals, primarily refereed journals. The specific journals represent a myriad of specialized, interdisciplinary and multi-disciplinary subject areas (e.g., recreation, forestry, urban studies, biology, sociology).

Research and technical reports were the next most common form for the carrying capacity literature. Significant information from these often lengthy reports is sometimes published in journals. One-fourth of all indexed references, and an equal proportion of citations, were research or technical reports. This may be attributed to the great proportion of technical research on carrying capacity which is carried out under the auspices of the federal government, and therefore published in a report format.

Proceedings or transactions of symposia accounted for 18.3% of all indexed references. Due to the relative "newness" of the carrying capacity field, it may be reasoned that research findings are expediently relayed to the scientific community via presentation at professional meetings and subsequent publication in a compilation of proceedings. Only 7% of all citations, however, were to this form of publication.

Reference to the actual presentation of a paper appears in only 3.3% of all indexed references, and 1.8% of all citations. Although a presentation alerts the scientific community to research findings, actual use of and reference to the information is usually through a published proceedings, or other officially distributed report or article.

Books and chapters in edited compilations directly related to recreational impacts and carrying capacity, as well as handbooks of tables, formulae, experimental procedures, and other reference texts accounted for 6.8% of all references. This is understandable considering the time required to compile an expository treatise on a single subject (e.g., a book on carrying capacity), the relative "newness" of the carrying capacity discipline and our requirements for inclusion in the citation index. Books, however, predictably account for nearly one-quarter of all cited references. Consistent with other studies, our data suggest a general decrease in the importance of books as a means of scientific communication in many fields. Book use has almost "disappeared" in the natural sciences (e.g., biology, chemistry, physics), but is still important in the humanities, social, behavioral and applied sciences (Crane 1972).

Graduate student research appears to play a relatively small but important role in the carrying capacity literature. Six percent of all indexed references, and 5% of all citations were to this form of publication. In addition, many important results obtained in the course of thesis and dissertation research are eventually published in appropriate scholarly journals.

Unpublished working documents and personal communications accounted for only 2% of all indexed references, and 1.2% of all citations. Review serials and annual reviews similarly were not a major forum for publication in the carrying capacity field. Less than 1%

Table 2. Distribution of Citations by Form of Publication

Form of Publication	Principal Citations		Reference Citations		Disciplinary Citations		TOTAL	
	N	%	N	%	N	%	N	%
Periodical/Journal	1228	43.4	5	.3	2232	50.2	3465	37.6
Technical/Research Report	841	29.7	106	5.5	1241	27.0	2188	23.7
Book/Chapters	290	10.2	1825	94.0	5	.1	2120	23.0
Proceedings/Symposia Trans.	219	7.7	4	.2	433	9.7	656	7.1
Dissertation/Thesis	149	5.3	--	--	293	6.6	442	4.8
Presentation/Seminar	49	1.7	--	--	121	2.7	170	1.8
Unpublished Document	11	.4	2	.1	94	2.1	107	1.2
Monograph	43	1.5	--	--	24	.5	67	.7
Annual Review	--	--	--	--	6	.1	6	.1
TOTAL	2830	30.7	1942	21.1	4449	48.2	9221	100.0

Sample: N = 629 References
Average Number of Citations per Reference: 14.7

of the indexed references and an equal percentage of all citations were from this form of literature.

The relative importance of monographs in the carrying capacity literature was of the same order of magnitude as is found in other scientific disciplines, accounting for less than 1% of all indexed references and citations. Detailed and intensive expository treatment of a subject is important from an archive point of view, but the time involved in the preparation of a monograph generally makes them unsuitable for the initial announcement of important scientific findings and thus infrequently utilized.

Journal Dispersion

By studying the distribution of references in any subject it is possible to establish a relatively brief list of core publications which account for a high percentage of all references. A select list of publications with a high distribution of references enhances accessibility to a substantial portion of the most frequently used literature.

Table 3 ranks the most important journals identified in this study. The journals are listed in descending order of the frequency of reference. Each journal which accounted for at least four entries was ranked individually; those appearing less frequently were treated collectively. No judgment as to quality is implied in this ranking.

Analysis of the dispersion patterns of the references to various journals revealed a distribution characteristic of many scientific disciplines. For those indexed references from journals, 50% appeared in only 11 journals, or 4.9% of the 223 journals noted. The next 39 journals, 17.5% of the journals noted, accounted for an additional 26% of the references, while the remaining 251 references, 24.7% of the total, were dispersed in 172 journals.

The actual journal dispersion was compared with a theoretical model of dispersion (Law of Scattering) developed by Bradford (1934). According to Bradford's hypothesis, the degree of scatter is inversely proportional to the productivity of the periodicals. A few journals at the core of the subject are responsible for a large number of references or citations, while the rest of the references are distributed over a large number of progressively more distantly related publications. According to Bradford:

> ... the aggregate of periodicals can be divided into classes according to relevance of scope to the subject concerned, but the more remote classes will, in the aggregate, produce as many references as the more related classes. The whole range of periodicals thus acts as a family of successive generations of diminishing kinship, each generation being greater in number than the preceding and each constituent of a generation producing inversely according to its degree of remoteness.

Table 3. Ranking of Journals by Frequency of References

Rank	Journal Title	Number of References	Percentage of Total	Cumulative Percentage
1	Journal of Leisure Research	106	10.4	10.4
2	Journal of Forestry	84	8.3	18.7
3	Leisure Sciences	76	7.5	26.2
4	J. of Soil & Water Conservation	68	6.7	32.9
5	Journal of Wildlife Management	49	4.8	37.7
6	Biological Conservation	37	3.6	41.3
7	J. of Environmental Management	22	2.2	43.5
8	Environment and Behavior	20	2.0	45.5
9	Journal of Applied Ecology	17	1.7	47.2
10	Wildlife Society Bulletin	15	1.5	48.7
11	Auk	12	1.2	49.9
12	Science	12	1.2	51.1
13	Canadian Field Naturalist	11	1.1	52.2
14	Design and Environment	11	1.1	53.3
15	National Parks & Conservation	11	1.1	54.4
16	Naturalist	11	1.1	55.5
17	J. of Park & Recreation Admin.	10	1.0	56.5
18	Western Wildlands	10	1.0	57.5
19	Bioscience	9	.9	58.4
20	J. of the Water Pollution Control Fed.	9	.9	59.3
21	American Forests	8	.8	60.1
22	Audubon	7	.7	60.8
23	Colonizing Waterbirds	7	.7	61.5
24	Forest Science	7	.7	62.2
25	Journal of Ecology	7	.7	62.9
26	J. of Personality & Social Psychology	7	.7	63.6
27	Wilson Bulletin	7	.7	64.3
28	Condor	6	.6	64.9
29	Environmental Conservation	6	.6	65.5
30	J. of Environmental Education	6	.6	66.1
31	Journal of Mammals	6	.6	66.7
32	National Wildlife	6	.6	67.3
33	American Birds	5	.5	67.8
34	Backpacker	5	.5	68.3
35	Hydrobiologia	5	.5	68.8
36	Journal of Range Management	5	.5	69.3
37	J. of the Soil Science Society of Am.	5	.5	69.8
38	Natural History	5	.5	70.3
39	Natural Resources Journal	5	.5	70.8
40	Parks and Recreation	5	.5	71.3
41	Water Resources Bulletin	5	.5	71.8
42	African Journal of Ecology	4	.4	72.2
43	Appalachia	4	.4	72.6
44	Breeding Birds	4	.4	73.0
45	Conservationist	4	.4	73.4
46	International Bird Banding News	4	.4	73.8
47	Journal of Environmental Health	4	.4	74.2
48	Journal of Environmental Quality	4	.4	74.6
49	Land Economics	4	.4	75.0
50	Psychological Bulletin	4	.4	75.4
51	Sierra Club Bulletin	4	.4	75.8
Titles with 1-3 References Each		251	24.7	100.5
TOTAL		1016	100.5	100.5

Bradford's formula for the "law of scattering" can be expressed as $1 : n : n^2 : n^3 : \ldots$ where n is the number of periodicals, and the ratio is based upon successive zones of equal numbers of citations. The results of the comparison of the actual distribution of the references with the theoretical distribution derived from Bradford's formula are presented in Table 4.

Table 4. Actual versus Theoretical Title Dispersion

Zone	Ratio	Theoretical Ratio (n=4)	Actual Ratio	Number of References in Each Zone
1	n	4	4	334
2	n^2	16	27	340
3	n^3	64	192	342

The actual findings differ from the predicted dispersion -- with slight variation in Zone 2 and significant variation in Zone 3. The large percentage of journals in Zones 2 and 3 indicate that journal dispersion in the area of carrying capacity is actually greater than expected. The discrepancy in actual versus theoretical dispersion highlights the substantial number of indexed references dispersed among many journals. This may well be attributed to the interdisciplinary and dynamic nature of the carrying capacity literature.

Subject Dispersion

Researchers in an interdisciplinary field such as carrying capacity utilize literature generated by a variety of disciplines. The subject dispersion of a discipline's literature may be considered a measure of the interrelationship of that discipline with other areas of specialization. In this study, the phenomenon of subject dispersion was investigated by generating keywords from reference titles, and analyzing the distribution of references to various subject areas.

Title word indexing (i.e., generating keywords from those terms used by an author in the document title, rather than the assignment of independent keywords), is a cost effective method of keywording (Garfield 1979). It is, however, an incomplete process in that it focuses only on the main subject of a document, overlooking material ancillary to the primary subject matter. In addition, there is a great deal of inconsistency in the extent to which authors' composition of a title truly reflects the subject matter. As an initial method of keyword generation, title word indexing is an accepted practice, which with time may be supplemented by assigned subject keywords.

Consistent with the interdisciplinary nature of the carrying capacity field, the title generated keyword index produced 1000 plus descriptive terms. This large number of keywords highlights a major problem in the field: the inconsistency in terminology utilized by its authors. Standardization of key terms in the field would facilitate communication, and with time, serve as a primary indicator of disciplinary structure and maturity.

Among the more frequently noted keywords are those characteristically defined as area or activity specific; including, but not limited to: parks, use patterns and users, management, forests, rivers, and impacts.

Time Characteristics

Time characteristics, or the temporal span of the subject literature, refers to the extent to which researchers reach back into the past to locate literature relevant to their research. The dates of publication or presentation for the 2714 indexed references ranged from 1897 to 1986 (89 years). The distribution of publication dates revealed only 3% of all references in the 62 years prior to 1959; 11.1% between 1960 and 1969; 22.4% from 1970 to 1974; a similar percentage, 24.9%, from 1980 to 1986; and one-third of all references published or presented from 1975 to 1979 (Table 5).

Table 5. Distribution of Reference Publication Dates

Year(s) of Publication	Number of References	Percent
1897 - 1959	80	3.0
1960 - 1964	82	3.0
1965 - 1969	221	8.1
1970 - 1974	609	22.4
1975 - 1979	1039	38.3
1980 - 1986	676	24.9
Undated	7	.3
TOTAL	2714	100.0

Mean date of reference publication: 1975
Median date of reference publication: 1977
Range in date of references: 1897 - 1986 (89 years)

Publication of the USDI National Park Service *Mission-66 Plan* in 1956 and the USDA Forest Service *Operation Outdoors Program* in 1957 signalled the beginning of interest and research endeavors in the outdoor area. With the distribution of the Outdoor Recreation Resources Review Commission findings in 1962, and subsequent reports throughout the 1960's, concern for a "quality environment" and the associated environmental, biophysical and social contributions and ramifications increased dramatically. The result is a great number of carrying capacity projects and a higher publication rate (85% of all references) from 1970 to the present.

The literature of "vogue or trendy" disciplines typically has a relatively short useful life, whereas for the more stable expository or classificatory sciences the useful life span of literature is considerably longer. Consequently, the time elapsed between publication of results and their subsequent citation by other investigators can be viewed as a measure of the rate at which the literature of a given discipline obsolesces (Burton and Kebler 1960). This same characteristic also provides some indication of the probable life expectancy of literature to be written in the future.

Knowledge of time properties or rates of obsolescence of subject literature provides an objective basis for segregating actively used and lesser used literature. Data for this analysis was obtained by recording the date of publication of each reference and calculating the elapsed time between the date of publication of the reference and the dates of the citations listed in the original publication. This analysis was performed on the sample of 629 references, and their 9221 citations (an average of 14.7 citations per reference).

Table 6 presents this elapsed time distribution for all principal citations. Over one-half of these citations were to documents published less than five years before the citing publication; 28% were to those published from 6-10 years prior; 10% were to those published from 11-15 years prior; and the remaining 15% were to materials published from 16-60 years before the citing reference.

Table 6. Distribution of Elapsed Time: Reference-Citation Publication Dates

Elapsed Time Between Publication and Citation (in years)	Number of References	Percent
0 - 5	1589	56.1
6 - 10	793	28.0
11 - 15	281	9.9
16 - 20	73	2.6
21 - 25	6	.2
26 - 30	13	.5
31 - 35	10	.4
36 - 40	16	.6
41 - 45	15	.5
46 - 50	9	.3
51 - 55	0	.0
56 - 60	1	.0
No Date	24	.9
TOTAL	2830	100.0

Using the Burton-Kebler formula of

$Y = 1 - a/e^{x} + b/e^{2x}$

where:

a + b = 1,
Y = cumulated percentage expressed as a decimal &
X = time in decades,

resulted in a "half-life" of 4.39 years for the carrying capacity literature. This relatively short half-life is similar to that of other active sciences undergoing rapid development and change either in content or techniques. It indicates that knowledge in the carrying capacity field is becoming obsolete fairly rapidly. An analysis of the half-life of reference and disciplinary materials, independent of principal citations, revealed that reference materials have a useful life of 9.4 years and disciplinary materials have a half-life of 7.5 years. This in turn indicates that the literature on carrying capacity is composed of a large segment of "ephemeral" contributions with a high obsolescence rate, and a much smaller group of "classical" papers whose rate of obsolescence is far less. This is further substantiated by the incidence of journal, technical report and proceedings use which reflects the rapid change in research emphases and topics, and the necessity for updated and efficient information dissemination.

Conclusion

VIMDEX is a software tool that can assist researchers and managers interested in identifying references related to recreational carrying capacity and visitor impact management. Searches can be performed on virtually any combination of data fields included in the index. Because the process of creating and maintaining an index is an on-going process, the authors intend to continue working on VIMDEX to enhance the capabilities of the menu system and to update the bibliographic entries.

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AN ANALYSIS OF VISITORS' DESIRE AND WILLINGNESS TO PAY FOR AN EXPANDED SERVICE LEVEL IN ONTARIO PROVINCIAL PARKS

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This study examined the desirability and willingness to pay of Ontario provincial park visitors for an expanded level of service. It used a compensatory, multi-attribute decision-making model and was analyzed using dummy variable regression. The results indicated visitors do desire an expanded level of service, and would be willing to pay for the opportunity to have these services available to them.

Introduction

The Ministry of Natural Resources (MNR) currently manages 219 provincial parks in Ontario. Each park falls into one of the following six classifications for provincial parks: Wilderness, Natural Environment, Nature Reserve, Historical, Waterway and Recreation.

Provincial parks are governed by policy documents which determine the standard level of service provided to the visitor within each park classification. The question arises whether this is the desired level of service by the visitor. Provision of an expanded mixture of opportunities, activities, services and facilities could serve to increase attendance at parks and the satisfaction level of visitors. Research by White and Schreyer (1981) found the second most popular reason people visited National parks in the U.S. was access to the facilities and programs offered. They also note peopled stay in the park only long enough to see all the prominent attractions. If the number of attractions were expanded, peoplemay stay longer in the parks.

If an expanded level of service is sought by visitors, the next question is how should the MNR pay for these expanded services? One method is for the user to pay for all the services they utilize in the park. It is important to look at methods of generating revenue from the visitors because in the last decade the Ontario provincial parks' budgets have been decreasing to the point where many programs, services, staff and construction projects have been eliminated. Therefore, the MNR are clearly not able to fund an expanded level of service provision, even if it is highly desired by the visitors.

Three of the park classifications were used to examine visitors' desire and willingness to pay for an expanded service level: Wilderness Parks, Natural Environment Parks, and Recreation Parks. The other three park classifications were not used since their objectives did not include recreation, only heritage appreciation and protection, and thus were not compatible with this study. A Wilderness park was defined as being a park where large, natural areas are left relatively untouched. Natural Environment Parks were defined as being focused around outstanding recreational landscapes and natural features. Recreation Parks were parks which use features of the outdoor environment to enhance participation in a wide variety of recreational opportunities with a high level of development occurring.

This study had three specific objectives: a) To examine whether visitors to three classes of Ontario Provincial Parks (Wilderness, Natural Environment and Recreation) desired an expanded level of service within the parks; b) If an expanded level of service was desired, what was the desired level of expansion; and c) How much would visitors be willing to pay for these expanded services.

Examples of an expanded service level included restaurants, motels, camping and recreational equipment available to rent in the park, and an increased visitor services program.

Variables

The visitors' perceived desirability for various levels of service was obtained using a compensatory, multiple attribute decision-making model. Fractional-factorial designs are used in multi-attribute decision-making to compose scenarios for the respondent to assess. These scenarios consist of all the possible combinations which can occur given the number of variables and the levels they are operationalized by. A fractional-factorial design is often utilized to decrease the number of scenarios the respondent must evaluate in a factorial design by ignoring the measurement of

some interactions which could occur. This is not a problem since the researcher can determine which interactions are ignored. Therefore, in this study a fractional-factorial design determined 27 hypothetical scenarios would be necessary to allow for the five main effects, or independent variables, to be analyzed as well as the two-way interactions between park classification and the other four independent variables.

The independent variables consisted of a pre-selected range of programs, facilities and services which were, or could be, offered by a park (Table 1). To operationalize these variables, they were each given three levels of attributes which corresponded to a high, medium or low level of service. Three levels were chosen to avoid an "all or nothing" situation which would occur if only two levels were used. Each of the 27 scenarios presented different levels of the five independent variables: park classification, lodging, food, equipment for rent, and in-park activities (see Figure 1 for an example of the instrument used).

The dependent variable was the desirability of the park scenario, rated on a seven point scale, where one equalled a very undesirable rating and seven represented a very desirable rating.

The second phase of the study asked the respondents to report how much they would be willing to pay (above the park entrance fees of $6.25 for day-users and $10.25 for campers) to have expanded levels of each variable available. The dependent variable, willingness to pay, was measured by the dollar amount the respondents recorded they would pay for each specific level of the independent variables. The independent variables were the same as in the first phase, however, the low levels of some of the variables were not included since this would be asking if the respondents would be willing to pay money for "no" services.

The respondents were also asked how willing they would be to donate their time or a lump sum of money to a park.

An eight page questionnaire was administered to 60 respondents at three parks. The respondents were divided into two convenience samples (campers and day-users) and ten people per group were randomly chosen at each park. Due to the nature of the design, these 60 people yielded 1,620 responses for analysis to determine the perceived desirability of a scenario.

Analysis and Results

Analysis for this study included dummy variable multiple regression and graphical representation of the results. The fractional-factorial design allowed for the examination of all main effects and of the interaction between park classification and the other independent variables. All other interactions were hypothesized to be insignificant.

Before subjecting the data to regression analysis, they were converted to standardized z-scores. This was done to account for individual variation of ranges of desirability. Initially, mean desirability scores (based on the standardized scores) were calculated to determine which scenarios were most desirable. The results illustrated the respondents did desire some level of expanded services. The

TABLE 1
Operationalization of Variables Used in the Study

Variable	Low Level	Medium Level	High Level
Park Classification	Wilderness Park	Natural Environment Park	Recreation Park
Food	No food available in the park.	Small convenience store located in the park with food items.	Small convenience store plus a restaurant located in the park.
Lodging	Primitive campsites available in the park.	Semi-serviced campsites with rental cabins available in the park.	Fully-serviced campsites plus a motel available in the park.
Equipment for Rent	No equipment available to rent in the park.	Some major types of camping and recreational equipment available to rent in the park (e.g. tents, canoes and bikes).	All types of major and minor camping and recreational equipment available to rent in the park (e.g. tents, canoes, back-packs, binoculars, sports equipment).
In-Park Activities	Printed brochures, self-guided trails, no souvenirs.	Printed brochures, self-guided trails, activity programs and guided hikes available during peak periods of visitor use, some souvenirs available.	Printed brochures, self-guided trails, many activity programs, guided hikes and talks offered year-round by park staff, staff always present to talk to, and many souvenirs available to buy.

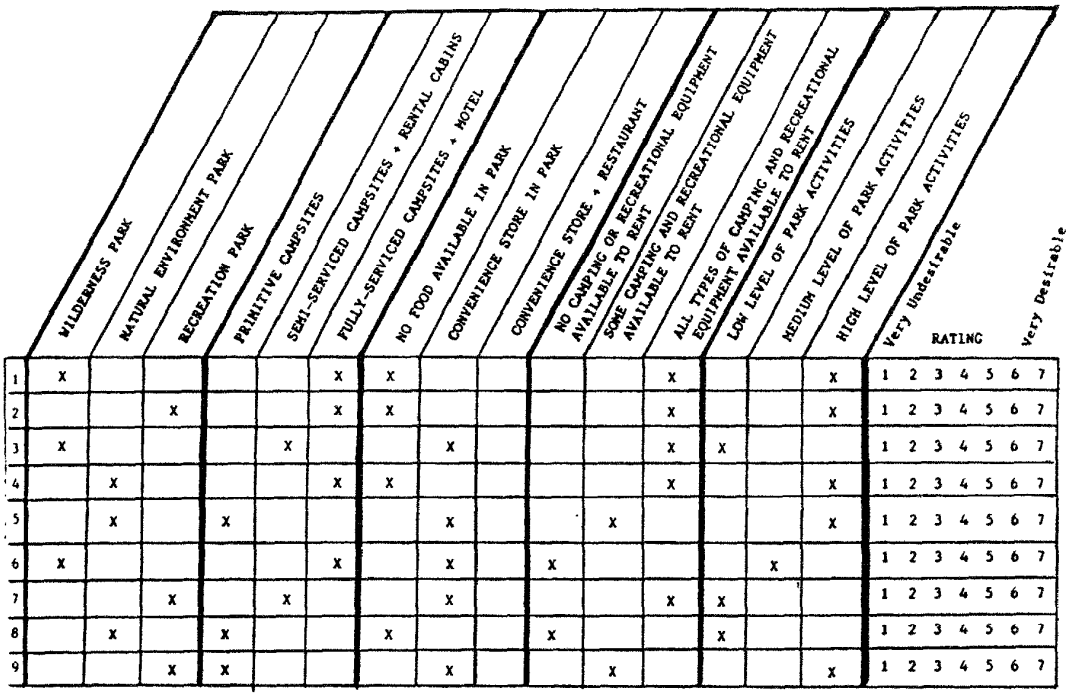
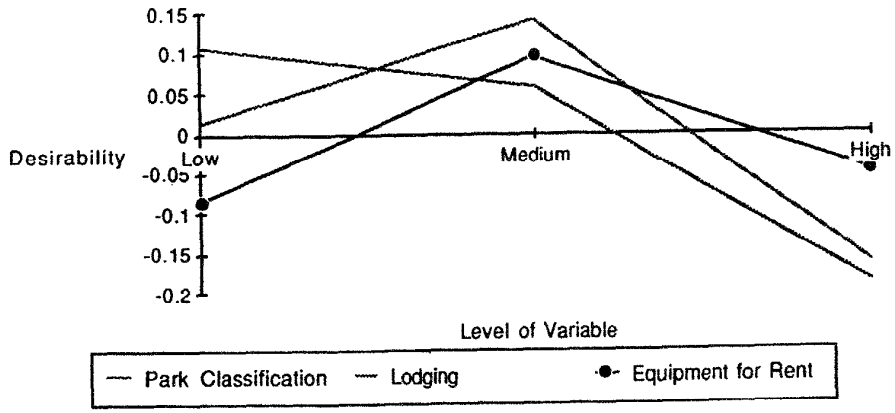


Figure 1: Example of Table Included in Questionnaire

most desirable scenario was comprised of a wilderness park (a low level of the park class variable) with semi-serviced campsites and rental cabins (a medium level of the lodging variable) and the opportunity to rent major types of camping and recreational equipment at the park (the medium level of the equipment for rent variable). Interestingly, the highest level of each variable (representing the most developed level of service) was not the most desirable, and in fact was often the least desirable.

The graphical depiction of the results is demonstrated in Figure 2 The three significant independent variables (park class, lodging and equipment for rent) only explained approximately 5% of the variance in site desirability (cumulative r^2=0.0429), therefore, there are other factors which influence desirability. Options suggested include scenery, water, and location. Since park classification did not explain a great deal of the desirability it appears to indicate visitors are unaware of the type of park they are visiting. This

FIGURE 2
Graph of Significant Main Effects By Desirability



was true from conversations with visitors as well. The classification of a park is not displayed in any of the promotional material associated with the park, nor is it shown on any of the signs within the parks. The Ministry of Natural Resources is currently deciding whether this information should be displayed at the parks.

Food and in-park activities did not significantly add to the understanding of a scenario's desirability. This is probably due to the following reasons: first, food is a convenience item which can be purchased anywhere along the route to the park, it is not the main reason people visit a provincial park; and second, the in-park activities are not publicized to potential visitors before they leave for the park, therefore, until they arrive at the park they are unaware of the activities which are offered.

The willingness to pay section provided interesting findings. Forty-one percent of the respondents indicated a willingness to pay some amount of money for specific services (ranging from no services to the highest level of expanded services) listed in the questionnaire. More day-users (56%) were willing to pay for services than campers (32%). Visitors were willing to pay the most for the lodging and equipment for rent variables. It should be noted that these were two of the variables from the first phase which influenced the scenario desirability.

When just the respondents who were favorably inclined to pay were examined, there was a difference in the amounts the day-users and the campers would be willing to pay for certain services. The day-users were more willing to pay for food, the low level of lodging, the ability to rent camping and recreational equipment in the park and the medium and high levels of in-park activities (Figure 3).

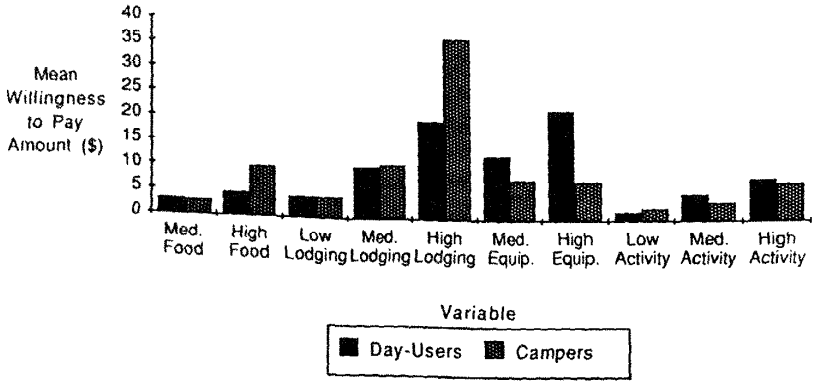
The visitors were asked if they would be willing to give a one-time only donation to a park in lieu of paying for services. Fifty-four percent reported they would be willing and the average amount of the donation was $64.13. From these results it is possible to speculate donations to provincial parks could potentially add up to a significant amount of money if a fund-raising campaign was initiated. Based on 1986 figures, the amount of money which would be generated if 54% of the visitors donated $64.00 is almost $450,000,000. Even though it is improbable this amount of money could be raised, it does have interesting implications for fund-raising potential. When asked which area they would like to see their donations go toward, the most frequent response was interpretive programs (32%), followed by recreational activities (22%), equipment to rent (20%), lodging (16%) and food (12%).

The visitors were also willing to donate their time at a provincial park instead of paying for services. Thirty percent of all visitors were willing to donate their time at a park. This potentially could account for over 1500 person years of help if 30% of the visitors each donated 2 hours of time. Again, it must be realized this is an optimistic view, however, it does help to identify some non-traditional areas where the MNR could generate revenue or volunteer hours if they acknowledged and sought out this type of help.

Implications and Discussion

While 60 people is not a very large sample size to generalize conclusions from, the results from this exploratory study may provide insight into visitors' desire for services and their willingness to pay. In fact, the MNR is conducting similar studies on a much larger scale and their findings are paralleling the findings of this study, providing some evidence of the validity of the results.

FIGURE 3
Graph of Mean Willingness to Pay for Willing Respondents



The rating of the desirability of the scenarios found respondents prefer wilderness and natural environment parks to recreation classed parks. This attraction may be due to the beautiful scenery. Research by White and Schreyer (1981) found the most popular reason people visited parks in the U.S. was to view the scenery. Richards, Daniel, Brown and King (1988) found the more scenic a site is, the more people are willing to pay for their camping site.

The level of the lodging variable which was most preferred (semi-serviced campsites and rental cabins) was probably due to the availability of washroom facilities. The attraction for washrooms is prominent in many park user surveys (Pope, 1987). The descriptions of these levels in the future should be improved because it was difficult to assess whether the attraction was for both attributes or one separately (the semi-serviced campsites or the rental cabins).

The attraction for the opportunity to rent major types of camping and recreational equipment at the park has potential revenue possibilities for the parks.

The finding that visitors were willing to pay for the opportunity to rent camping and recreational equipment at the park offers some additional revenue generating sources for the parks. Managers should investigate methods of providing this service such as offering equipment to rent alone as a concession (e.g. canoes, tents and bikes) or offering packages that would include all the equipment for a particular activity. Examples could include a camper's package (tent, sleeping bags, coleman stove and cooler), a hiker's package (backpacks, binoculars, tent and sleeping bags), or a beach package (bikes, canoe and inflatable air mattresses). These rental packages could be publicized in promotional material and park brochures to allow for advance notice and planning.

In addition, providing rentals may potentially increase the number of visitor days since traditional day-users may switch to visiting as campers. This would generate additional revenue in both entrance fees and rental fees.

There is the opportunity for co-operating associations to become involved in many aspects of providing expanded services and generating revenues. This would be beneficial to the Ontario Parks System because currently the provincial parks are unable to keep any funds which are raised as a result of user fees since all monies must be returned to the consolidated fund of the provincial government. However, if co-operating associations were encouraged to provide a number of the services, they could use the profits or donations for in-park activities. Co-operating associations could also help parks staff by providing and organizing volunteer labor.

Day-users were more willing to pay for the expanded levels of in-park activities than campers. This may be due to two reasons. First, the campers stay in the park longer, so they may want to explore the trails and programs at their leisure. The day-users are only in the park for a short period of time, therefore, they may want a guided tour so they can see all the attractions without having to spend a great deal of time searching for them. Second, the campers may have an increased knowledge about the outdoors since they spend more time at the parks. The day-users may not have the knowledge and thus would be willing to pay more to have the park staff take them on guided hikes.

Since the day-users were more willing to pay for these activities than campers, it could imply that interpretive programs should be staged near day-use areas and be widely promoted to that group. Campers should have access to do-it-yourself guides and maps so they can conduct their own hikes. As well, activities should be offered during peak day-use times so this group can choose to partake in these activities. The commonly offered evening interpretive and visitor services programs do not cater to this clientele. Currently day-users are not considered in the marketing strategies of the Ministry of Natural Resources, however, this is beginning to change in light of these, and other, findings.

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NON-PARTICIPATION IN MARINE RECREATIONAL FISHING IN NEW YORK: MANAGEMENT IMPLICATIONS AND OPPORTUNITIES[1/]

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Abstract

In the winter of 1987, 1013 metropolitan New York City households were interviewed by telephone regarding reasons for not participating in recreational fishing in New York's marine waters during 1986. The results of the data collected indicate that scarcity of fish was not a major reason for non-participation. Four barrier areas which limited participation were identified, and seven management opportunities for recruiting new participants through public awareness and education were explored.

Introduction

Recreational sportfishing is an important leisure pursuit in the United States. The Sportfishing Institute estimates that some 60 million Americans fished during 1985 (Sportfishing Institute, 1988), making sportfishing the second most popular recreational activity among U.S. adults (18 years of age and older). The 1985 Gallop Poll reported that recreational fishing in the United States was the single most popular leisure activity among adult men, with women ranking it fifth in popularity (Sportfishing Institute, 1986). Saltwater angling provides a unique sportfishing experience for those who live in or visit marine coastal areas of the United States. In 1985, an estimated 13,709,000 saltwater sportfishing recreators over the age of 16 fished a total of 155,172,000 days in U.S. marine waters (U.S. Fish and Wildlife Service, 1985). Based on this data, the Sportfishing Institute, using the Bureau of the Census population forecast, estimates that recreational saltwater fishing will increase to 186,534,800 days by the year 2000 and to 211,042,600 days by the year 2025 (Sportfishing Institute, 1989).

Impact of Sportfishing

In New York, saltwater fishing participation reflects the popularity of this coastal recreational pursuit (Buerger, 1987). During 1987, 3000 metropolitan New York City (five burroughs of New York City plus the counties of Rockland, Westchester, Nassau, and Suffolk) households were randomly selected and interviewed by telephone about their sportfishing participation in New York marine waters during 1986. From this sample, 1262 usable interviews were generated. The analyzed data provides a "picture" of marine recreational fishing in New York. During 1986, approximately 583,000 metropolitan New York City households or nearly 1,170,000 individuals participated in recreational sportfishing in New York waters (Kahn, 1989). Another 25,000 households or 50,000 anglers from upstate New York and out of state also participated in marine fishing in New York waters. As a result of the sportfishing activity of metropolitan New York City anglers in 1986, approximately 1,139,000,000 dollars in direct revenues were generated (Kahn, 1989). Initial reaction to these results are impressive in the sense of both numbers of participants and associated economic impact. However, a closer examination of the results shows that only about fifteen percent of metropolitan New York City households participated in recreational sportfishing in 1986. This means that approximately 3.4 million metropolitan New York City households or nearly seven million people did not participate in marine recreational fishing during that year. The management implications both from a resource and economic perspective of non-participation in recreational fishing seem great. As an example, increased participation in sportfishing may result in an economic windfall to local and regional economies (although the increase in economic activity may simply be a transfer from other sectors of the economy). In addition, there are other important reasons why increased participation can be viewed as positive. These center around the fact that individuals who have more leisure options also have more opportunity for improving their quality of life. On the other hand, increased fishing activity from recruitment of new participants may result in a negative impact (overharvesting) on a particular fishery. Consequently, managers of fisheries and recreation resources need to understand the

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influence they have on recruitment of new anglers if they are to meet their management mandate. If indeed exert some control on recruitment, then participation in recreational sportfishing can be managed to maximize the positive aspects of increased participation (user satisfaction, increased economic impact, etc.) while still protecting the resource from overuse.

Methodology

In an effort to better understand non-participation, those households contacted in the telephone sample who did not recreationally fish in New York's marine waters were asked reasons why they did not fish. The data collected indicated that 1,013 of the sample households did not possess any members who participated in sportfishing during 1986. These interviewees were provided with a list of thirteen reasons for "not fishing." The respondents could select as many reasons for not fishing as appropriate. Table 1 summarizes the results for why subjects did not participate in recreational saltwater fishing.

Table 1.--Reasons For Not Participating in Recreational Saltwater Fishing in New York

REASON	% OF SAMPLE
Other interests or hobbies	75
Not enough free time	51
Don't have fishing gear	47
Don't like to bait hooks or clean fish	45
Don't like to catch fish	45
Too much pollution	40
Never thought of it	34
Too hard to get to fishing area	24
Don't like boats	22
Cost too much	18
Don't like to eat fish	17
Fish are too scarce	12
Physically unable	8

Reasons for Non-Participation

As can be seen in Table 1, responses ranged from the most frequent response "other interests or hobbies" (75% of the sample), to the least recorded response "physically unable" (8% of the sample). All of the responses provide information about non-participation, but perhaps the most important response from a management on non-participation perspective was "fish are too scarce" (12% of the sample). The implication of this result is that the opportunity to catch fish does not seem to play a major role in an individual's decision to participate or not to participate in recreational saltwater fishing. This would imply that non-participants' perception of the marine fishery in New York is that if you participate in recreational fishing, you are likely to catch fish. Since the management of fishery stocks in the marine environment is quite complex, and the ability of managers to significantly influence the size of the stock is limited in the short run, understanding that the resource abundance (number of fish) is not a major factor in the decision to participate would suggest that other barriers to participation, which may be more manageable, do exist.

Barriers to Participation

A closer examination of the non-participation data indicates that four barrier groups can be formed from the thirteen individual responses that may help describe non-participation. The first barrier group that can be identified is a time barrier which includes: "never thought of it;" "other interests or hobbies;" and "not enough free time" responses. The time barrier can be interpreted as lack of time to engage in a new activity or not realizing that sportfishing was an option as an activity to participate in during leisure time. A second barrier group was fishing as a recreation activity. This participation barrier area focused on aspects of the recreational fishing activity that precluded participation: i.e., "don't like boats," "costs too much," and "don't have fishing gear." The fish themselves also could be identified as a third barrier group. In this area, subjects note non-participation based on qualities associated with the fish including: "don't like to eat fish;" "don't like to catch fish;" and "don't like to bait hooks or clean fish." The final barrier group identified by non-participants was the fishing environment. This barrier area was composed of the individual non-participation reasons: "fish are too scarce;" "too much pollution;" and "too hard to get to fishing areas." The breakdown of subject responses to each barrier group can be seen in Table 2.

Table 2.—Subject Responses to Why They do not Participate in Recreational Saltwater Fishing in New York by Barrier Groupings and Individual Responses*

Barrier Groupings	Individual Reasons
Time Barrier	(Response in %)
Never Thought of it	34
Other Interests or Hobbies	75
Not Enough Free Time	51
(a)1 of 3 = 88%	
(b)2 of 3 = 56%	
(c)3 of 3 = 14%	
Fishing Activity Barrier	
Don't Like Boats	22
Costs too Much	18
Don't Have Fishing Gear	47
(a)1 of 3 = 62%	
(b)2 of 3 = 21%	
(c)3 of 3 = 3%	
Fish Barrier	
Don't Like to Eat Fish	17
Don't Like to Catch Fish	45
Don't Like to Bait Hooks or Clean Fish	45
(a)1 of 3 = 62%	
(b)2 of 3 = 13%	
(c)3 of 3 = 9%	
Fishing Environment Barrier	
Fish are too Scarce	12
Too Much Pollution	40
Too Hard to get to Fishing Areas	24
(a)1 of 3 = 52%	
(b)2 of 3 = 19%	
(c)3 of 3 = 4%	

*Sample Size (n) = 1013; Mean Number of Responses Per Subject ($\bar{x}$) = 4.4, S = 2.1

(a) = Percent of subjects in the sample that selected one of the three reasons in the barrier grouping.
(b) = Percent of subjects in the sample that selected two of three reasons in the barrier grouping.
(c) = Percent of subjects in the sample that selected all three reasons in the barrier grouping.

Management Opportunities

The data presented in Table 2 indicates that the barrier groupings as a whole and specifically, individuals' non-participation reasons, can be used by recreation managers to promote recruitment of new saltwater sport anglers. Each barrier group possesses at least one non-participation reason that is based on user perception as opposed to the resource base itself. Specifically, seven reasons for non-participation provide recreation managers with the opportunity to recruit new participants without a major adjustment in time and expenditures by the potential participants, the fishery stocks, or the fishing environment. The seven reasons are: "never thought of it;" "don't have fishing gear;" "don't like to eat fish;" "don't like boats;" "don't like to bait hook or clean fish;" "costs too much;" and "too hard to get to fishing area." All of these recruitment opportunities are based primarily on providing public awareness and education for non-participants who indicate that they did not participate basically due to lack of knowledge. A closer look at each of the non-participation reasons provides a better understanding of how increased public awareness and education about recreational saltwater fishing by recreation and fisheries managers may increase recruitment of new participants.

The non-participation reason, "don't have fishing gear" was cited by 47 percent of the sample as a barrier to participation. From a management perspective, this reason can be interpreted as the public not being aware of what equipment is necessary to fish or that they physically do not have access to fishing equipment. When incorporating the non-participation reason, "costs too much" (18% of sample), the potential of managers to overcome these barriers seems high. As an example, the "don't have fishing gear" barrier could be broken down through a public awareness program focused on type of equipment needed for specific fisheries and "how to" educational sessions on proper use and maintenance of equipment. These programs could be sponsored by recreation or fisheries management agencies, through local fishing clubs, or tackle dealers. The sportfishing equipment manufacturing industry has for years been promoting and supporting sportfishing education programs in their own interest to increase sales of equipment. Industry has been receptive to joint agency/industry awareness and education programs and is usually willing to supply demonstration equipment, educational materials, and instructors. Much of the emphasis of these programs is on low-cost, easy to use equipment suitable for entire family fishing outings.

A portion of the non-fishing public did not participate in saltwater fishing because they "don't like to bait hook or clean fish" (45% of sample), "don't like boats" (22% of sample), or "don't like to eat fish." Once again, these barriers provide management opportunities for recruitment of new participants through public awareness and education. These three reasons for non-participation indicate that there are public misconceptions about what behavior is necessary to participate in sportfishing. Education programs designed to instruct potential anglers on techniques such as using artificial baits and lures along with the opportunities available for

horefishing (surf fishing and pier/dock fishing) ay well encourage new participation. Also, mphasis on catch and release behavior not only vercomes the reluctance of some non-participants o fish due to not wanting to clean fish but also romotes a fishing "ethic" that emphasizes the port of fishing, not the harvest of the resource. articipants recruited in this manner may well ecome the genesis of the new angler that onservation-oriented fisheries management is eared towards. Certainly this type of ecruitment would help overcome the non-articipation reason, "don't like to eat fish." owever, another approach for management in terms f recruitment would be an emphasis on consumer ducation. That is, much resistance to eating ish is based on lack of knowledge associated with ow to prepare fish and the nutritional value of ish. Consumer education would emphasize echniques for properly handling, preparing, and erving fish along with the associated health enefits of eating fish. Outlets for such nformation could be markets, newspapers, seafood estivals, dockside demonstrations, etc. ndividuals in an ever increasing health-conscious ociety may be more willing to participate in a eisure activity where one of the outcomes of articipation is a highly nutritional "healthy" ood.

nother non-participation barrier noted by the ample was "too hard to get to fishing areas" (24% f sample). This particular reason for non-articipation may or may not be a management pportunity to recruit new participants based on ow subjects interpreted this reason. If the ublic is not fishing because there are not enough ccess sites, access may well be a constraint that recreation management cannot address due to the rohibitive costs of creating new fishing sites. However, if access to fishing does exist, this non-participation response may indicate that the public is not aware of where access sites are located. Once again, a public awareness program using the media, seminars, publication of fishing access maps, etc. would help overcome this barrier resulting in the recruitment of new sportfishing participants.

The final response barrier response that would seem to lend itself to management efforts was "never thought of it" (34% of sample). All of the programs described for the above non-participation barriers would, if implemented, move towards overcoming the public's lack of knowledge of recreational saltwater angling as a leisure activity. The very nature of public awareness and education about different aspects of recreational saltwater fishing would focus attention on awareness of the activity. Consequently, overcoming any or all of the other manageable reasons for non-participation would also "break down" the "never thought of it" barrier.

Summary

In the New York City metropolitan area, saltwater fishing is a popular recreational activity. However, for a number of reasons, over 7.8 million metropolitan New York City residents elected not to participate in recreational saltwater angling during 1986. Examination of the reasons for not participating indicates that four barrier areas (groupings of reasons) exist. Those areas are: time; fishing activity; fish itself; and the fishing environment. Although barriers exist to participation, the scarcity of fish does not seem to be a main reason for non-participation. Seven of the reasons given for non-participation would provide recreation managers with the opportunity to recruit new participants through programs of public awareness and education about saltwater fishing. Consequently, if managers of fisheries and coastal recreation resources in the metropolitan New York City area choose to pursue recruitment of new saltwater recreational fishing participants, the probability for success would seem high based on the nature of the non-participation reasons given by many of the non-angling public.

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CONSUMER SURPLUS VALUES AND ECONOMIC IMPACTS OF HUNTING AND FISHING[1]

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Consumer's surplus values and expenditures associated with hunting and fishing in Maine are presented. Both types of economic data are presented on a per-person and aggregate basis. The relatively large magnitude of the aggregate surplus and expenditure values indicate the activities are important to participants and to the Maine economy.

Introduction

In 1987, the Maine Legislature formed a Commission to study the impact of game and nongame species of wildlife on the Maine economy. The Commission was asked to study both the consumptive and nonconsumptive uses of the resources. The Commission was formed, in part, to provide input to the Legislature regarding the funding of the Department of Inland Fisheries and Wildlife. Currently, the Department is funded primarily from the sale of hunting and fishing licenses, but severe budget shortfalls in the past have prompted the Legislature to consider alternative methods of funding the agency.

In January, 1988 the Commission contracted with the Department of Agricultural and Resource Economics at the University of Maine to conduct an economic evaluation of recreational uses of Maine's fish and wildlife resources. This study will provide part of the information needed by the Commission to accomplish its objectives. During the first year of the study, consumptive uses of the resources were examined. Nonconsumptive uses are being studied in the second year. In addition, more specific research on consumptive uses are being conducted during the second year.

The purpose of this paper is to present the results obtained during the first year of the study. Specifically, data related to the economic impact of fishing and hunting activities in Maine are reported, along with the consumer's surplus values associated with these two activities.

Procedures

The data required for the study were obtained from random samples of individuals (both residents and nonresidents) that purchased either a fishing or hunting license in Maine for 1987. According to the Department of Inland Fisheries and Wildlife, there were about 204,000 licensed resident anglers and 89,000 nonresident licensed anglers in 1987. A random sample of 4,000 anglers (2,000 residents and 2,000 nonresidents) was selected and surveyed about their fishing activity and their fishing-related expenditures in Maine during 1987. There were about 176,000 licensed resident hunters and over 36,000 licensed nonresident hunters in 1987. A random sample of 3,000 hunters (2,000 residents and 1,000 nonresidents) was selected to participate in the hunting survey.

Although separate mail surveys were conducted for hunting and fishing, both surveys served the same two purposes. First, data required to estimate the economic value and economic impact of hunting and fishing were obtained. In addition, the surveys obtained information needed to define subsamples of individuals that will be sent followup surveys in the second year to obtain more detailed information about specific types of hunting and fishing. Response rates, as a percent of deliverable questionnaires, were 79 percent for the hunting survey and 78 percent for the fishing survey.

Before presenting the results, a brief description of the type of economic data collected may be helpful. Consumer's surplus values were estimated using contingent valuation.[2] For the purposes of this study, the contingent-valuation question asked respondents to indicate the maximum dollar amount they would pay per trip, such that for any amount above this stated value they would stop participating in the hunting or fishing activity being evaluated. Surplus values were calculated in the following manner. Respondent's reported average costs per trip were subtracted from their responses to the contingent-valuation question. This difference was then multiplied by the number of trips the individual reported taking, and this product was divided by two.

The consumer's surplus values represent the additional amount of money participants would pay,

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[2]For a discussion of contingent valuation, see Anderson and Bishop (1986), Mitchell and Carson (1989), and Cummings, Brookshire and Schulze (1986). Research comparing contingent-valuation results with actual cash transactions are reported in Dickie, Fisher and Gerking (1987), Heberlein and Bishop (1986), and Welsh (1986).

if necessary, to continue to participate in the activities, over and above the amount they are already paying to participate. Hence, these values constitute the net economic benefits that accrue to participants. The values also provide an indication of how sensitive hunters and anglers are to changes in trip-related costs of participation.

Recreational expenditures are the costs associated with participation in the activities. These expenditures represent the economic impact on the state's economy in that they generate employment, income, tax revenues and further economic activity within the economy. Since the purpose of the study is to measure the impact of fish and wildlife activities on the Maine economy, only those recreational expenditures made in Maine were measured.

Three types of recreational expenditures were measured. The first is trip-related expenses made in Maine. These represent the purchase of "expendable items" that participants consume during a hunting or fishing trip. Examples include gasoline, commercial transportation, food, lodging, bait, ammunition and guide fees.

The second type of expenditure is special equipment purchased in Maine and used exclusively for hunting or fishing. Examples include, guns, fishing rods, tackle, decoys, and special clothing used only for hunting or fishing. These items can be used on more than one hunting or fishing tip, instead of being expended on a single trip.

Finally, expenditures in Maine for items that are used for hunting or fishing and other activities were obtained. Items in this category include vehicles (on- and off-road), boats, motors and accessories, camping equipment including campers and trailers, and even recreational property. Since these items may be used for other activities besides hunting and fishing, the expenditures for these items were prorated to the recreational activity based on the percent of total use of the item that is devoted to the activity under study. For example, if a person purchased a boat for $10,000 and used it 25 percent of the time for fishing, $2,500 of the cost of the boat was attributed to fishing.

Results

Before presenting the consumer's surplus and expenditure data, it may be useful to examine the characteristics of the hunters and anglers. Selected socioeconomic characteristics of participants are reported in Table 1. Participants in both activities are, on average, about 40 years of age and are predominately male. Males account for 81 percent of the resident anglers, and 99 percent of the nonresident hunters. Average educational levels of participants only vary slightly. Nonresident anglers have the highest annual income levels, followed by nonresident hunters, resident anglers and, finally, resident hunters. Although resident anglers and hunters have lower incomes than their nonresident counterparts, the average household income levels reported for resident hunters and anglers are above the average annual income of all Maine households.

Table 1. Selected Socioeconomic Characteristics of Resident and Nonresident Anglers and Hunters in Maine during 1987.

Characteristic/Activity	Residents	Nonresidents
Average Age:		
Fishing	41	42
Hunting	40	42
Percent Male:		
Fishing	81	88
Hunting	93	99
Average Years of Education:		
Fishing	13	14
Hunting	13	13
Average Household Income:		
Fishing	$29,400	$47,300
Hunting	$28,300	$42,900

Consumer's Surplus Values

Consumer's surplus values for open water and ice fishing are reported in Table 2. Open water fishing values are reported separately for lake/pond fishing, and river/stream fishing. Values are also reported separately for single-day and multiple-day trips. These categories were chosen based on the hypothesis that the categories represent the major types of inland fishing in Maine, and that these differences in types of fishing may be reflected in the consumer's surplus values attributed to the activities.

Table 2. Average Annual Consumer's Surplus Values for Selected Types of Sport Fishing in Maine during 1987.

Type of Fishing/Trip Type	Average Annual Surplus Value Per Angler	
	Residents	Nonresidents
Pond/Lake Fishing:		
Single-day trips	$149	$ 68
Multiple-day trips	$163	$155
River/Stream Fishing:		
Single-day trips	$ 54	$ 50
Multiple-day trips	$102	$121
Ice Fishing:		
Single-day trips	$ 87	$ 37
Multiple-day trips	$120	$ 71

Consumer's surplus values for lake/pond fishing are higher than those reported for river/stream fishing and ice fishing. As expected, multiple-day trip values are higher than single-day trip values. In addition, surplus values for residents are higher than the values reported for nonresidents in all cases except multiple-day river/stream fishing trips. The lower surplus values for nonresidents are primarily due to the fact that nonresidents took fewer trips than residents.

Consumer's surplus values for several major types of hunting are reported in Table 3. Again, separate values are reported for single-day and multiple-day trips. Furthermore, values are reported according to the species or group of species hunted, since one species or group of species is usually chosen for each hunting trip. It is possible, in some instances, to hunt more than one species on a given trip, such as grouse and deer. However, even in this case, one species is usually the primary species of interest.

Table 3. Average Annual Consumer's Surplus Values for Selected Types of Hunting in Maine During 1987.

Type of Hunting/Trip Type	Average Annual Surplus Value Per Hunter	
	Residents	Nonresidents
Deer:		
Single-day trips	$ 90	$108
Multiple-day trips	$ 91	$154
Bear:		
Single-day trips	$ 58[c]	$ 47[c]
Multiple-day trips	--[d]	$101
Rabbit:		
Single-day trips	$ 15	$ 44[c]
Multiple-day trips	--[d]	$ 34[c]
Grouse and Woodcock:		
Single-day trips	$ 31	$ 86
Multiple-day trips	$ 28[c]	$ 97
Sea Duck:[a]		
Single-day trips	$ 76	--[d]
Multiple-day trips	--[d]	--[d]
Migratory Waterfowl:[b]		
Single-day trips	$ 68[c]	$ --[d]
Multiple-day trips	--[d]	--[d]

[a]Includes Eiders, Old Squaws and Scooters.
[b]Includes inland and coastal ducks (except Eiders, Old Squaws and Scooters), and Canada Geese.
[c]Estimate should be interpreted with caution since it is based on a limited number of observations.
[d]Insufficient observations to report an average surplus value.

The highest single-day consumer's surplus value for residents is for deer hunting, followed by sea duck, migratory waterfowl, bear, grouse and rabbit hunting. Note that resident multiple-day trip values are not reported for several species, because the number of observations was too small to calculate a reliable average. The lack of sufficient observations reflects the finding that residents participate in few multiple-day hunting trips, except for deer and grouse, and these species may be hunted on the same multiple-day trip. Note also that resident multiple-day trip values for deer and for grouse and woodcock are about the same as single-day consumer's surplus values.

For nonresidents, the highest consumer's surplus is associated with multiple-day deer hunting, followed by single-day deer hunting, and multiple-day bear hunting. Grouse and woodcock surplus values are also relatively high. Note that nonresident surplus values for deer hunting are greater than those reported for residents. This is true for all other hunting values reported, except single-day bear hunting, and the difference between these values is relatively small. Nonresident multiple-day trip values are higher than single-day values for all species except rabbit. Nonresident hunters generally participate in multiple-day hunting trips for deer, bear, and grouse and woodcock. Nonresident surplus values are not reported for sea duck and migratory waterfowl hunting because of insufficient observations.

Finally, aggregate measures of consumer's surplus were estimated using the average surplus values in Tables 2 and 3 and the number of hunters and anglers who actually took single-day and multiple-day trips of each type. The aggregate consumer's surplus for sport fishing in Maine are $60.8 million for residents and $13.8 million for nonresidents. Aggregate surplus values for hunting in Maine are $22.1 million for residents and $5.4 million for nonresidents. Hence, the total consumer's surplus is about $74.6 million for fishing and $27.5 million for hunting.

Economic Impacts of Hunting and Fishing

The reader will recall that three types of expenditures were obtained from respondents: trip-specific expenses for items consumed on the trip, expenditures for equipment that is only used for hunting or fishing, and expenditures for items used for hunting or fishing as well as other uses. The expenditures for items in the latter category are prorated based on the percent of use devoted to fishing or hunting.

Residents spent an average of $328 per person on trip-related expenses in Maine in 1987, compared to $391 for nonresident anglers (Table 4). As expected, residents spent more on gasoline and bait than nonresidents, since residents take more trips than nonresidents. However, nonresidents spent more per angler for commercial transportation, lodging, guide fees, and rental equipment, thereby increasing their total trip-related expenses made in Maine to a

level above that reported by residents.

Table 4. Per Person Trip-Related and Equipment Expenditures Made in Maine for Fishing and Hunting During 1987.

Activity/Expenditure Category	Average Annual Expenditures Per Person	
	Residents	Nonresidents
Fishing:		
Trip-related	$ 328	$ 391
Fishing equipment	$ 332	$ 138
Prorated share of other equipment	$ 968	$ 464
Total	$1,628	$ 993
Hunting:		
Trip-related	$ 198	$ 419
Hunting equipment	$ 208	$ 189
Prorated share of other equipment	$ 469	$ 477
Total	$ 875	$1,085

As expected, resident anglers, on average, spent more for fishing equipment in Maine than did nonresidents. Obviously, nonresidents purchase a large part of their fishing equipment outside Maine. However, nonresidents still spent an average of $138 for fishing equipment in Maine. The three largest categories of equipment purchased by both residents and nonresidents were: boat (canoe), motor, trailer and accessories used only for fishing; tackle and tackle boxes; and rods, reels, and rod holders. Note also that fishing equipment purchases per resident angler are approximately equal to resident trip-related expenditures per angler. Similar results have been found in previous studies of angler expenditures in Maine (Reiling, et al., 1982). The same relationship holds for residents trip-related hunting expenses and hunting equipment purchases.

Finally, note that the prorated share of resident and nonresident expenditures in Maine for items used for fishing and other activities is larger than trip-related expenses and fishing equipment expenditures made in Maine. Resident anglers had an average prorated expenditure level of $968 while nonresident expenses averaged $464. For residents, the three largest categories were vehicles ($358), recreational property ($220) and boats, canoes, motor, trailer and accessories ($145). For nonresidents, the three largest categories were recreational property ($277), vehicles ($76), and travel trailers, campers and motor homes ($43). These data reflect the current high level of activity in the recreational land market in the state. However, nonresident expenditures for vehicles and travel trailers and campers in Maine are higher than expected.

In terms of hunting, the average trip-related expenditures of nonresidents ($419) is more than double the average for residents ($198). Although the two groups spent about the same amount for gasoline in Maine, nonresidents spent larger sums for commercial transportation, food, lodging and guide fees.

Residents spent slightly more in Maine for equipment used exclusively for hunting, $208 compared to $189 for nonresidents. However, differences exist in terms of the major items that were purchased by the two groups. The leading categories for residents were guns ($85), special clothing used only for hunting ($32), and bows and arrows ($17). The leading expenditure category for nonresidents was the nonresident hunting license ($66), followed by clothing used only for hunting ($39) and guns ($30). These differences reflect the relative high cost of a nonresident hunting license, and the fact that nonresidents purchase equipment outside Maine as well as in the state.

In contrast to fishing, the prorated share of hunting items that are also used for other activities was slightly larger for nonresidents than for residents. The major reason for this result is the prorated cost of recreational property purchased by the two groups. The average prorated share for nonresidents was $277, compared to $79 for residents. Vehicles also accounted for a large part of total prorated expenses for both groups--48 percent of the total for residents and 25 percent of the total for nonresidents.

In total, resident hunters spent $875, while nonresident hunters spent $1,085 in Maine in 1987. On average, nonresident hunters spent about $90 more in Maine than nonresident anglers. Resident anglers, on average, spent about $750 more than resident hunters.

Finally, aggregate expenditures made in Maine in 1987 were estimated by multiplying the per-person expenditures reported in Table 4 by the actual number of residents and nonresidents that fished and hunted in Maine in 1987. These totals are presented in Table 5. Three observations are worthy of comment. First, total expenditures for fishing by both residents and nonresidents are about twice as large as the total expenditures made by residents and nonresidents for hunting. Hence, the economic impact of fishing in Maine is twice as large as the economic impact of hunting.

Second, recall that the aggregate consumer's surplus reported earlier represented how much hunters and anglers would pay in additional trip-related expenses before they would stop participating in the activities. Comparing the aggregate surplus values to the actual aggregate trip-related expenses suggests that resident anglers are willing to pay relatively large increases in actual trip-related expenses before they would stop participating. The aggregate surplus values for resident anglers of $60.8 million is larger than actual trip-related resident expenses associated with fishing. Consequently, actual trip-related costs, in aggregate, could more than double before resident anglers would discontinue participation in fishing.

Table 5. Total Trip-Related and Equipment Expenditures Made in Maine for Hunting and Fishing During 1987.

Activity/Expenditure Category	Total Expenditures (in Millions) Residents	Nonresidents
Fishing:		
Trip-related	$ 55.6	$ 32.8
Fishing equipment	$ 56.3	$ 11.6
Prorated share of other equipment	$164.2	$ 38.9
Total	$276.1	$ 83.3
Hunting:		
Trip-related	$ 31.1	$ 15.0
Hunting equipment	$ 32.7	$ 6.7
Prorated share of other equipment	$ 73.6	$ 17.0
Total	$137.4	$ 38.7

Finally, the prorated share of expenditures made for items that are used for other activities as well as hunting or fishing make up a high percentage of total hunting and fishing expenditures. For example, the prorated share of the cost of these items accounts for almost 60 percent of total resident fishing expenses, and about 54 percent of resident hunting expenses. Although the cost of these items have been prorated to reflect the portion of their use devoted to fishing or hunting, one can argue that these expenditures should not be attributed to hunting and fishing since they are also used for other purposes. This is an important issue, since these types of items account for such a large part of the expenditures reported in Table 4 and 5.

In our opinion, the decision regarding whether or not to include the prorated expense of these items as part of the economic impact of hunting and fishing hinges on whether the item would have been purchased if the individual did not participate in hunting or fishing. Using the example of the $10,000 boat that was used 25 percent of the time for fishing, inclusion of the prorated $2,500 expenditure for the boat is appropriate only if the individual would not have purchased the boat if the person did not fish. If the item would not have been purchased if the individual did not fish, inclusion of the prorated share of its cost seems appropriate. Otherwise, it should not be included. Unfortunately, it was not possible to ascertain this type of information in the mail surveys conducted last year. We plan to do additional work on this topic in the second year of the study.

Summary

The purpose of this paper is to report the consumer's surplus values and economic impact of hunting and fishing activities in Maine. Overall, the activities generated consumer's surplus values of over $100 million in 1987. The total economic impact associated with hunting and fishing is at least $240 million, and may be even higher if part of the prorated share of items used for other activities, in addition to hunting and fishing, are included in the estimates of economic impacts.

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CONFLICTS BETWEEN RECREATION AND SUBSISTENCE USE OF FISH AND WILDLIFE IN NEW ENGLAND

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Harvesting natural resources for personal use occurs in relatively affluent, modernized societies as well as in more remote areas. While these resources are seldom valuated, they can make an important contribution to the standards of living of low-income households. Conflicts are likely to arise between those who desire to have fish and wildlife to satisfy recreational motivations and to those who utilize these resources for food and other needs.

Introduction

Traditionally, subsistence referred to a high level of human dependency on harvesting natural resources for direct consumption; that is, personal use of resources where allocations occurred outside the commercial market. The household or extended kinship group was often the unit of production: effort tended to be labor intensive and, although barter and trade were often highly developed, subsistence resources were primarily derived from locally available sources of supply. Conventional scientific interpretation often focused on subsistence as a minimal standard for physical survival. In the present time frame, however, most subsistence activities have become intertwined with the market and public sectors of the economy and the payoffs of participation involve more than physical survival (Muth, Ruppert, and Glass 1987, Muth and Glass 1989). The contemporary definition of subsistence includes psychological and sociocultural functions in addition to a means to supplement other sources of income (Muth and Glass 1989, Glass and Muth 1989). Harvest of natural resources no longer represents the sole source of sustenance. Contemporary views toward recreation also have changed significantly. While recreation may have once been considered little more than the frivolous use of leisure time, it is now viewed as an integral part of the modern lifestyle. As a result, the functions of recreation and subsistence tend to overlap in present-day lifestyles. In fact, some authors (Sharif 1986) suggest that subsistence includes psychological and sociocultural payoffs similar to those attributed to recreation.

Since both recreation and subsistence activities can enhance the level of social welfare, the distinction between them may seem relatively unimportant. However, state and federal laws and regulations, as well as court decisions affecting allocation of natural resources, have made it important that these two terms be differentiated. While legal definitions contribute little to establishing differences in levels of dependency for fish, wildlife, and other natural resources, the definitions are often the basis by which opportunities for resource use are allocated.

In the northeast, limited legal guidelines have been established to distinguish recreational harvesting from subsistence harvesting. Nonetheless, recent studies have demonstrated that the direct consumption of natural resources can provide an important supplement to enhance living standards of selected local households (Ratner 1984). While subsistence in North America is most often associated with remote regions such as northern Canada and Alaska, people in the more industrialized regions also supplement their incomes by harvesting natural resources for personal consumption.

In this paper, no attempt will be made to develop a sharp distinction between the contemporary roles of subsistence and recreation. We contend that significant subpopulations exist whose dependence on fish and wildlife resources can be characterized by a subsistence orientation rather than a recreational orientation. Further, the potential for conflict exists between those motivated to harvest fish and wildlife for sustenance and those with sport-oriented motivations. In examining the conflicts, it becomes clear that many participants have mixed packages of motivations. However, those driven primarily by a desire to supplement monetary income through harvesting of fish and wildlife (while they may enjoy complementary payoffs) have needs likely to differ from the classical sport-motivated participants, and these differences are seldom acknowledged in the allocation and management of fish and wildlife.

Subsistence in Contemporary Rural Alaska

Since subsistence has been a major issue in natural resource allocation in Alaska, it has received more attention in that state than in the lower 48. Both federal and state laws give subsistence use of fish and wildlife a priority over commercial and sport users, although the legal definitions of subsistence do not necessarily relate to the level of dependency of those involved. While subsistence is often associated with Alaskan Natives--Indians, Eskimos, and Aleuts--most special rights of the aboriginal people relating to subsistence and other land claims were relinquished under the terms of the Alaskan Native Claims Settlement Act of 1971 (Busiahn 1984). Consequently, both state and federal laws pertaining to Alaska do not

distinguish subsistence dependency on the basis of race. In fact, subsistence designation is based primarily on traditional and customary use as well as rural residency.

While many rural Alaskan communities may be geographically isolated, they have been profoundly influenced by the forces of modernization. Electric service is generally available and many households have modern electrical appliances. Centralized water supply and sewage systems are commonplace. Many communities may not have road connections to outside points, but rely on air or water transportation, or both, and these are often regularly scheduled. Most communities have telephone and satellite communications. Educational opportunities at local public schools are generally available and college courses are taught by the University of Alaska in many rural communities (Alonso and Rust 1976, Glass and Muth 1988).

Historically, rural Alaska was heavily dependent on subsistence activities for physical survival, but rural communities have evolved to a present situation in which they are dominated by mixed economies containing public, private, and subsistence sectors (Glass 1987). The public sector has a major role in rural Alaskan communities. Government employment lends stability to local economies, where seasonality of employment is a characteristic of the private sector. Public investment stimulates local employment and other economic activities as well as providing services. Government agencies provide a myriad of services including social programs designed to reduce poverty and improve public health. As a result of the existing public programs, a safety net exists that alleviates the threat of doom that was historically associated with resource scarcity when communities were highly dependent on subsistence harvests for survival. Rural Alaskan residents have access to the same social programs and public services as other Alaskan residents and U.S. citizens.

A recent study of Yakutat, Alaska, (Glass and Muth 1988) demonstrates the extent to which the public sector is involved in the economics of modern rural communities. During the period from 1980 to 1986, the State of Alaska invested more than $15 million in Yakutat (an ethically mixed community of 561 people) for capital improvements. Thus, capital investments by the state, alone, amounted to $26,755 per person over the 7-year period. In 1984, per capita state investment for the community was $9,729. Obviously, investments of this magnitude also had significant influence on other sectors of the economy.

The public sector made contributions to the Yakutat economy other than its capital investments. Government employment accounted for approximately one-third of local employment and tended to be more stable throughout the year than the resource-based private sector. Due to the seasonality of private sector employment, unemployment compensation payments also helped provide stability, particularly in the winter months. During 1984, Yakutat residents collected 1,178 weeks of unemployment compensation totalling $133,386. Additionally, all residents of Alaska (men, women, and children) receive an annual permanent fund dividend payment, the amount of these varying from $ 331.29 in 1984 to $ 1,000 in 1982.

While the private sector provides approximately two-thirds of the total monetary income reported by Yakutat households (Glass and Muth 1988), employment in this sector is stimulated by public investment, and the leading income category, fishing, depends on the extraction and processing of publicly-owned resources. Other major sources of income from the private sector were retail trade, logging, and construction.

All in all, Yakutat was a relatively affluent community, even when adjustments were made to allow for the higher costs of living in Alaska. On the basis of a 50 randomly sampled households, from a total of 181 in the community, the mean annual household income during 1984 was between $37,324 and $47,676 at the 95 percent confidence level. For those sampled, the mean income was $42,500 while the median was $40,000 (Glass 1987). Nearly one-quarter of the respondents had a household income of $50,000 or greater. While comparative cost estimates are not available for Yakutat, it is noteworthy that a moderate budget to support a four-person family in Anchorage was 26 percent higher than that required to meet the same standard in the lower 48 (Leask 1984). Even though costs in Anchorage are usually considerably lower than Yakutat for most imported goods, household incomes in Yakutat appear to compare favorably with the U.S. mean household income of $22,415 and the median of $27,464 in 1984 (Bureau of the Census).

Despite relatively high household incomes, Yakutat residents continued to harvest large quantities of fish and wildlife for personal use. For example, during 1984, the mean harvest of subsistence foods (moose, salmon, halibut, crab, berries) per household was 1,107 pounds and the median harvest, 820 pounds (Mills and Firman 1986). At the community level, the total subsistence harvest was between 150,809 and 250,070 pounds at the 95 percent confidence level (Glass 1987). The sharing and distribution system that is an integral part of the subsistence lifestyle was also very much in place (Mills and Firman 1986). Furthermore, the State of Alaska recognizes Yakutat as a subsistence-dependent community and residents are given special priorities in fish and wildlife regulatory allocations.

Although there are many significant differences between a remote Alaskan community and communities in New England, there are many similarities as well. The Yakutat figures demonstrate that the people of a modernizing, relatively affluent community in Alaska still

harvest large quantities of fish, wildlife, and other natural resources for personal use. While the resources may be viewed as income supplements rather than the sole source of survival, they contribute to the local lifestyle and standard of living. Further, harvesting activities provide psychological and sociocultural benefits with functions similar to the broader contemporary concepts of recreation, such as a sense of self-reliance and group cohesion. One of the most signficant differences between rural New England communities and remote Alaskan communities may be the high degree of accessibility in New England that enables outsiders to compete with local households for fish and wildlife.

The contribution of fish, wildlife, and other natural resources to the well-being of rural Alaskan residents is well established (Kruse 1982, Smythe 1988). With this in mind, the extent to which the direct consumption of natural resources contributes to the well-being of residents of the more industrialized regions of the nation, especially New England, will be examined.

Subsistence in Other States

Limited information is available on the nature and extent to which fish and wildlife are used to supplement income in the 48 contiguous states. An emerging social science literature (often focusing on traditional use by native Americans), however, documents the extent to which resource harvesters, often more accurately characterized as subsistence users, depend on fish, wildlife, and plant species for economic and cultural purposes (Gladwin and Butler 1982, Muth and Glass 1989, Muth, Ruppert, and Glass 1987, Overbey 1982, Ratner 1984, Thurtell 1980, Usher 1987, West 1986). As in contemporary Alaska, there is alternative income that provides basic survival needs, yet the standard of living can be enhanced by direct consumption of resources as well as by the psychological and sociocultural benefits of harvest and distribution. Although this is true for hunters and fishermen in all strata of modern society, it has special implications for rural households below the poverty level--households for whom resources procured through hunting, fishing, and gathering activities may make the difference between a relatively comfortable lifestyle and a rather hand-to-mouth existence. For example, low-income households can supplement and improve their living standard by harvesting fish and wildlife for sale (with furbearer pelts and some species of fish), or through income in kind from fish and wildlife for food.

Urban dwellers may also supplement their income through personal use of fish and wildlife, but these resources are apt to be more readily available to rural residents. According to the 1980 census, nationwide there were 5.7 million rural households with incomes below the poverty level. In New England, there were 235,000 rural households with incomes below this level. The figures clearly indicate the existence of a subpopulation that can benefit from direct consumption of fish and wildlife. If the resources are available and low-income households have the skills and equipment to harvest fish and wildlife, resource gathering can provide an improved standard of living.

While the imprecise definitions of subsistence behavior make it difficult to quantify, there is evidence to suggest that many people in the southern 48 contiguous states hunt and fish to secure food. A study by Kellert (1982) indicated that 14.7 percent, over 33 million, of the U.S. population had hunted over a 2-year period. However, 42.7 percent of these were classified as meat hunters -- their primary motivation for hunting was to obtain meat. On this basis, there were over 14 million meat hunters in the 48 contiguous states.

For the northeast, the same study indicated that 9.7 percent of the population had hunted over the 2-year period; 37.5 percent of these were meat hunters, compared to 39.5 percent who were sport hunters, and 23 percent, nature hunters (i.e., those who hunted primarily to be close to nature). On the basis of these figures, in the industrialized northeast, there were approximately 1.8 million hunters who participated primarily to secure meat. Thus, in absolute terms, there were substantially more meat hunters in the industrialized northeast than in Alaska.

Fishing was considerably more popular than hunting, with a nationwide participation rate of 44.4 percent (100 million fishermen) over the 2-year period. Here again, securing fresh fish for food was the most frequently given motivation for fishing, amounting to 28 percent. These figures compare to 20.5 percent who were primarily motivated by sport. For the northeast, one-third of the total population had fished in the past 2 years and 26.4 percent, 14 million, were motivated to secure fresh fish for food.

While the imprecise meaning of subsistence makes it difficult to estimate the extent to which it is practiced in the northeast, or Alaska for that matter, the figures previously cited provide some interesting insights. The extent of the rural population with incomes below the poverty level demonstrates the existence of subpopulations that need to enhance their standard of living. One source of this enhancement is the personal consumption of fish and wildlife, which may be viewed as income in kind. We realize that the vast majority of hunters and fishers probably possess a constellation of motivations and meanings that include both recreational and subsistence elements. Kellert's studies indicate significant segments of the population viewed obtaining food as their primary motivation for both hunting and fishing. Although combining hunters and fishers would involve considerable double counting since many individuals engage in both activities, the estimates provide evidence that many people of the contiguous 48 states, including the highly industrialized northeast, hunt and fish primarily to obtain meat.

While limited information is available on the harvesting of natural resources in the New England area, a study of adjacent Crown Point, New York (Ratner 1984) revealed that, by the direct consumption of natural resources, the average Crown Point household generates a gross value of approximately $1,500 per year. The study concluded that the outputs from these household activities, which are normally not included in conventional estimates of household income, provided the equivalent of 100 full-time jobs per year and had an annual gross value of $910,780 to the community. These estimated values were based on all resources harvested, not fish and wildlife alone.

Discussion

Households attain and enhance their standards of living from a combination of input factors--employment, profits from commercial enterprises, governmental transfer payments, and other forms of monetary income. Income in kind from non-market sources, however, can also contribute to an improved standard of living. Thus, the utilization of natural resources from outside the commercial market can supplement monetary income and increase standards of living. Conceivably, fish and wildlife taken for personal consumption can be a vital ingredient in raising the income of many households from poverty to more comfortable levels.

In New England, there are 235,000 low-income, rural households needing to supplement their income to more reasonable levels. A natural resource base exists that can help alleviate the problem and substantial numbers of people hunt and fish to secure food, although no information is available on the proportion who are in the rural poverty category. While limited empirical evidence is available on the magnitude of fish and wildlife harvesting for personal consumption in New England, it obviously has the potential to enhance the living standards.

If managing agencies do not give sufficient consideration to the use of fish and wildlife for subsistence related harvesting, serious repercussions may occur in resource management. First, resources are apt to be undervalued since this measure of value is not included in estimates of national or regional products. In Alaska and northern Canada, several attempts have been made to establish the cash-basis substitution value of personal use of resources (Usher 1976, Nowak 1977).

Second, ignoring the dependency on direct consumption is a social equity concern. Fish and wildlife management in the United States has a long history of concern for the equitable distribution of resources held in public trust, so allocation has never been directed toward securing the highest return on investment or servicing only the well-to-do, as has been the case in many European nations. When not all user groups are considered, elitism may become a factor. Indeed, fish and game laws and regulations that favor certain groups are likely to disenfranchise other groups, particularly those most dependent on the harvest to satisfy physical subsistence needs. For example, fishing regulations that prohibit non resource-threatening activities such as snagging or spearing of certain species cater to the sporting mentality, but remove an efficient method of meeting subsistence needs. The same fishing laws that disenfranchise subsistence users may encourage them to poach because the laws are considered nonsensical or discriminatory.

In summary, there is limited information on the extent to which harvesting of fish, wildlife, and other natural resources for personal consumption contributes to the living standard of rural, New England residents. To gain a better insight on the magnitude of the uses and the values involved so that equity in distribution can be rationally considered, several areas for discriminating research are suggested. The following research needs, in no particular order of priority, are offered:

1. Determine the income effect of subsistence activities Notwithstanding the psychological and sociocultural benefits of participation in subsistence activities, there are also tangible benefits that represent income in kind and can be expressed in monetary terms. It should be noted, however, that wild fish and game are imperfect substitutes for marketed commodities and, thus, such evaluation is difficult in itself. Nonetheless, these goods enhance the standard of living and represent a quantifiable measure. By ignoring such values in compilation of regional and national products, some resources are being underevaluated and as a result, may receive less than optimal public managerial concern.

2. Quantify the costs and returns of harvesting fish, wildlife, and other natural resources for personal consumption
Obviously, the net income of natural resource harvesting is the primary consideration. However, there are many complex factors involved in calculations such as the sharing and distribution systems that often exist in subsistence-oriented communities, measuring returns where participation reaps its own rewards, and the allocation of multi-purpose investment costs.

3. Examine the level of dependency of low-income households on harvesting of fish, wildlife, and other resources
Not only is it important to have a better understanding of resource value, but it is also significant to determine the distribution of these benefits. How critical is the harvest for direct consumption of fish, wildlife, and other natural resources to low-income, rural households? Enhancing the socioeconomic status of low income rural

households may be more important than the total resource contribution to the regional product.

4. Determine the payoffs of involvement in the harvest and distribution system
Other research has indicated that participation in the harvest, sharing, and distribution system may be as important, or more important, than the tangible results in terms of food and fiber or their monetary equivalent. To what extent does participation in the system enhance the overall well-being of rural, New England households?

5. Examine the role of elitism in the setting of fish and wildlife regulations
Modern precepts of sport hunting and fishing have all but ignored people with legitimate needs for fish and game as a source of food or other basic necessity. Low-income, rural residents often have high dependency on fish and wildlife as sources of food, fiber, and recreation and tend to have limited alternatives due to low incomes. Fish and wildlife harvesting regulations are often perceived as enhancing the self-image of sportsmen who have quite different motivations than those with a subsistence dependency.

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A COMPARISON OF THE RESULTS OF NEAR AND FAR MARKET CONVERSION STUDIES FOR THE WHITE MOUNTAINS OF NEW HAMPSHIRE

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This study compares the results of inquiry-conversion studies conducted on near and far markets of the White Mountains tourist region of New Hampshire. Similarities and differences are identified and specific recommendations for the development of future promotion strategies for each market are proposed.

Introduction

Inquiry-conversion studies are fundamental tracking and evaluation methods used in the tourism industry to measure the impact and value of promotion programs. Like many agencies responsible for the promotion of tourism, the White Mountain Attractions Association has conducted several inquiry-conversion studies. Most recently, the association has focused on evaluating the impact and conversion value of the White Mountain Attractions Map & Guide, a promotional piece which provides geographic information while showcasing tourist attractions, recreational opportunities, and amenities of the White Mountain Region of New Hampshire.

In 1987 and again in 1988, the association conducted an inquiry-conversion study of the annual Map & Guide which was distributed throughout New England and the nation (Gustke 1987, Gustke and Luloff 1988). Although the two versions of the Map & Guide were not identical, they were very similar in content and format. Because of their similarities a comparison of the conversion rate associated with each is possible.

The 1987 inquiry-conversion study focused on:

1. Identifying the demographics of the prospective tourists who received the Map & Guide.
2. Identifying the "information value" of the Map & Guide.
3. Establishing the conversion rate of the prospective tourists who received the Map & Guide.

Results of the 1987 study suggested that additional efforts should be focused on identifying and researching new markets. Therefore, the 1988 study concentrated on prospective new markets in the Southwest, Midwest, and the West Coast. The study emphasized issues similar to those of the 1987 study, however, the target markets from which data were collected were different. This paper describes and compares the similarities in the results of the 1987 and 1988 inquiry-conversion studies and thereby identifies the similarities and differences between what might be considered the "Near" and "Far" markets of the White Mountain Attractions Association.

Methods and Procedures

The 1987 Inquiry-Conversion Study

The objectives of the 1987 study were met by developing a questionnaire which was mailed to a random sample of 1890 prospective New Hampshire tourists. The sample was selected from a total of 667,000 individuals who received a copy of the White Mountain Map & Guide inserted in a Sunday issue of a prominent New England newspaper. The original sample size was 2000, however, 110 of the questionnaires were undeliverable because the subscribers had changed their addresses or terminated their subscriptions. With 11% (205) of the questionnaires returned, this closely approximates the rate of return which can be expected for a one wave mail out survey (Heberlein and Baumgartner 1978).

The 1988 Inquiry-Conversion Study

The 1988 study consisted of interviews with a stratified random sample of prospective tourists who had requested travel information from the White Mountain Attractions Association. The sample was selected from a list of 711 people who requested the Map & Guide. A total of 210 telephone interviews were conducted at the end of the fall tourist season. The 711 names and addresses were from prospective tourists who resided in what can be considered far markets. (Ohio, Florida, California, Alabama, South Carolina, and Louisiana).

The interviews were designed to identify trip behavior and the influence of the Map & Guide. The questionnaire mailed to prospects in the 1987 study and the one used to interview prospects in the 1988 study contained a number of the same or similar questions.

Results

The results are presented in two sections. The first focuses on describing the simple demographic differences between the near and far markets while the second emphasizes the similarities and differences of responses to the similar questions posed to the two markets.

Demographics

The far market prospects had an average age of 48.7 years while the most frequently reported age was 50 years old. Slightly less than one-half of the prospects were 50 years old or older (48.7%) while slightly more than one-half were 49 years old or younger (51.3%).

The average age for the near market was 43.7 years. Slightly more than one-third were 50 years of age or older (34.7%) while a substantial 65.3% were 49 years old or younger. In comparison, the far market prospects were generally a little older than the near market prospects. The near market prospects could be categorized as predominantly young adults and adults. The far market prospects were composed of a range of adult categoris including young adults, adults, mature adults, and senior adults. Differences between the near and far markets exist according to age.

The near market prospects reside predominantly in Massachusetts and southern New England. An analysis of zip codes provided by the prospects indicates that over 90% of the near prospects reside within five areas in Boston; the Middlesex-Essex area (37.6%), the City of Boston (30.7%), the Hingham and Norwood area (13.7%), the Bedford area (10.7%), and the Brockton area south of Boston (4.4%). One prospect resided in Providence, Rhode Island and five did not give their zip code. This near market is located within a couple of hours to one-half day easy commute to the White Mountain Region of New Hampshire (Table I).

Table I - Residence of Tourist Prospects

Markets			
Near		Far	
Massachusetts		Ohio	33.8%
Middlesex-Essex	37.6%	Florida	21.0%
Boston	30.7%	California	19.5%
Hingham & Norwood	13.7%	Michigan	13.8%
Bedford	10.7%	Alabama	6.7%
Brockton	4.4%	South Carolina	2.9%
Rhode Island		Lousiiana	2.4%
Providence	.5%		
	100.0%		100.0%
	N=205		N=210

The far market prospects, as the name implies, reside at considerably furhter distance. The individuals interviewed all live a minimum of two days drive to one-half day fly-drive travel time from the White Mountain Region. The far market prospects reside predominantly in the states shown in Table I.

A comparison of these demographics suggests that the two samples represent not only different geographic markets, but they also represent markets composed of prospects of different ages or age groups. The greater Boston near market prospect appears to be younger and in an earlier stage of life cycle while the far merket prospects appear to be somewhat older and in a later stage of life cycle. These differences may have some implications for future promotional programs toward these groups.

Common and Similar Questions

Implied in the scope of the kind of evaluation reported in this study is the measurement of the usefulness, information value, and general influence of the Map & Guide. Also implied is the investigation of the trip and travel behavior exhibited by the prospects who responded to questions about the promotional Map & Guide. The 1987 and 1988 studies contained common or similar questions designed to elicit responses about usefulness, information value, influence, and general trip behavior of the prospects from the different markets.

Both market prospects rated the Map & Guide as useful to them in their search for information about the White Mountains. A substantial 70.2% of the far prospects rated the Map & Guide as very useful. The remainder of the prospects rated the Map & Guide as either useful, or moderately useful. None of the prospects rated it as not useful (Table II).

Table II - Prospect's Ratings of the Usefulness of the Map & Guide

	Markets	
Usefulness Rating	Near	Far
Very useful	36.7%	70.2%
Useful	50.5%	23.4%
Moderately useful	12.8%	6.4%
Not useful	0.0%	0.0%
	100.0%	100.0%
	N=205	N=210

In contrast, 36.7% of the near prospects rated the Map & Guide as very useful. About two-thirds rate it as useful or moderately useful, and again no one rated it a being not useful. More of the far market prospects rated the Map & Guide as very useful as compared to the near market prospects. These preliminary findings suggest that proximity and familiarity may influence the perceived usefulness of the Map & Guide as a promotion piece.

The perceived information value of the Map & Guide may be as important or valuable as the perceived usefulness of the piece. The far market prospects generally rated the information value of the Map & Guide as highly informative. Slightly over three-fifths (60.6%) of the respondents rated the Map & Guide a very informative. This rating was followed by 30.9% who said the Map & Guide was informative, 8.5% rated it as moderately informative and no one said that the

Map & Guide was not informative(Table III).

Table III - Prospect's Ratings of the Information Value of the Map & Guide

Information Value	Markets Near	Far
Very informative	44.5%	60.6%
Informative	47.3%	30.9%
Moderately informative	8.2%	8.5%
Not informative	0.0%	0.0%
	100.0% N=205	100.0% N=210

The near market prospects rated the Map & Guide a generally informative. Slightly more than two-fifths (44.5%) rated it as very informative. A substantial 47.3% said it was very informative, followed by 8.2% who rated it as informative.

In general, both the far and near market prospects rated the Map & Guide as useful to very useful. However, more of the far market prospects rated the Map & Guide as very useful as compared to the near market prospects.

The purpose of the Map & Guide is to influence or persuade prospects to make a trip to New Hampshire to pursue recreational and leisure activities. It is difficult to attempt to directly measure the impact and/or effect of promotion literature on trip taking. However, we attempted to gather some information on the subject.

The respondents from both markets were asked if they felt that the Map & Guide had influenced their making a trip to the White Mountain Region. The response to this question can be treated as an indicator of the impact of the promotional literature (Table IV).

Table IV - Map & Guide's Influence on a Trip to New Hampshire

Influence	Markets Near	Far
Influenced trip	17.1%	24.0%
Did not influence trip	82.9%	65.6%
Not sure	0.0%	0.0%
	100.0% N=205	100.0% N=210

A substantial 65.6% of the far prospects reported that the Map & Guide did not influence them to make a trip to New Hampshire. Slightly less than one-quarter (24.0%) said that it had influenced their decision and 10.4% were not sure about the influence.

Similar responses were reported by the near market prospects. An overwhelming 82.9% said that the Map & Guide had not influenced them to make a trip to New Hampshire while 17.1% stated that it had influenced them to make a trip. The responses from the prospective tourists in both markets suggests that the Map & Guide had some influence on them, however, it is not seen by a predominant number of the prospects as a key factor which influences a decision to make a trip to this region of New Hampshire.

The purpose of the Map & Guide is to attract prospective tourists or vacationers to the White Mountain Region. To identify if this purpose was being achieved, the prospects were asked to identify the purpose of their trip. Almost three-quarters of the far prospects (74.5%) reported the purpose of their trip was a vacation. They were followed by 3.1% who stated that the purpose of their trip was to visit friends, 3.1% to visit relatives, 2.0% took a trip to conduct business, and 17.3% took trips which fit into the category of other (Table V).

Table V - Purpose of Prospect's Trips to New Hampshire

Trip Purpose	Markets Near	Far
Vacation	36.5%	74.5%
Weekend getaway	34.7%	0.0%
Visit friends	14.4%	3.1%
Visit relatives	1.3%	3.1%
Business	0.0%	2.0%
Other	13.1%	17.3%
	100.0% N=205	100.0% N=210

The near market prospects were distributed differently over trip purposes. More than one-third of the respondents stated that the purpose of their trip was a vacation (36.5%). Another 34.7% identified their trip as a weekend getaway. A much smaller percentage said that their trip was to visit friends (14.4%) while 1.3% reported that they made a trip to visit relatives. The remaining 13.1% trip purposes were categorized as other.

As would be expected because of travel time and distances, the far market prospects generally are unlikely to be visiting New Hampshire for purposes other than taking a vacation. However, it is interesting to note that a small percentage of the respondents indicated that visiting friends or relatives was the major purpose of their trip to New Hampshire. In contrast, the percentage of near market prospects who reported that the purpose of their trip was to visit friends was much larger than that reported by the far market prospects. Weekend getaways and vacations were identified as the main purpose of the trip by almost equal percentages of the near market prospects. These differences are what might be expected because of geographic residence

and past marketing and promotional programs of the White Mountain Attractions Association.

Trip duration influences the economic impact of the visit and may be directly influenced by the Map & Guide. Similarly, the amenities and activities shown in the Map & Guide may directly influence the planning of a trip. Finally, length of trip is also influence by the distance and time required to travel to the destination. Therefore, it might be expected that proximity to the region might influence the length of trips to the destination. To clarify the differences between the two markets, the length of the prospects' trips to the White Mountain Region was identified.

The far prospects reported an average length for a vacation of 13.9 days. The 13.9 day vacation was one of an average of two vacations a year which typically last 14 days. The near market prospects reported trips to New Hampshire of 2 to 10 days with an average of 2.8 days.

The real impact of the Map & Guide is represented in how many prospective tourists made a trip to New Hampshire after they received the Map & Guide. The trip may not have been induced by the literature, but the trip was made and the economic impact resulting from the trip pays for the production and distribution of the literature. Therefore, identification of the number of trips taken by prospects is an indication of the conversion of the funds invested in promotion into economic impact resulting from tourist expenditures.

The conversion of the far prospects is represented by 56.1% of the the interviewed respondents reporting that they had taken a trip to New Hampshire after receiving the Map & Guide. Slightly more than two-fifths said that they did not take a trip (43.3%) while less than 1.0% said they didn't remember whether they took a trip (Table VI).

Table VI - Conversion Percentages of the Prospective Markets

Trip Behavior	Markets Near	Far
Took a trip	62.5%	56.1%
Did not take a trip	37.5%	43.3%
"I don't remember"	0.0%	0.6%
	100.0%	100.0%
	N=205	N=210

More than one of every ten near market prospects reported taking a trip to the White Mountains after receiving the Map & Guide. Only a little less than two-fifths of the prospects indicated that they had not taken a trip after receiving the Map & Guide (37.5%).

The conversion rate for both markets appear comparable. However, further analysis shows the differences between the two rates. The far market conversion rate is 56.1% of a sample of 210 prospects. The sample was selected from a population of 711 prospects from the Southeast, Midwest, and the West Coast markets. The near market conversion rate is 62.5% of 205 prospects. The 205 questionnaires represent a response rate of 11% from a sample of 1980 mailed questionnaires. Results of the Accountability Task Force's (USTTA 1989) review of conversion studies suggests that one of the formidable problems with conversion studies is the response rate of mailed questionnaires. Low response rates produce unrepresentative results which tend to be manifested in inflated and unrepresentative conversion rates. The inflation may be as high as 50 percent. Using such figues in the calculation of economic impact will obviously result in inaccurate and biased representations of the value of the promotional program and tourism in general.

Recognition of the Map & Guide or actually keeping the publication represents the value attached to the publication by prospective tourists. To determine this value the prospects from the far market sample were asked whether they remembered receiving the Map & Guide. The near market prospects were asked a similar question which focused on recognition of the publication and keeping the publication for use in planning future trips to the White Mountains.

Slightly more than one-half of the near market prospects reported that they had kept the Map & Guide (50.2%). More than one-third said that they had not kept the Map & Guide (37.6%), and less than one-tenth said they didn't remember if they had kept it. An overwhelming 85.7% of the far market prospects reported that they remembered receiving the Map & Guide. A small 9.5% said they didn't remember receiving it and a meager 4.3% were not sure if they had received the Map & Guide.

If we assume that reporting having kept the Map & Guide is similar to remembering that you had received it, responses to these two questions can be compared. Comparison might suggest that the Map & Guide is more valued by those who reside some distance from the region because they have less of an opportunity to be exposed to or acquire information about the region. However, the Map & Guide might be of similar value to both prospective markets, except that the near market may percieve that because of its proximity to the region it can acquire the information it needs to plan or make a trip easily or in a reasonable amount of time.

The antithesis to these specualtions is that the similar, not equivalent Map & Guides were distributed by two different methods. The 1987 version was distributed to the near market as an insert in a Sunday issue of a prominent New England newspaper. The 1988 form was distributed

to the far markets by direct mail. The observed differences may be the result of the distribution methods used by the White Mountain Attractions Association. In addition, a prospective tourist who is seeking information about an area or a destination attraction might be more attuned to recognizing information which she/he requested rather than information which was included in a handful of promotional inserts in a newspaper.

Conclusions and Recommendations

A comparison of the near and far market conversion study results leads to the following conclusions and recommendations:

1. Procedurally, our experience suggests that telephone suveying is more effective than mail efforts in gathering inquiry-conversion data. The value of the interview procedures is the high response rate as compared to the low response rate associated with mailed questionnaires. To address the potential bias of self selection and a low response rate it seems appropriate to use the telephone interview method for acquiring conversion rate data in a reasonable time frame and at a reasonable cost.

It can be argued that a reminder or mail-back procedure would yield results comparable to the interview procedure. This is a valid argument, however, the interview method provides results quickly which is often very important when a decision must be made about the continuation or termination of a promotion program or effort.

2. Comparison of the results reveals important implications for attracting the far market segment of the tourist trade. When the far market tourists visit New Hampshire they stay for a longer period of time and when they are not vacationing they are equally likely to visit friends and relatives. Their trips to visit friends and relatives deserves some attention. Promotional campaigns which emphasize not only tourist type activities, but those which include visiting friends and relatives may help attract additional visitors to the region. This is a potentially important and valuable market which could be cultivated. A promotional effort which emphasizes both tourist activities combined with visiting friends and relatives might yield some interesting results in both the near and far markets.

3. A far market campaign and strategy needs to be developed and implemented concurrently with a renewed effort to attract those from the near market areas who are familiar with the area, but who have not come to the area in recent years. Capturing this near market segment will take a very creative and innovative promotional program.

4. The differences between the far and near market ratings of the usefulness of the Map & Guide may be due to the proximity or familiarity of prospects with the White Mountain Region. It may be reasonable to suggest that the perception of the usefulness and information value of the Map & Guide may be dependent upon travel experience and familiarity with a broad range of promotional travel literature. In the future travel experience and familiarity with travel literature should be measured and controlled so that we can develop an understanding of the importance of these two factors in influencing the value and impact of promotional travel literature.

5. It can be speculated that the Map & Guide may complement or reinforce other promotional efforts such as television, radio, or print advertising. It can also be speculated that the acquisition of a brochure or a promotional piece like the Map & Guide is a routinized act which is part of an information gathering ritual. The ritual is also an integral part of planning a trip. The outcome of the ritual is useful information, however, the expectation of discovering new or unique things to see and do may be the underlying motivation of the behavior. The ritual and the potential for discovery may be as equally important or more important than an actual trip.

These comments should not be considered as renouncements of the value of promotional programs. Rather, they suggest that a more realistic way of evaluating the impact of promotional brochures like the Map & Guide is to investigate the context in which prospective tourists seek information to plan trips. Specifically, such investigations should focus on identifying the variables which influence information seeking and trip planning behavior. In addition, the relationship between distribution channels and types of promotion designed to attract tourists deserves more systematic investigation. Future conversion studies should identify the association and interrelationships between the channels, messages, and the impact of tourism promotion programs.

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IMPACT OF SKI AREAS ON VERMONT RURAL COMMUNITIES

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Twenty-five ski towns and 25 control towns were selected to monitor and compare economic and social trends in rural Vermont. Ski towns grew faster in real estate wealth, reducing the property tax burden on year-round residents. However, this gain was partially offset by a cost to local residents--loss of local ownership of property.

Introduction

While the first ski areas in Vermont were developed in the 1930's, it wasn't until the 1960's that major growth took place. The State of Vermont provided the "seed money" for many areas by constructing access roads from the main highways to a base lodge in the mountains--usually 2 to 3 miles of highway, costing from $1.5 to $5.0 million. The investment by the state was made at a time when the Vermont Agency of Development was promoting Vermont as "The Beckoning Country."

Ski areas and associated development have had a major impact on life in rural Vermont. Along with the ski trails have come second homes, hotels, motels, condominiums, and restaurants. There is no doubt that the increase in state tax revenue associated with this development has had a pay-back many times the investment in access roads.

Comparison of ski and control towns

To determine whether or not ski area and associated development has been good for local communities in which they are located, a study was undertaken in 1980-1981 to compare economic and social trends in 50 Vermont communities in the time period 1970 to 1980 (Francis 1983). This report updates the Francis material to 1985 and 1987 wherever possible.

The 50 communities selected for study were similar in size and other attributes. However, 25 of these communities were located near a major ski area, while 25 were not so located (this latter group will be hereafter referred to as "control communities"). A comprehensive 26-item socioeconomic profile was developed for all 50 communities. SPSS, Version M, was used to compute comparative averages for ski vs. control towns. A two-tailed t-test and a Pearson's r-test were used to determine correlation. In Tables 1-4 the most important differences between ski towns and control towns are summarized. All differences were tested at the 95% confidence level.

The differences noted in Table 1 are important because of their impact on daily life in a rural community. The growth rate in number of year-round residents in ski towns was no greater than that growth rate in control towns. Thus the community cost to service year-round residents was not increased because of ski area development.

Table 1. Socioeconomic differences between ski and control towns.

Item	Ski	Control
Total population		
1970	845	1,406
1980	1,077	1,747
1985	1,147	1,847
School population		
1970	202	338
1980	198	365
1985	181	329
Lodging capacity		
1961	405	106
1981	685	67
1985	706	112
Second home % of tax base		
1970	28	7
1980	34	6
1985	32	2
Resident ownership ratio		
1981	34	71
1985	30	62

The largest single operating cost incurred by a community is the cost of educating its children. The development of a ski area did not result in an increase in the number of children to be educated. School populations decreased in both ski and control towns over the period 1970 to 1985. The absolute number of children to be educated was significantly higher in control towns.

The number of transients in a community is also related to town operational costs. There definitely were more transients in ski communities This is clearly shown by the significantly greater lodging capacity in both hotels and motels in ski towns. Additionally, the percent of the property tax base in second homes was much greater in ski communities. Second homes add to the transient population when they are rented out to others (a common practice in ski communities).

The development of ski areas and associated facilities brings with it a decrease in local property ownership. The money needed for construction comes from individuals and corporations residing outside the local community. Only about one-third of the total real estate value of ski towns is locally owned--two-thirds is owned by nonresidents of the community. The situation was found to be exactly the reverse in control towns. This loss of local ownership must be carefully weighed when assessing the total impact of ski area development.

Property Values Compared

One criticism of development relates to the increase in adjacent property values and the inability of local residents to pay the higher prices for land and buildings. This was not studied by Francis in the period 1970-1980; however, it was studied in the update. The results are shown in Table 2.

Table 2. Property values in ski and control towns, 1987-1988.

Item	Ski	Control
Year-round residence		
6+ acres	$135,000	$96,000
<6 acres	$78,000	$57,000
Open land per acre	$4,434	$2,331

The data in Table 2 are not corrected for differences in quality of property. If the average home in a ski area is of higher quality, or if the open land has better views, the differences may be quite small. However, if quality is equal, both large lot and small lot homes are about one-third higher in value in ski towns. Land prices are about twice as high in ski towns.

Year-Round Residential Property Tax Burden

The real cost or benefit associated with development, from the perspective of the local resident, is the relative residential property tax bill. Residential property taxes were calculated for each of Vermont's 246 communities. These taxes were then equalized to account for differing assessment ratios. The median community in Vermont in terms of residential taxes was assigned a value of 100 and taxes in all other communities were divided by taxes in the median community and multiplied by 100 to create a tax index. If a community had a tax index of 110, residential property taxes in that community are higher than "average" for Vermont. If a community had a tax index of 90, taxes are lower than average.

Throughout the period of analysis the tax index in ski communities was significantly lower (an average of 41 points lower) than the index in the control towns.

However, to assess burden of property taxation, one must evaluate tax levels relative to income earned. While ski areas employ some professional and managerial workers, most of the labor force is engaged in service-type employment which carries a lower wage level. The income index comparisons shown in Table 3 confirms this situation.

Tax burden can be expressed as a single number by dividing the tax index by the income index. In this case, the higher the resulting number, the greater the tax burden. Control towns are compared with ski towns in Table 4.

Table 3. Residential property taxes and income in ski and control communities.

Item	Ski	Control
Tax index		
1970	71	111
1980	65	109
1985	61	107
1987	61	107
Income index		
1974	102	110
1980	92	109
1985	101	109
1987	102	110

Table 4. Residential property tax burden[a/] in ski and control communities.

Item	Ski	Control
Tax burden		
1970	70	101
1980	71	100
1985	60	98
1987	60	97

[a/] Tax index divided by income index multiplied by 100. Higher number means greater burden on local residents.

Despite the lower income levels in ski towns, the burden of taxes was significantly lower than in control towns. There is no question that ski area and associated development and the taxes paid by the owners of such property resulted in this subsidy to local property owners.

No attempt was made in this study to quantify level or quality of services in either ski or control towns. All 50 towns were rural and there were very few services provided other than education and road maintenance. There was little evidence of "frivolous" spending of extra tax revenue in ski communities.

Taxes paid by second homeowners represented about one-third of all taxes collected in ski towns (as compared to about 5% in control towns). Second homeowners pay the same tax rate as year-round residents; however, since they educate their children in another community, they receive very little value for taxes paid.

The Second Home Element

If one factor were to be identified as being more important than any other as a source of the difference between ski and control towns, it would

be the presence of second homes. From a statewide standpoint, the value of second homes in Vermont now is nearly four times the value of all property classified as "farm" (Hayden 1988). In fact, the value of second homes is 94% of the value of all commercial property in the state.

There has been a steady increase in the number and value of second homes in Vermont since the early 1960's. Ragatz (1969) found that in 1960 Vermont was third among all states in the proportion of second homes relative to all housing starts. By 1973, the total value of second homes was about $600 million (Johnson 1974). In 1987 second homes in Vermont were worth $3.2 billion (Hayden 1988).

The rate of growth between 1973 and 1983 was about 14% annually. Between 1983 and 1985, the annual growth rate had risen to about 25%, and between 1985 and 1987 the growth rate had risen further to about 35% per annum.

Vermont administrators and legislative leaders have expressed concern over the magnitude of second home growth in recent years. The construction of year-round homes has lagged behind second homes in many areas of rural Vermont. A comparison of the growth rate in the two types of construction is shown in Table 5.

Table 5. Increase in housing units 1980 to 1986, ski vs. control towns.

Item	Ski	Control
	- - - % - - - -	
Increase in year-round homes	9	11
Increase in second homes	50	- 6[a/]

[a/] Represents a reclassification of property from seasonal to permanent.

In 1988 the Vermont General Assembly enacted Act 200, popularly referred to as the "Growth Bill." While time and space does not permit detailed discussion of this bill in this paper, it can be safely said that the growth of second homes in the state spurred passage of this legislation. The further development of second-home communities in Vermont will come under much closer scrutiny by regional planning commissions in the years ahead. Ski towns are not likely to lose what they currently possess; however, growth is unlikely to continue at the pace of the mid-eighties.

Second Home Property Tax Revenue

In 1985 Vermont second homeowners paid about $29 million in property taxes. About $19 million of this went into local school systems while $10 million was used to pay for roads and other town expenses. Taxing second homeowners for local education violates the "benefits received" principle of fair taxation. In essence, this might be construed as preferential treatment to year-round residents.

From a public policy standpoint there is logi to support the $10 million paid by second homeowne for road maintenance and town operations. However that same logic would not support the $29 million paid into local educational systems. If this $29 million was spent on programs that would benefit the second homeowner, greater equity would result. At least two possibilities exist: 1) creation of a roadside visual protection program and 2) establishment of a rural housing aid program.

A roadside visual protection program might logically include local grants for roadside beautification (brush cutting, eyesore removal, etc.). Such practices would enhance the rural landscape, and thereby increase property values for both residents and nonresidents.

Poor quality, single unit roadside housing reduces adjacent property values significantly. The establishment of a rural housing aid program, based upon second homeowner tax revenue, might be used to encourage cluster housing (as opposed to string development). Higher quality housing at affordable prices would benefit local residents and protect the second homeowner's local investmen

In either case, both residents and second homeowners receive some benefit from this use of tax dollars, rather than the benefit accruing only to local residents.

There have been proposals by legislators and other government leaders that would place second homeowner tax revenue in a centralized fund to be redistributed to all Vermont communities. If this were to happen, local residents of ski towns would be faced with an immediate property tax increase, or current service levels would have to be reduced.

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IMAGES OF VERMONT COMMUNITIES AND THE NEW ENGLAND REGION: CONSTRUCTED TYPOLOGIES

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Introduction

Information about traveler's perceptions of tourism destinations is essential for effective tourism planning and promotion. Travelers form mental images of destinations which are used in deciding which attractions or sites they will visit (Fridgen 1987). Images of places, physical environments, people, and amenities influence traveler preferences and choices. Many of these images are patterned, occurring as a result of similar experiences, exposure to advertising, and observations made on-site.

Previous image research on tourism has focused on perceptions of landscape, people and climate of a region (Hunt 1975), categorization of preferences for destinations in relation to the destination area's image (Goodrich 1978), and analysis of a site's attractiveness based on comparison of stated and revealed preferences (Ewing and Kulka 1979). Generally, these studies either examined images of broad state regions (Hunt 1975; Gustke 1982; Goodrich 1978) or focused on specific attractions (Ewing and Kulka 1979; Gartner 1976). Fridgen's (1987) study of traveler perceptions of Michigan tourist destinations departed from these two general concentrations of image analysis. His cognitive mapping study focused on county regions. The literature reveals that few studies have explored traveler perceptions of community areas although many communities, particularly those in rural regions, are embracing tourism for economic growth and revitalization.

Many of Vermont communities and community regions are popular tourist destinations, offering varied outdoor recreation pursuits, scenic landscapes, and escape from the congestion and hectic pace of more urban environments. A wide variety of destination resorts, rural communities, rural regions, and statewide agencies are actively promoting Vermont community areas as tourist destinations in order to capture additional revenue. Yet, there has been no systematic exploration of traveler images of Vermont's communities and rural community regions. Moreover, as an extension, there is a lack of information on traveler perceptions of states within the general New England region.

Purpose

The purpose of this research was: 1) to explore traveler perceptions of Vermont communities and rural community regions, categorizing the images of the communities and regions into types; and 2) to enhance understanding of community attributes which differentiate those images. As a result of the survey instrument pretest and review of literature, a secondary objective of the research emerged--an exploration of Vermont visitors (i.e., those who were unfamiliar with Vermont communities) perceptions of New England region states and adjacent Canadian Province. Three research questions were formulated for this exploratory study:

1) Are there key dimensions of tourist/visitors images of Vermont communities and community regions? Can a meaningful typology of communities be developed which differentiates communities?
2) What are the characteristics or attributes which differentiate communities and community regions?
3) What are the dimensions and associated images Vermont tourists/visitors have of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont, State of New York, and Province of Quebec.

Methods

Eighteen geographically diverse Vermont communities and community regions were selected for inclusion in the study: Burlington, Sugarbush Valley, Middlebury, White River Junction, Brattleboro, Vergennes, Newport/Jay Peak area, Stowe area, Rutland/Killington area, St. Johnsbury/Lyndonville area, Montpelier/Barre area, Bennington, Windsor/Ascutney area, Manchester area, Springfield/Bellows Falls area, Rochester/Randolph/Brookfield area, Mt. Snow/Wilmington area, and Woodstock. Twenty community areas (i.e., regions) originally were chosen because of their geographical dispersion and known tourism attraction. The list of communities was culled and changed after review by State chamber of Commerce personnel and as a result of instrument pretesting. The eighteen areas selected for inclusion in the survey represent commercial/high density communities, major resort communities, waterfront/bedroom communities, and agricultural communities (Bevins and Zwick 1988). Because the selected communities were familiar to a sufficient sample in the pretest, researcher confidence that respondents were knowledgeable about community features and setting increased (Fridgen 1987; Goodrich 1978).

Data were collected from a nonprobability sample of 466 out-of-state visitors. Using a sampling strategy similar to that employed by Perdue (1984), high volume sampling sites (i.e., sites identified as major stopping points for visitors entering the state) were selected for each of three seasons: June/July/August, September/-October, and December/January/February/March. Sites were then randomized over time blocks during each of the seasons and quota samples were established. Subjects at the selected interview sites were systematically approached and requested to participate in the survey.

Refusal rates varied, ranging 5--40 percent over the 18 interview sites.

A three part survey instrument was developed and administered by personal interview. In the first portion of the survey subjects were provided with 18 cards, each containing the name of one community area. Each subject was instructed to sort the cards into piles or groups on the basis of the similarity of the community areas. The judgments of similarity among communities, aggregated over all respondents, can be represented in a composite 18x18 similarity matrix. This composite matrix illustrates paired comparison ratings (Biglan 1973). In the second part of the survey, respondents were asked to complete nine bipolar ratings (i.e., semantic differentials) on the 18 communities. This task was asked of respondents in order to obtain information which could be used in interpreting the multidimensional solutions derived from the paired comparison ratings (Paxon and Tarnai 1981). The bipolar attributes selected for the study consisted of community and regional characteristics (attributes) identified in the tourism literature (Richie and Zins 1978; Hunt 1975; Gartner and Hunt 1987), augmented with community characteristics suggested by chamber of commerce officials and suggestions offered by respondents in the pretest. Seven point ratings scales were developed for each of the nine bipolar scales: growing--unchanging, friendly--unfriendly, water recreation area--mountain recreation area, summer destination--winter destination, agricultural--commercial, tourist--resident, congested--open, peaceful--hectic, and wealthy--poor. The third part of the questionnaire elicited demographic and socioeconomic information from respondents.

The pretest of the survey instrument revealed that over half of the contacted visitors were unfamiliar with the Vermont communities included in the survey and, thus, felt incompetent in judging the similarities between communities or rating their attributes. Even though they were unfamiliar or felt incompetent in judging communities, many of the pretest respondents stated their familiarity with states in the region. A subsequent review of the travel/tourism literature indicated little empirical evidence existed about travelers' images of the New England region. The study then was expanded to ascertain visitors' (i.e., those visitors unfamiliar with Vermont communities) perceptions of selected Northeastern/New England states and the Province of Quebec. The seven states included with Quebec in this section of the study were: Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont. Similar card sorting techniques, attribute ratings, and demographic questions were employed with this additional sample of visitors, once they were identified in the interview process.

Analysis

The 18x18 aggregated similarity matrix of communities and the 8x8 state similarity matrix were submitted to Kruskal's nonmetric multidimensional scaling program. Nonmetric multidimensional scaling (MDS) is a statistical technique that graphically displays the underlying structure or dimensions of empirically derived perceptual data (Goodrich 1978, p.4). Within n--dimensional space, objects of analysis are represented as points, where distance among points corresponds to the degree of similarity of objects (stimuli), and significant relationships between stimuli are preserved (Biglan 1973; Goodrich 1978). The optimal number of underlying dimensions is dependent on a calculated "stress" figure, analogous to a goodness-of-fit score, and the interpretability of the dimensions. Stress scores range from .0 to 1.0. The larger the stress figure the poorer the fit. Kruskal (1964) suggests that it is reasonable to choose a dimensional solution for interpretation which has a small stress, and for which further changes in number of dimensions do not significantly reduce stress. Therefore, a plot depicting the dependence of stress on dimension will exhibit a noticeable "bend" or "elbow" indicating the appropriate number of dimensions to interpret (Kruskal 1964). In this study, a spacial representation of the similarity or clustering of communities and states on their respective underlying dimensions was developed and subsequently interpreted with the aid of the bipolar ratings.

Bipolar ratings were used to interpret the content of the dimensions. The separate bipolar ratings for each stimuli (i.e., community or state/province) were averaged over all respondents (see Table 1). The average of ratings for each stimuli was correlated with its coordinates (position) on the dimensions of the multidimensional solution. Thus, the nine bipolar attribute scales were correlated with the dimensions for both the community solution and the state solution. As a further aid in the interpretation of the dimensions, the bipolar rating scales were regressed on the coordinates of the multidimensional space. An examination of the standardized regression weights for significantly associated regressions ($p<.005$) provides additional information for interpreting and labeling the discovered dimensions, yielding a measure of the relative dependence of stimuli on the attributes.

Table 1: Average Bipolar Ratings for Communities and States

Communities	Growing— Unchanging	Friendly— Unfriendly	Water Rec— Mountain Re	Summer Des Winter Dest	Agricultural Commercial	Tourist— Resident	Congested- Open	Peaceful - Hectic	Wealthy— Poor
Burlington	5.916	5.532	5.078	4.753	3.006	4.318	4.578	4.214	4.667
Sugarbush	5.468	5.266	2.138	2.606	3.511	5.742	3.585	5.032	5.043
Middlebury	4.578	5.411	3.400	3.978	4.389	3.889	3.156	5.233	4.922
White River	4.427	4.864	4.175	4.476	3.689	3.942	3.981	4.553	3.660
Brattleboro	4.898	5.120	3.556	3.954	3.306	3.796	4.370	4.417	3.787
Vergennes	3.545	4.907	4.256	4.791	4.814	3.907	2.884	5.209	3.698
Newport/Jay	4.797	5.234	2.297	2.656	4.094	5.375	3.234	5.031	4.016
Stowe	5.552	5.272	1.920	2.568	3.248	6.080	4.088	4.832	5.456
Rutlnd/Kiltn	5.798	5.020	2.182	2.636	3.101	5.404	4.495	4.313	4.828
St J/Lyndon	4.556	5.190	3.587	4.063	4.079	4.508	3.556	4.921	3.873
Montp/Barre	4.729	5.282	3.482	4.059	3.424	3.541	4.094	4.494	4.188
Bennington	4.905	5.041	3.608	4.378	3.784	4.500	4.095	4.811	4.784
Winds/Ascut	3.852	5.074	2.815	3.481	4.481	4.185	2.852	4.889	4.000
Manchester	5.632	4.853	2.882	3.809	2.735	4.985	5.059	3.971	5.382
Springfield	3.537	4.610	3.854	4.146	4.098	3.780	3.634	4.976	3.317
Roch/Rand/Br	3.500	5.167	3.542	4.167	4.917	3.833	2.958	5.458	3.500
Wilm/Mt Sno	5.260	5.096	1.959	2.194	3.055	5.589	4.123	4.384	4.822
Woodstock	4.487	5.507	3.280	4.440	3.707	5.680	3.667	5.293	5.680

States/Prov.	Growing— Unchanging	Friendly— Unfriendly	Water Rec— Mountain Re	Summer Des Winter Dest	Agricultural Commercial	Tourist— Resident	Congested- Open	Peaceful- Hectic	Wealthy— Poor
Maine	4.429	5.444	4.571	4.821	4.755	5.240	2.454	5.954	3.439
Rhode Island	4.640	4.323	5.590	5.571	2.975	4.584	4.758	3.839	4.528
Massachusetts	5.573	4.317	4.606	4.885	2.922	4.161	5.321	3.344	5.216
Vermont	4.846	5.825	3.252	3.691	5.012	5.537	2.520	6.057	3.947
New Hampshi	4.969	5.364	3.426	4.133	4.559	5.067	3.087	5.559	4.123
Connecticut	5.548	4.356	4.904	4.883	3.032	3.660	5.053	3.532	5.633
New York	5.095	3.467	4.024	4.462	3.252	4.319	5.281	3.138	4.895
Quebec	4.579	4.632	3.967	4.276	4.211	5.007	3.658	4.724	4.158

Findings

Multidimensional solutions were generated for five, four, three, and two dimensions of the community comparisons and respective stress scores of .025, .047, .076, and .125 were obtained. Both a three and two dimensional solution were generated for the state similarity matrix and associated stress scores were .006 and .008, respectively. A plot of stress figure against the dimensions suggests that a three dimensional solution is most appropriate for the community similarity matrix and the two dimensional solution appears optimal for the state matrix (see Fig. 1 and Fig. 2). Reliability of the solutions were tested by splitting the samples into subsets, subjecting the subsets to MDS, and comparing their solutions (Shepard et.al.1972). Similar to results from the full solutions, the stress scores from the community subsets indicated that a three dimensional solution was optimal and the state subset scores supported a two dimensional solution.

Figure 1: Community Stress Values

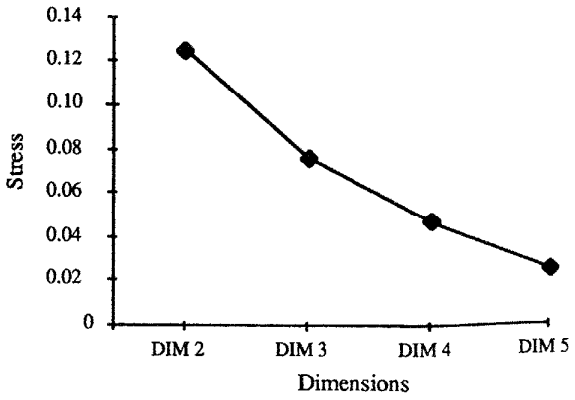
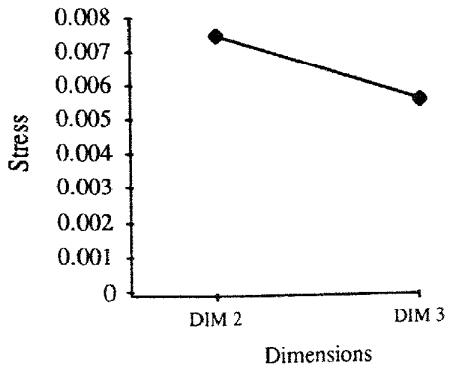


Figure 2: State Stress Values



Communities Survey Results

The SYSTAT nonmetric multidimensional program plotted a three-dimensional MDS solution for the community based data (Fig. 3a, Fig. 3b, and Fig 3c). The spacial display indicates the degree to which communities are viewed as being similar to each other (see Fig. 4). The closer two or more communities are in multidimensional space, the more similar the communities were perceived to be. The array of communities along a dimension axis indicates, to some extent, whether the communities have lesser or greater amounts of an attribute defining the dimension. A visual inspection of dimension 1 plotted against dimension 2 (Fig. 3a) shows a tight grouping of communities containing major resorts separated on dimension 1 from communities containing more commercial/residential aspects. A visual examination of dimension 2 is less clear. Brattleboro, Burlington, Montpelier/Barre are located at the positive end of the dimension, separated from Vergennes, Middlebury, and Woodstock which are located toward the negative end of the dimension. The visual representations in both Figure 3a and Figure 3c suggest the communities may be differentiated on dimension 2 by an attribute related to the pace of activity within a community or extent of commercial activity. Dimension 3 (see Fig. 3b and fig. 3c) appears to separate growing commercial centers such as Burlington from static or smaller growth communities such as Springfield, Rochester/Randolph/Brookfield, and Vergennes.

Figure 3a: Three-dimensional Solution for Communites:
Plot of Dimension 1 and Dimension 2

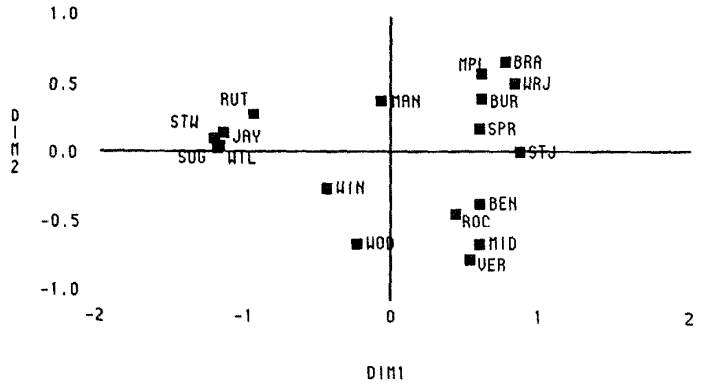


Figure 3b: Three-dimensional Solution for Communites:
Plot of Dimension 1 and Dimension 3

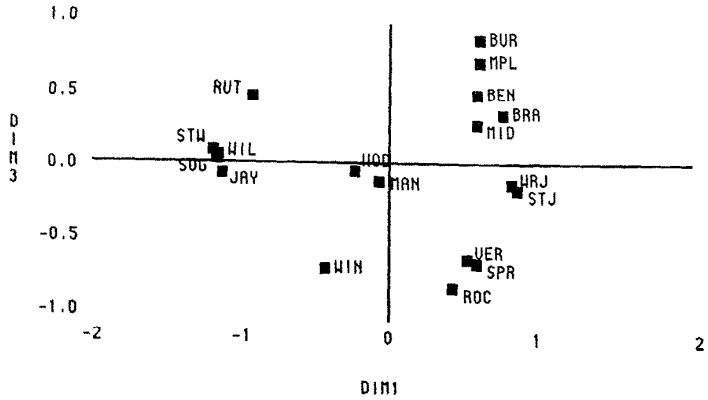


Figure 3c: Three-dimensional Solution for Communities:
Plot of Dimension 2 and Dimension 3

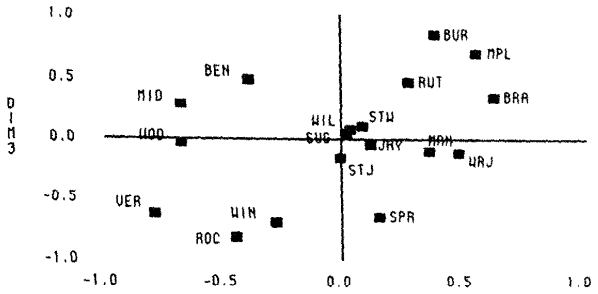
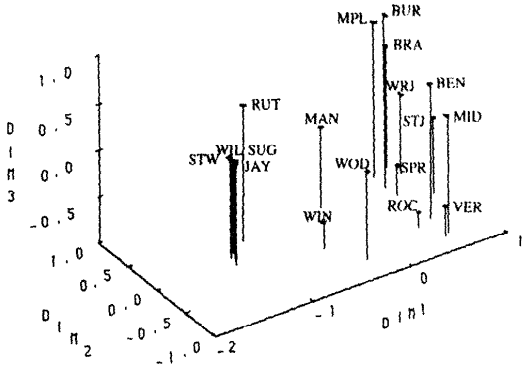


Figure 4: Three-dimensional
Solution
for Selected Vermont Communities



As an aid to the interpretation of the dimensions, correlations between the nine bipolar attributes and the three dimensions were examined (See Table 2). Correlational analysis indicated that three bipolar attributes were highly correlated with dimension 1: water recreation--mountain recreation (r=0.885), summer destination--winter destination (r= 0.895), and tourist--residential (r= -0.860).

Table 2: Correlation of Nine Bipolar Ratings with Three Dimensions

Attributes	Dimension 1	Dimension 2	Dimension 3
Growing-Unchanging	-0.434	0.498	0.771
Friendly-Unfriendly	-0.151	-0.174	0.505
Water Rec.-Mountain Rec.	0.885	-0.034	0.031
Summer Dest.-Winter Dest.	0.895	-0.207	-0.070
Agricultural-Commercial	0.300	-0.688	-0.682
Tourist-Resident	-0.860	-0.036	0.147
Congested-Open	-0.030	0.693	0.651
Peaceful-Hectic	0.037	-0.777	-0.552
Wealthy-Poor	-0.511	-0.122	0.465

However, none of the attributes are uniquely correlated so that it alone interprets the dimension. Interpretation based on the visual inspection of the dimension and correlation analysis suggests dimension 1 is a destination discriminator that may be labeled alpine--non-alpine. Dimension 2 was interpreted as being distinguished by the pace of activity within the community. This was supported to some extent by the moderate correlation (r= -0.777) with the peaceful--hectic attribute rating and by the lesser correlation (r= 0.693) with the bipolar attribute: congested--open. Subsequently, dimension 2 was labeled on a commercial center-vacation village continuum. The moderate correlations between dimension 3 and the growing--unchanging (r= 0.771) and agricultural--commercial (r= -0.682) attributes support labeling dimension 3 as a growth--stability discriminator.

The attribute ratings also were regressed on the coordinates of the multidimensional space. Eight of the nine bipolar items had significant ($p < .005$) squared multiple correlations; only the friendly--unfriendly attribute rating wasn't

significant. The largest squared multiple correlation was associated with the summer destination--winter destination attribute (R^2=.845). An examination of the standard regression weights indicates the variance in the rating of dependence on the growing--unchanging attribute was explained primarily by the values of communities on dimension 3. Variance in the ratings of dependence on water recreation--mountain recreation, summer destination--winter destination, and tourist--residential attributes was primarily explained by the values of communities on dimension 1. The coordinate values of communities on dimension 2 explained the variance in the ratings of dependence on the peaceful--hectic attribute.

Three dimensions were derived from the multidimensional scaling solution. The dimensions involved: 1) a physical/topographical environment (nonalpine--alpine); 2) pace-of-life domain (commercial center--vacation village); and 3) elements of change (growth--stability). It was possible to cross--classify communities on the three dimensions into eight distinct types. A 2x2x2 organization was developed as a result of the bipolarization of each dimension (see Table 3). The categorizations of communities into these types could be used to further examine similarities or differences among the units or their respective members.

Table 3: Cross-classification of Communites on Three Dimensions of Multidimensional Space

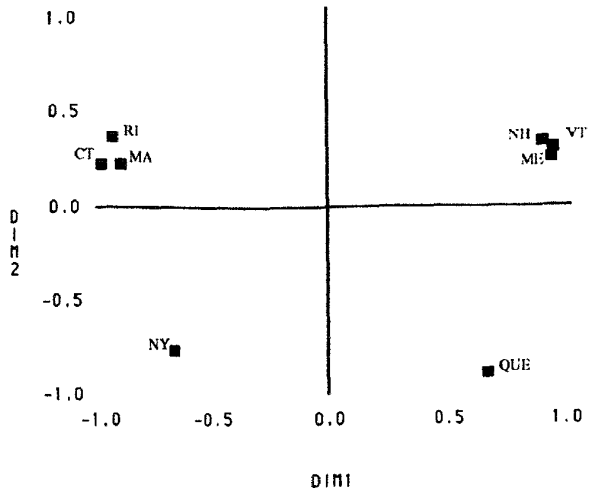
	Growth		Stable	
	Nonalpine	Alpine	Nonalpine	Alpine
Commercial Center	Burlington Brattleboro Montpelier/Barre	Sugarbush Stowe Area Rutland/Killington Wilming/Mt Snow	White river Junction St J/Lyndonville Springfield	Newport/Jay Manchester
Vacation Village	Middlebury Bennington		Vergennes Roches/Rand/Brook	Windsor/Ascut Woodstock

State Survey Results

Two dimensions were plotted in multidimensional space from the respondent paired comparisons (n=284) of seven states and the Province of Quebec. A visual examination of the plots reveals a clear separation between four groupings (Fig. 5). Arrayed at the positive end of dimension 1 is a tight cluster of the states Vermont, New Hampshire, and Maine. Connecticut, Massachusetts, and Rhode Island are tightly grouped at the negative end of the dimension 1 axis. New York and Quebec are uniquely separated from each other and the two clusters of New England states. The separation of the four state groupings suggest that the respondents saw clear differences in them. Conversely, the tight clustering of VT, NH, and ME and of CT, MA, and RI indicate respondents viewed each of these groups of states as being very similar. Interpretation of dimension 1 could be geographical. Northern New England states and Quebec are on the positive side of the dimension and southern New England states and New York are located on the negative side. Dimension 2 is less distinct in its separation, but differentiates the traditional New England region from two outliers (i.e., New York and Quebec) in the multidimensional space. Similar to the communities analysis, correlations were obtained between dimensions and bipolar attribute ratings to aid in the interpretation of the solution.

The correlational analysis showed that the bipolar attributes: agriculture--commercial (r= .983), tourist--resident (r= .902), congested--open (r= -.954), and peaceful--hectic (r= .940), were all highly correlated with dimension 1. Regression analysis also revealed the variance in ratings of dependence on these four bipolar attributes was primarily explained by dimension 1. Dimension 1 interpretation was refined to reflect this analysis and the dimension was defined as pastoral--nonpastoral. None of the bipolar attributes were uniquely correlated with dimension 2. An examination of regression weights shows that dimension 2 accounted for more of the variance in ratings on friendly--unfriendly attribute than dimension 1. The squared multiple correlation (R^2= .951) between the two dimensions and the attribute indicate a large amount of the variance in ratings of dependence on the friendly--unfriendly attribute was accounted for by the states in the two dimensions. Dimension 2 was thus labeled as amiable--distant.

Figure 5: Two-dimensional Solution for Eight Northeastern States/Province of Quebec



Implications

Four general implications may be drawn from this study. First, multidimensional scaling can operationalize traveler/tourist images of destination communities, making it a useful tool for further comparative studies. Second, the multidimensional space provides a means for cross--classifying stimuli (i.e., communities and states) into taxonomies for further study. Thus, the types of communities developed in this study may be used to examine other tourism related variables. Third, as Goodrich (1978) noted, researchers can employ the technique to study changes in perceived image. Fourth, while limited in generalizability, the study empirically demonstrates that New England, as a region, does not have a unidimensional or unified image. Rather, there are distinctive clusters of states.

Likewise the images of Vermont communities are varied, but patterned. Understanding of image is the first step in changing or capitalizing on the image. The close proximity of the community images of Stowe, Wilmington/Mt. Snow, Newport/-Jay Peak, and Sugarbush Valley have interesting implications for tourism marketing by indicating some interstate competition. Other communities have unique position but not a clearly defined image on the dimensions measured in this study (e.g., Woodstock, St. Johnsbury/Lyndonville, Manchester area). Communities or tourist regions may wish to adopt a cooperative marketing strategy, capitalizing on their perceived similarities. Coversely, communities may wish to develop or emphasize a unique image in order to develop a competitive market position. Goodrich (1978) suggests states or communities could enhance their market position through advertising attributes which they have in abundance (e.g., historic sites, cultural opportunities), but which few tourists perceive. In Vermont, the image for many communities is an alpine envir(ment, yet water is in abundance throughout the state. Village folklore, sugaring traditions, and agricultural interpretation also may offer alternative means of appealing to visitors. By bettering our understanding of community image we also can gain greater insight into making c communities better living environments.

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A COMPARISON OF RECALL AND DIARY METHODOLOGIES IN THE COLLECTION OF EXPENDITURE DATA

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The purpose of this study was to examine the advantages and disadvantages inherent in the collection of expenditure data using recall and diary methodology. During the 1986 Penn State football season, ticket holders received recall questionnaires for the entire season and in 1987 diaries were distributed to the same ticket holders. Differences were found between the two methodologies; specifically, use of the diary instrument resulted in an under reporting of large purchases. In certain expenditure categories, the diary methodology appeared to offer greater accuracy, even though response rates were, in all likelihood, going to be less than the recall questionnaire.

Introduction

Resource allocation in the public sector is becoming increasingly dependent on detailed feasibility studies. Professionals are expected to justify both capital and operational expenditures in financial terms; that is, the "bottom line" for the agency, community, region, and state may need to be determined prior to legislative approval. Even ongoing programs are being evaluated in economic terms more frequently. A number of data collection methods have been used to assess expenditure patterns in various economies. Among the more frequently used methods are recall, diary, and point of purchase.

The purpose of this investigation was to examine the advantages and disadvantages of the two most commonly used methods, the recall and diary methods.

In 1986 the sponsoring agency, Penn State University, requested that a study be conducted to determine the economic impact of Penn State Football on the local and the state economies (Ericksen et al.). For the purposes of this study the local economy was defined as the Centre Region; an area that falls within a 25-mile radius of the Penn State football stadium. The timing of the request in 1986 necessitated that the recall collection method be used since the season was well underway. In order to compare the advantages and disadvantages of the recall method with the diary method, a second study was conducted during the 1987 season (Guadagnolo et al.).

Selection of Subjects

For the 1986 season a total of 1,974 ticket accounts were randomly selected from the total population of approximatley 16,000 eligible ticket accounts. In order for an account to be eligible for the random draw, the account holder had to live outside the 25-mile radius of the State College, Pennsylvania area. Since each ticket account represented an average of 3.4 seats, the total number of fans included in the initial sample was 6,712.

The mailing of a recall questionnaire, followed by a reminder post card and a second recall questionnaire resulted in a response rate of 85% (1,678). In this investigation an incentive was used. Specifically, those returning a completed questionnaire were eligible for drawings which involved two season football tickets, two post season bowl tickets and a team autographed football.

For the 1987 study, which used expenditure diaries, a total of 1,050 respondents from the 1986 study were selected. The same subject population was used in an effort to provide as much similarity as possible between the two populations, particularly since the intervening influences of two different seasons and time would impact on the results.

The 1,050 ticket accounts were mailed two diaries for two separate games during the 1987 football season. This resulted in a total of 300 diaries mailed for each of the seven home games, or 2,100 diaries. The ticket holder of record would receive the diary one week prior to the game selected. A reminder post card and a second mailing did not occur, since the reporting would then be one of recall rather than the diary method.

The response rate for the diary method resulted in a useable rate of just over 50% (1,055). While the total diaries returned was 66% (1,386), many of the ticket holders had elected not to attend the specific game under study. As with the 1986 season, incentives were used, including two season tickets and a team autographed football.

Profile of Ticket Holders

Due to the fact that the 1987 sample was represented by the 1986 respondents,

there is very little variation between the 1986 and 1987 profiles; therefore, the following numbers from the 1987 data are almost identical to the 1986 data.

The commitment to Penn State football is considerable. The average ticket holder has had his or her account for an average of 11.9 years. For those residing within Pennsylvania, the average trip to a given game involved a round trip of 241 miles. Eighty-three percent of the ticket holders indicated that they traveled with the same party to each of the seven home games. Eighty-three percent reported that they had family members in the group, 65% had friends, 36% relatives, and 18% business associates. For those ticket holders residing beyond the boundaries of Pennsylvania, the average round trip mileage per game was 586 miles. It should be noted that high mileage is somewhat distorted by a few distant travelers. Over three-fourths of the out-of-state fans actually traveled less than 500 miles round trip. As with Pennsylvanians, most out-of-state account holders traveled with the same party (77%) and came with family (78%) or friends (65%).

Instrumentation

With the exception of the expenditure section, the 1986 and 1987 questionnaires were quite similar. The first series of questions profiled the number of tickets in the account, years of ownership and the makeup of the traveling party. Questions were then asked about mode of transportation, whether any party members did not attend the game and what they did instead, overnight stay in area, number of nights, and the type of accommodations.

The second part of the questionnaire included a three-day diary plus an "Other Days" section. For purchases related to the game that were not made on Friday, Saturday or Sunday, the respondent was asked to record the expense(s) in "Other Days." The respondent was asked to include all expenses for the entire traveling party under one of fifteen expense categories: (1) Restaurants; (2) Food and Beverages in Retail Stores; (3)Admission Fees; (4) Nightclubs, Lounges, and Bars; (5) Clothing and Equipment Bought Primarily for Use at the Game; (6) Other Retail Shopping; (7) Lodging Expenses; (8) Personal and Health Expenses; (9) Private Auto expenses; (10) Commerical Transportation; (11) Baby-Sitter Fees; (12) Equipment Rentals; (13) Charitable Donations; (14) Any Other Expenses; and (15) Stadium Expenses (not including cost of football tickets). With each of these expense categories several examples were provided.

Each expense category for each day was further segmented into three columns representing: "Within 25 miles of State College," "Further away but within Pennsylvania," and "Out of State."

Results

One of the obvious advantages of the diary method is the ability to examine expenditures not at the season level, but rather at the individual game level. Certainly those seeking expenditure information must decide whether such information is of value before deciding what methodology to employ. In this particular study for example, the sponsors were interested in examining how an evening game might effect local spending, particularly as it might relate to local restaurants and other retail shopping. In 1987 the Alabama-Penn State Game was the only evening game. Figures 1 and 2 suggest that scheduling evening contests do not appear to impact negatively on expenditures. As noted in Figure 3, the Alabama Game resulted in a per person expense of $43.48 in the local economy; the highest of any of the seven home games. It must be noted that the dollar amounts presented in Figures 1 and 2 represent the per person expenses prorated over all the ticket holders, not just those reporting an expense in the category.

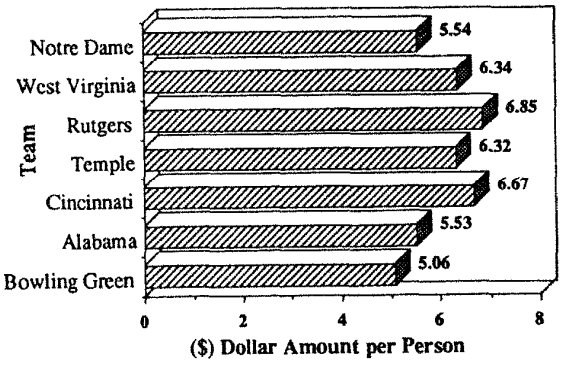

Figure 1
Restaurant Expenditures (1987 Season)
Diary Method

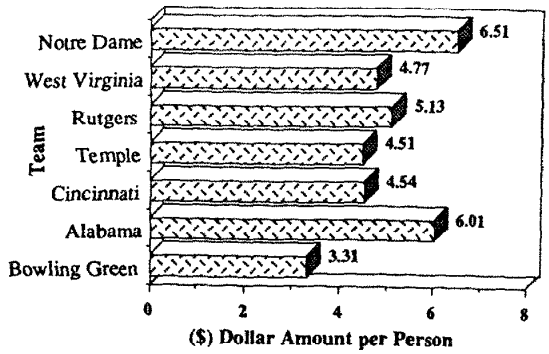

Figure 2
Other Retail Shopping Expenditures
(1987 Season)
Diary Method

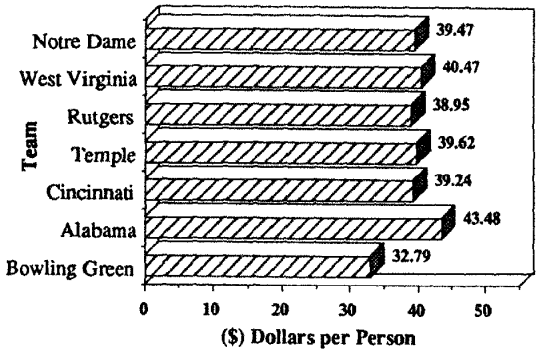

Figure 3
Total Expenditures Per Person Per Game
Local Economy by PA Residents (1987 Season)
Diary Method

Table 1 represents the total local direct spendings (excluding ticket and stadium expenses) as calcualted by use of the recall method during 1986 and the diary method in 1987. While there are several limitations in interpreting the data due to the fact that two different seasons are represented, the 1986 season exceeds 1987 expenditures by $1,430,000. Interestingly, the expenditures within Pennsylvania but outside of the State College area were $1,410,000 greater in 1987. If one were to combine both local and Pennsylvania expenditures, the totals over the two years would reflect only a .1% difference. This discrepancy may suggest that the respondents are less inclined to split a total seasonal expenditure when purchases take place in both the local and in-state regions; in other words, when using the recall questionnaire, the subject may attribute all gasoline purchases to the local economy, even though some of them may have been made outside of the State College area.

When the price of the tickets and stadium expenses are added to the season total, we find that the 55,000 season ticket holders living outside the local economy contribute approximately twenty million dollars in direct expenditures in the immediate State College area. Additionally, there are another 30,000 students and season ticket holders who have elected to remain in the area and attend the games. While their contribution to the local economy hasn't been examined, it undoubtedly adds considerably to the Penn State football weekend.

Table 1
1986 and 1987 Season Income
Local Direct Expenditures

	1986 Season Recall Method	1987 Season Recall Method
Restaurants	3,116,500	2,799,600
Food & Beverage in Retail Stores	649,000	664,000
Admission Fees	105,600	150,400
Bars, Night Clubs and Lounges	886,700	603,700
Clothing & Equipment for the Game	905,600	732,000
Other Retail Shopping	2,214,800	2,339,300
Lodging Expenses	2,377,000	2,328,000
Personal and Health Expenditures	45,300	41,500
Private Auto Expenses	1,233,800	901,700
Commercial Transportation	384,800	147,100
Baby-Sitter Fees	41,500	26,400
Equipment Rentals	15,100	7,500
Charitable Donations	101,900	60,400
Other Expenses	320,700	166,000
T O T A L S	12,398,100	10,968,100

Conclusions

While this study is descriptive in nature, it does attempt to explore some of the advantages and disadvantages of both the recall and diary methodologies. A number of conclusions have been reached which suggest that, under the right conditions, the less expensive recall method may in fact serve the researcher's needs. The following observations and conclusions are offered:

--Regarding response rates, the recall method, in nearly all cases, will be higher than the diary method. This is a given when a series of events (i.e., football games) are being studied. Using the recall questionnaire, if the respondent attends just one of seven events (i.e., games) he or she has something to report. In the case of the diary questionnaire, if the respondent does not attend that specific event (i.e., game), then there are no expenditures to report.

--Technically, the diary method is also a matter of recall; however, it is hoped that the recall takes place immediately after the purchase. Exactly when the respondent completes the diary requires additional research. In this investigation about 5% of the total sample actually returned their diaries prior to the event! This response probably underscores the routine associated with the event; that is, the traveling party knew what was going to be purchased and how much each purchase was going to cost.

--If the event or series of events have considerable ritual or routine associated with them, then the recall method may provide accurate information even after a considerable period of time has passed between the event(s) and the reporting of expenditures. In the case of the committed Penn State football fan, it became obvious that they could recall, in considerable detail, their purchases for the entire season, even though some games had taken place as much as four months earlier.

--When reviewing individual questionnaires over the two years, it became obvious that there was an under-reporting of the "large ticket items" among those using the diaries. For example, ticket holders did not associate the purchase of a "tailgating vehicle" with a given game. Yet, during the 1986 season, several such items were reported on recall questionnaires. Therefore, the large purchases associated with a season or series of events are less likely to be reported if one employs the diary method.

While most of what has been presented seems obvious, it is important to recognize, in advance, that the method(s) selected will provide both advantages and disadvantages, in terms of cost, response rates, the nature of the information collected and most importantly the accuracy and completeness of the information collected.

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THE EFFECTS OF PRETESTING AND DEGREE OF ADVENTURE ON SELF-CONCEPT[1/]

Anderson B. Young and Thomas W. Steele

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Involving 184 participants in 4 college level Outdoor Education Practicums (OEP), this study tested (1) whether posttest Tennessee Self-Concept Scale (TSCS) scores are higher for groups exposed to the instrument as a pretest; (2) whether groups exposed to Project Adventure during the OEP have higher TSCS scores than those in the standard OEP; and (3) whether the OEP effects positive self-concept change. No significant differences were found for groups exposed to the pretest or to the Project Adventure component. Effects of the basic, low adventure, OEP were significant.

Over one hundred studies have been conducted on the effects of Outward Bound, adventure education and related types of outdoor programs. Most frequently, the dependent variable is self-concept, usually measured by the Tennessee Self-Concept Scale (TSCS). These studies stem from the idea that the progression of challenges faced by program participants leads to desirable increases in self-confidence, self-concept, and other characteristics. Despite a number of exceptions, the collective trend of these studies suggests that such programs have a positive effect on self-concept. Unfortunately, as noted repeatedly across the last decade (van der Smissen, 1976; Iida, 1976; Ewert, 1983 and Holmes, 1985), most studies claiming significant effects are weakened by one or more of the following flaws:

1. The most common weakness is the use of one group designs. As emphatically noted by Campbell and Stanley (1963), the one-group pretest posttest design forces the researcher to make clear why positive results should be attributed to the treatment instead of nearly every conceivable threat to internal validity. In most instances, researchers have not faced that formidable task.

2. In the studies employing comparison (control) groups, the subject groups and/or the treatment given are highly nonequivalent. Treatment groups are usually self-selected, predisposing them to being affected by the treatment, while comparison groups are generally comprised of those who did not seek or receive any treatment. Although covariate analysis can ameliorate problems of statistical nonequivalency, it cannot be trusted to solve the problem of differential recruitment (Campbell and Stanley, pp. 48-49). Even in studies with randomly selected or similarly recruited comparison groups, educational research ought to compare alternate forms of treatment rather than some instruction with no instruction.

3. In nearly every study, all subjects are pretested. Neither through design nor statistical analysis are pretest effects measured. One wonders if similar results could be expected with groups not exposed to the instrument prior to treatment.

4. Finally, few studies have attempted to identify the components of outdoor programs that affect outcomes. Because so many different types of outdoor programs seem to yield positive self-concept change, there certainly is no single formula for success. Yet little is known about the critical ingredients for designing effective programs. Indeed, it is not even clear to what degree an outdoor program has to fit the adventure education model of progressive challenges in order to achieve significant changes in self-concept.

There are exceptional studies that serve as models for further research. Through a longitudinal study with 16 one-group pretest-posttest replications, the durable gains reported by Holmes (1985) were more convincing than the findings of earlier one-group studies. In different ways, other studies (Ewert, 1982; George, 1979; and Stogner, 1978) represent improved recruitment of comparison groups or more appropriate comparisons of alternative treatments. Not only did George's study compare viable treatment alternatives, it also approached a "component analysis" by having two of the compared treatments differ in only one respect. The issue of pretesting, which can only be measured in a true experimental design with random selection, seems not to have been addressed before the present study.

Despite many studies on the effects of high adventure outdoor programs on self-concept, there remain unanswered questions which form the basis for the hypotheses tested in this study.

Hypotheses

1. Exposure to the TSCS as a pretest, in itself or through treatment interaction affects posttest TSCS scores. Test-retest reliability findings for the TSCS would suggest that pretest exposure, in itself, does not affect subsequent posttest scores. In conjunction with a

[1/]This study was made possible in part by an Alumni Grant for the Improvement of Instruction from the Alumni Association of the State University College at Cortland.

treatment, however, pretests could affect outcomes. Outdoor program studies to date have not examined whether comparable results can be achieved with subjects who were not pretested.

2. Subjects exposed to Project Adventure or a ropes course component during an outdoor program will have higher TSCS scores than subjects who do not receive ropes course training. In Outward Bound types of adventure education programs, ropes course training is a standard component. In that context, it is definitely needed in the progression of skills instruction for the mountaineering experiences that follow. Yet its popularity as a stand alone program and as a component in nonmountaineering personal growth oriented outdoor programs would suggest that many practitioners believe it to be a critical program component. That belief or similar postulations (e.g., Ewert, 1983, p.18) about linear relationships between personality changes and adventure activities are untested hypotheses.

3. A professional preparation course in outdoor education (Outdoor Education Practicum or OEP), not rooted in the adventure education model, will effect significant changes in self-concept. Seeking to promote personal growth, many programs have tried to emulate the Outward Bound/adventure education model. Some may wonder if shorter programs, conducted in less remote areas, with less emphasis on stress inducing challenges, and involving lower risk activities, can in any way approach the success of Outward Bound.

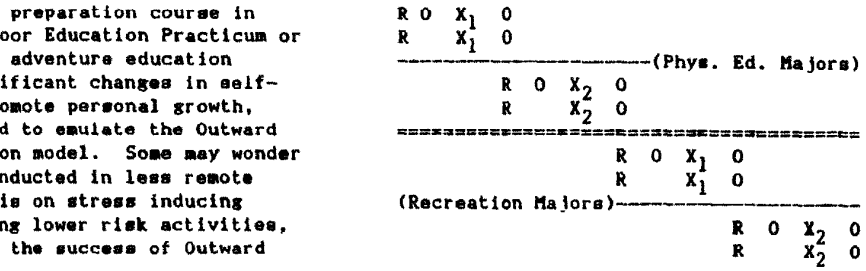
Methods

The study was conducted during two physical education and two recreation education summer Outdoor Education Practicums (OEP) at the SUNY-Cortland Outdoor Education Center in the Adirondacks. The OEP is a required, hands-on professional preparation course in the methods and principles of outdoor education and organized camping. Secondarily it seeks to foster positive environmental attitudes. The OEP includes 7 or 8 days of skills training at the Center and 5 or 6 days of flatwater canoe tripping in semiwilderness areas. For this study, one physical education department OEP and one recreation department OEP were modified to include high ropes adventure activities. In other respects, these two OEP's were nearly identical to their low or nonadventure education, control group counterparts. In all four OEP's, half of the students were randomly selected for pretesting with the Tennessee Self-Concept Scale (TSCS). All subjects were posttested.

Design

The overall research paradigm was a nonsimultaneous variation of the separate-sample pretest-posttest control group design (Campbell and Stanley, pp. 55-56). Its complex appearance in Figure 1 is simplified by recognizing within it the simpler and more powerful designs that were used to address the three research questions. For clarity, the component designs are named in conjunction with their associated research questions or hypotheses.

1. To test the hypothesis that exposure to a pretest affects posttest scores, one combines the pretest with the treatment variations ($O+X_1$ & $O+X_2$) and regards $O+X_1$ & $O+X_2$ as "treatments." Consequently, one can test the hypothesis through four replications of the true experimental posttest-only control group design or through a single large posttest-only control group design with a four strata random sample. If the pretest interacts with either of the treatments, the $O+X_1$ or the $O+X_2$ groups should have higher posttest scores.[2/]

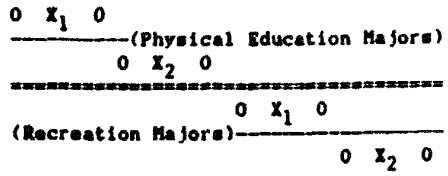


SYMBOL	MEANING
X_1	Outdoor Education Practicum (OEP)
X_2	OEP with Project Adventure Unit
O	Tennessee Self-Concept Scale
R	Random Assignment
--	Similarly recruited, nominally & statistically equivalent
==	Differently recruited, nominally & statistically nonequivalent

Figure 1.--Research Paradigm: Nonsimultaneous variation of the separate-sample pretest-posttest control group design.

[2/] To test the hypothesis that pretests interact with treatments to affect posttest scores, one also could regard the pretest as a treatment and create a replicated factorial nonequivalent control group design with Project Adventure or level of adventure as the other independent variable. Unfortunately, one cannot use the pretest as a covariate and as a treatment. Therefore, despite nominal and statistical equivalency of groups, the results would have to be viewed cautiously. Using this approach, no significant main or interaction effects were found.

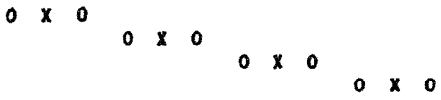
2. To test the hypothesis that the OEP with an added adventure education component would effect higher self-concept scores than the OEP without project adventure, one eliminates the unpretested subgroupings to create two separate nonequivalent control group studies (Fig. 2). Given nominal and statistical equivalency, replication, and covariate analysis, results can be interpreted with measurable levels of confidence.



SYMBOL	MEANING
X_1	Outdoor Education Practicum (OEP)
X_2	OEP with Project Adventure Unit
0	Tennessee Self-Concept Scale
—	Similarly recruited, nominally & statistically equivalent
==	Differently recruited, nominally & statistically nonequivalent

Figure 2.--Nonsimultaneous, nonequivalent control group design. (Statistical nonequivalence and other factors prompted use of Physical Education majors and Recreation majors as representing different populations. Hence the experiment is conducted twice: i.e., it has built in replication.)

3. Finally, to test the hypothesis that the OEP (with or without a project adventure component) affects self-concept, one again eliminates the unpretested subgroupings to create four replications of the pre-experimental one group pretest posttest design (Fig. 3). Although normally considered a weak design, in this application, most threats to internal validity could be dismissed. History was controlled through the experimental isolation of subjects during the OEP itself and through replication. Regarding maturation, existing research would refute claims that in the span of two weeks, with or without intervention, college students' self-concepts normally change (Dickenson, 1979; Fitts, 1965). Testing effects would be measured in the findings for hypothesis 1. Because the TSCS is a fixed printed test with established reliability, instrumentation problems were improbable. Regression effects were unlikely because groups deviated minimally from TSCS norms and because the design permitted replication of results. Selection and mortality are normally controlled by this design. Of all the threats to internal validity, only the interaction of selection with other factors would remain as a possible but improbable threat.



SYMBOL	MEANING
X	Outdoor Education Practicum (OEP)
0	Tennessee Self-Concept Scale

Figure 3.--Replicated one-group pretest-posttest design.

Subjects

The study involved 184 recreation and physical education majors who were taking the respective summer Outdoor Education Practicums as a requirement for their majors. Most recreation majors had finished their sophomore or junior year: most physical education majors had completed their junior or senior year. The mean ages of physical education and recreation majors were 22.2 and 20.3 respectively. Seventy percent of the recreation majors were women. Only 43.6% of the physical education majors were women. Physical education majors chose OEP sections on a seniority basis: recreation majors were assigned to sections in a quasi-random fashion. Because of differing methods of assignment, male-female ratios, ages, and pretest scores, physical education and recreation major groupings could not be considered equivalent, even for the purpose of a nonequivalent control group design. Pretest measures confirmed the reasonable equivalency of the two physical education groupings and of the two recreation groupings.

Treatments

The study was conducted at the SUNY-Cortland Outdoor Education Center, accessible only by water, in the Adirondack region of New York State. The principal treatment, the Outdoor Education Practicum, is a required, experientially taught professional preparation course in the methods and principles of outdoor education and organized camping. Secondarily it seeks to foster positive environmental attitudes. The OEP includes 7 or 8 days of "in-camp" skills training at the Center and 5 or 6 days of flatwater canoe tripping in semiwilderness areas. Although now teaching up-to-date low impact camping skills, its basic character builds on the school camping or resident outdoor education model described by Carlson (1983).

For this study, one physical education department OEP and one recreation department OEP were modified to include high ropes adventure activities. Physical education students spent one day doing low and high elements under the supervision of certified Project Adventure

instructors and another half day of rappelling. Recreation students had a similar one day Project Adventure experience but did not rappel. In other respects, these two OEP's were nearly identical to their low or non-adventure education, control group counterparts. The physical education students not receiving Project Adventure spent additional time in orienteering and nature study. Their recreation counterparts took a day paddle to net suckers in a nearby stream.

Instrumentation

The Tennessee Self-Concept Scale (Fitts, 1964), used in this study, measures overall self-esteem and ten other aspects of self-concept such as identity, self-satisfaction, physical self, and social self. With well established reliability and validity (Fitts, 1965; Bentler in Buros, 1972), the TSCS is the most commonly used measure in earlier studies of outdoor programs and self-concept (Iida, 1976; Ewert, 1983). Because the instrument's 10 subscales are intercorrelated (Bentler), only its "Total Positive" overall self-esteem score was used.

Analysis

Instruments were hand scored and double checked for accuracy before entering data for computer analysis by the Statistical Package for the Social Sciences (SPSS). Data were analyzed using SPSS descriptive, ANOVA, covariance, and t-test procedures. ANOVA was used to examine the pre-experimental equivalence of subject groups. An independent t-test was appropriate for the posttest only design used with the first hypothesis. The dependent t-test was appropriate for the pretest-posttest design of hypothesis 3. Analysis of covariance, which adjusts posttest scores to compensate for pretest differences, was used with the nonequivalent control group design associated with the second hypothesis.[3/] All hypotheses were evaluated at the .05 level.

Results

Hypothesis 1 stated that the mean posttest score for subjects taking a pretest before the OEP would be higher than that of subjects not pretested. As indicated in Table 1, the pretested mean of 357.5 was not significantly different from the mean of 355.7 for subjects who were not pretested, t (182) = −0.44, p = .662. The null hypothesis was accepted.

Table 1.--Mean Posttest "Total P" Overall Self-Esteem Scores as a Function of Pretesting (Replicated for 4 Groups)

Group 1	n	Mean	S.D.	t Value	DF	p
Not Pretested	22	355.77	22.11			
				0.40	41	.691
Pretested	21	353.10	21.72			

Group 2	n	Mean	S.D.	t Value	DF	p
Not Pretested	27	347.22	30.09			
				-0.43	47	.668
Pretested	22	350.73	25.78			

Group 3	n	Mean	S.D.	t Value	DF	p
Not Pretested	24	363.71	18.97			
				1.21	45	.231
Pretested	23	354.00	34.10			

Group 4	n	Mean	S.D.	t Value	DF	p
Not Pretested	21	357.33	29.96			
				-1.51	43	.139
Pretested	24	370.83	29.99			

All Groups	n	Mean	S.D.	t Value	DF	p
Not Pretested	94	355.69	26.14			
				-0.44	182	.662
Pretested	90	357.47	29.15			

[a/] Group 1 = Recreation without Project Adventure; Group 2 = Recreation with Project Adventure; Group 3 = Physical Education without Project Adventure; Group 4 = Physical Education with Project Adventure.

2. The second hypothesis stated that the adjusted mean score of subjects receiving a component of Project Adventure training would be higher than that of subjects exposed only to the OEP. Because this experiment was replicated, two sets of data are presented in Table 2. The adjusted posttest means of the two physical education groups differed little. In the replication with recreation majors, the difference was greater. The mean of the Project Adventure group was 354.2, while the mean of of the OEP-only group was 349.7. Nevertheless, as illustrated in ANCOVA Tables 3 and 4, the differences were insignificant in both the initial physical education test (F (1, 44) = 0.12, p = .734) and the replication study with recreation majors (F (1, 44) = 1.17, p = .286).

[3/] In several instances the reader, noting that the sizes of compared groups differ, may question whether the homogeneity-of-variance assumption has been violated. It has. As Hopkins and Glass (1978, pp. 257-258) point out, however, the violation is inconsequential when the larger n is associated with the larger variance or when the null hypothesis is accepted. From that perspective, therefore, the violations in this study were inconsequential.

Table 2.—Adjusted Mean Total Positive Scores as a Function of Project Adventure (PA)

Group	N	Pretest	Posttest Unadjusted	Posttest Adjusted
Initial study with Phys. Ed. Majors				
OEP with PA	23	343.72	354.00	361.31
OEP w/o PA	24	363.04	370.04	359.92
Replication with Recreation Majors				
OEP with PA	21	342.00	353.00	354.15
OEP w/o PA	22	343.75	350.72	349.71

Table 3.—Analysis of Covariance: Posttest Self-Esteem Scores with Pretest as Covariate (Physical Education)

Source of Variation	Sum of Squares	df	Mean Square	F	p
Pretest	41901.25	1	41901.25	240.45	<.001
Treatment	20.41	1	20.41	0.12	.734
Residual	7667.67	44	174.27		
TOTAL	49589.32	46			

Table 4.—Analysis of Covariance: Posttest Self-Esteem Scores with Pretest as Covariate (Recreation)

Source of Variation	Sum of Squares	df	Mean Square	F	p
Pretest	16017.08	1	16017.08	88.72	<.001
Treatment	210.97	1	210.97	1.17	.286
Residual	7221.57	40	180.54		
TOTAL	23450.42	42			

3. The final hypothesis suggested that the Outdoor Education Practicum would effect significant gains in the overall self-concept of subjects. Table 5 shows the means, gains, and t values for each class and for the four groups combined. Examined individually, three of the four OEPs were found to have had significant effects at the .05 level. When combined, the posttest mean of 357.5, a gain of 9.21, also reflected a significant change (t (89) = - 6.19, p = <.001).

Table 5.—Effect of OEP on Overall Self-Esteem Score (Replicated for 4 Groups)[a/]

Group 1	Mean	S.D.	Gain	t Value	DF	p
Pretest	342.00	25.67				
			11.10	-4.11	20	.001
Posttest	353.10	21.72				
Group 2	**Mean**	**S.D.**	**Gain**	**t Value**	**DF**	**p**
Pretest	344.68	25.79				
			6.05	-1.74	21	.097
Posttest	350.72	25.78				
Group 3	**Mean**	**S.D.**	**Gain**	**t Value**	**DF**	**p**
Pretest	342.00	33.02				
			12.00	-5.29	22	<.001
Posttest	354.00	34.10				
Group 4	**Mean**	**S.D.**	**Gain**	**t Value**	**DF**	**p**
Pretest	363.04	34.59				
			7.79	-2.36	23	.027
Posttest	370.83	29.99				
All Groups	**Mean**	**S.D.**	**Gain**	**t Value**	**DF**	**p**
Pretest	348.27	31.77				
			9.21	-6.19	89	<.001
Posttest	357.48	29.15				

[a/] Group 1 = Recreation without Project Adventure; Group 2 = Recreation with Project Adventure; Group 3 = Physical Education without Project Adventure; Group 4 = Physical Education with Project Adventure.

Discussion

This study addressed three questions: (1) whether TSCS pretests would affect posttest TSCS scores, (2) whether increasing a program's level of adventure with ropes course training would affect self-concept, and (3) whether a required college Outdoor Education Practicum, not rooted in the adventure education model, could effect significant changes in self-concept. Neither pretesting nor the Project Adventure component had significant effects on self-concept. The Outdoor Education Practicum did have significant effects.

Strictly speaking, these results cannot be generalized beyond these populations of professional preparation students. Nevertheless, because the design of the study permitted each finding to be replicated, the implications merit consideration.

(1) TSCS pretests need not be given to achieve results, and they do not bias results. Given the established test-retest reliability of the TSCS, this finding was not surprising. Nevertheless, usual research designs have, at best, controlled for rather than measured, pretest effects. Further replication of this

study's finding would remove any doubts programmers have about whether results can be achieved if no pretest is given. Equally important, researchers would have less reason to suspect testing contamination in the existing body of studies that used one-group designs. (Unfortunately researchers and practitioners still face the external validity question of posttest effects.)

(2) As a one or two day addition to a program, Project Adventure or ropes course training is not critical to self-concept change. Even the most enthusiastic proponent of Project Adventure would be reluctant to claim that a single day or two will alter personality. Nevertheless, in the context of the OEP, Project Adventure represented an increase in the level of stress and adventure. Therefore it is worth noting that not every increase in adventure programming yields self-concept gains. This finding does not suggest, however, that the ropes course experience was a waste of time. Students enjoyed it which is important in itself. In many contexts it is certainly useful for skills instruction and other outcomes not measured in this study. Further, Project Adventure, when combined with other growth enhancing program components, may augment outcomes. Additional research is needed to explore this possibility.

(3) Adventure education need not be the primary aim or model to achieve positive gains in self-concept. Perhaps too often outdoor professionals think their programs must emulate the dramatic activities and settings associated with Outward Bound. In fact, self-concept gains can be achieved through less striking and less contrived challenges and through a variety of other means. Because subjects in this study were older and more physically able than those in most related research, many might think they would require greater adventure challenges to be affected. Nevertheless they changed during the OEP. Unfortunately this study did not reveal why they changed. Subjects spent more than half their time in the relative comfort of the 500 acre Outdoor Education Center. Their canoe trips lasted only five nights. The Practicum goals listed skills learning, professional preparation, and environmental appreciation above personal growth. The practicum directors, former students of L.B. Sharp and Julian Smith, were not inclined to quote Kurt Hahn or Claude Cousineau. Despite minimal resemblance to an Outward Bound type of program, the OEP effected significant change in students' self-concept.

Concluding a literature review and speaking of Outward Bound, Alan Ewert once said, "we have discovered an educational black box: we know something works but we don't know why or how" (1983, p. 27). Perhaps we have discovered another black box or that Alan's black box is bigger than first imagined. Regardless, we still don't know why or how. All three questions addressed in this study are a reminder of how little is known about specific variables responsible for self-concept changes during outdoor programs. Two small variables were tentatively ruled out in this study. The task of identifying what must be included remains before both researchers and program designers.

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MOTIVATIONAL ORIENTATION: PARTICIPANT OUTCOME PREFERENCES BETWEEN SELF AND OTHER IN THE USE OR CONSUMPTION OF COMMON-PROPERTY RECREATION RESOURCES

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In the pursuit of recreation activities, common-property resources are "consumed." Early laboratory research assumed people using a common-property resource would seek to maximize their own gain. Later research, however, revealed that many subjects exhibited motivational orientations different from maximum individualistic gain. The laboratory research reported here compared the use behavior of individualistic and cooperative subjects. Results revealed that, as predicted, individualistic subjects requested more resource units than did cooperative subjects.

Introduction

During the pursuit of many recreation activities, common-property resources are used or consumed. These resources can be tangible, such as fish or game stocks in the cases of fishing or hunting, or intangible, such as "solitude" in the case of hiking or backpacking in a remote wilderness setting. The problem of interest in this study is the use or consumption of such common-property recreation resources at rates in excess of what is optimal or appropriate. Excessive use levels can lead to the depletion of an abundant resource, or prevent the recovery of a depleted resource. The purpose of this paper is to report the results of a laboratory experiment designed to examine the use behavior of individuals harvesting from a common-property renewable resource pool. The goal is to develop a greater understanding of individual and collective resource use, which can eventually be employed to encourage users to voluntarily curtail their use, thus avoiding resource overuse or depletion.

The overuse of renewable common-property resources is not new, nor has it occurred infrequently. This pattern of behavior has occurred even when those involved had some knowledge or understanding of the situation (overuse), and what the final outcome was likely to be (depletion).

This problem has received much research attention in other disciplines including psychology, social psychology, political science and economics. It has not, however, been a topic of interest for those involved in the provision or management of recreation resources, despite the fact that many recreation activities are dependent upon renewable common-property resources that can be overused.

Perhaps the most influential, most descriptive and most cited publication on this subject is Garrett Hardin's (1968) "Tragedy of the Commons." His paper has served as a catalyst to focus attention on the growing problem of resource depletion. Hardin describes a situation where a number of herdsmen graze their cattle on a common pasture that is free and open to all. It is expected that each herdsman will try to keep as many cattle as possible on the commons and thus maximize his own individual gain. This is a rational decision because the profit generated from each animal grazed is pocketed in full by the herdsman who owns it, while the cost, measured as damage to the commons, is shared by all herdsmen. The built-in incentive for each herdsman is therefore to increase the size of his own herd. Unfortunately, this is the conclusion reached by every rational herdsman, setting in motion a process by which the carrying capacity of the pasture is eventually exceeded, and the commons overharvested and depleted.

This general description of the process by which resource depletion occurs is a type of social trap (Platt 1973; Cross and Guyer 1980). A social trap occurs when there is conflict between a highly motivating short-term reward and a long-term punishment. A collective trap of the tragedy of the commons type occurs when the conflict is between short-term individual interests and long-term collective or group interests. A recreational angler who catches a large number of fish satisfies his own short-term individual interest, but harms the collective long-term interests by overusing the resource. If enough anglers pursue their short-term individual interests, they will collectively deplete the resource. The short-term individual reward typically guides and encourages behavior that ultimately leads to long-term disaster for the group. This particular class of problem has come to be known in the course of subsequent research as the "commons dilemma."

Commons as originally conceived are jointly used resources or goods owned by all (the public) and by no one person in particular, and to which everyone has free access (Lloyd 1837; Hardin 1968) In today's reality, commons take on a much wider variety of forms (Schelling 1973). A resource may be used jointly by many people, yet be owned or managed by only one or a subgroup. For other commons the resource is not free, but there exists no a-priori restrictions on when, how much or who may purchase or use the goods.

Resources that can be classified as common property are diverse and include oil, timber, whales, public libraries, parks, wilderness areas,

lakes, rivers and game and fish stocks. Commons were typically set aside on the assumption that supply of the good could meet collective demand (Edney 1981), and as long as conditions of abundance continued, the arrangement functioned well. When the supply of a public resource or commons becomes scarce, however, the arrangement does not always function well. Commons dilemma-type problems are most likely to arise when some publicly provided good is scarce (Berk et al. 1980).

Many resources are now, or will be at some time in the future, in scarce supply relative to demand. Efforts to solve resource scarcities through increased supply have not always been completely successful, and many have argued that technology by itself cannot resolve the issue of resource scarcity (Blakeslee 1979; Hardin 1968, 1974; Wiesner and York 1964). Hardin (1968) points out that an implicit assumption of any discussion published in a professional or scientific journal is that the problem of interest has a technical solution. He defines a technical solution as "one that requires a change only in the techniques of the natural sciences, demanding little or nothing in the way of change in human values or ideas of morality." There is, however, a class of human problems called "no technical solution problems," of which there are real world examples. Hardin uses population growth as an example, arguing that the earth has a finite supply of resources which can support only a finite population. Population growth must "eventually equal zero." Infinite population growth cannot be supported on finite resources, and neither mining the seas nor a new strain of wheat can change that (Hardin 1968). From this it is argued that there are human problems, such as resource scarcities, for which no technical solution exists.

In the absence of a quick technological solution, and the continued condition of resource scarcity, people are forced into the dilemma of choosing between their short-term individual interest or the long-term collective interest (Kramer and Brewer 1984). In such a situation the rationality of the individual usually wins, group interest is sacrificed and the resource overused (Brechner 1977; Cass and Edney 1978; Edney and Bell 1984; Jorgensen and Papciak 1981). Other, non-technical, solutions are needed if further resource depletion due to overuse is to be avoided.

In a recent review of the literature, Messick and Brewer (1983) identify two types of non-technical solutions to the commons dilemma. The first type involves structural solutions that come about through coordinated, organized group action (Kramer and Brewer 1984), and include those political solutions based upon "mutual coercion, mutually agreed upon" favored by Hardin (1968). Such solutions typically require agreement among group members to relinquish their free access to the commons, and to institute some other system of resource allocation in its place. Restriction of access, however, runs counter to the concept and history of the commons.

The second type of solution relies upon individual preferences and social motives to maximize those factors that influence individuals to include collective or group interests in their personal decision making. This solution encourages individuals to voluntarily restrain their use or consumption of a common property resource in the absence of external constraint or coercion (Kramer and Brewer 1984). This type of solution has drawn the attention of psychologists and social psychologists, and is the solution of interest in this study.

Literature Review

Research into the question of individual vs. collective behavior in a dilemma situation has examined a wide range of variables. Most of these variables can be grouped into one of two general categories: those related to characteristics of the individual, and those related to characteristics of the situation. Results from this research have provided some understanding of how certain variables tend to increase the likelihood of individuals voluntarily making decisions consistent with the collective good.

A third category of variables, however, those related to characteristics of the resource, has received virtually no research attention. The lack of research in this area represents a limitation of the current literature on understanding behavior related to the commons dilemma.

This paper seeks to build and expand upon previous research into the commons dilemma, and to incorporate resource characteristics into the study design. The independent variable of interest in this study is motivational orientation (a characteristic of the individual). In addition, a set of scope conditions will define a set of resource characteristics as presented to the subjects in a laboratory experiment.

Motivational Orientation

Research has shown that individuals possess different motivational orientations (individual preferences for a particular self-other outcome distribution in the use of a renewable resource), and that these motives are related to differences in individual choice behavior (Pruitt 1967; Messick and McClintock 1968; McClintock et al. 1973; Kuhlman and Marshello 1975a, 1975b; Griesinger and Livingston 1973). Two recent studies have examined the effects of motives on choice behavior in an n-person "sequence dilemma" laboratory experiment (Liebrand 1984; Liebrand and van Run 1985). In the first study, Liebrand (1984) classified subjects according to motivational orientation. These motives were altruistic, the motivation to maximize other's outcomes; cooperative, the motivation to maximize the sum of own and other's joint outcome; indi-

vidualistic, the motivation to maximize own outcome; and competition, the motivation to maximize the difference between own and other's outcomes. Subjects then participated in groups of seven in a simulated dilemma, presented as a conservation of resources problem. Results of the experiment showed a significant effect due to motivational orientation. Competitive subjects took the most, individualistic subjects took less but more than the average amount, cooperative subjects took less than the average and altruistic persons took the least. As part of that study, Liebrand conducted a second experiment using 20-person groups. He was able to replicate these results, and concluded that there is a covariation between interpersonal differences in social motivation and choice behavior.

Liebrand and van Run (1985) conducted a similar study using subjects in the United States and the Netherlands. They again used the sequence dilemma, explaining it in terms of a conservation of energy problem, with consumption expressed in monetary terms. Subjects were classified by motivational orientation (altruistic, cooperative, individualistic, competitive) using two different techniques, the first based upon the Kuhlman and Marshello procedure (1975b), the second on a geometric procedure (Liebrand 1984). Results of this study replicated previous findings (Liebrand 1984). Altruistic subjects took the smallest amounts, followed by cooperators, individualists and competitors, who took the most. Based on these findings, the authors argued that "great confidence" can be placed in the reported relationship between choice behavior and motivational orientation in a dilemma-type situation. This relationship was found in both the United States and in the Netherlands, and was found using both methods of motive classification.

Resource Characteristics

A review of the literature shows that little research attention has been directed towards those variables related to characteristics of the resource. There is little understanding of how different characteristics of the resource affect choice behavior in a dilemma-type situation.

Of the research that has been directed at understanding the effects of differences in resource characteristics, investigators found significant results. Rutte et al. (1987) conducted a resource dilemma game in which half of the subjects were initially faced with a pool having few remaining resources (a scarce resource condition), and half were initially faced with a pool having abundant resources. Results showed that individuals had higher mean harvest requests when the resource was initially in abundant supply than when the resource was in an initially-depleted condition. Beyond this little is known about how different characteristics of the resource affect an individual's harvest decisions.

These results suggest further research is appropriate. Several questions can be raised concerning resource characteristics and their effect on harvest behavior. For example, how do subjects respond to an increasing or decreasing pool size? How would the pattern of choice behavior change if two or more resources were available to choose from? What if these multiple resources had different values, or if they had different rates of replenishment or depletion?

Independent Variables Operationalized

Prior research has been directed towards the effects of motivational orientation on harvest behavior of individuals participating in commons dilemma-type games. They have not, however, been examined through the use of a replenishable resource dilemma (RRD), currently the most sophisticated experiment design. Also, the consideration of resource characteristics and how they might affect harvest behavior has received virtually no research attention.

Motivational orientation is not a traditional variable since it cannot be experimentally manipulated. Instead, the concept represents an underlying trait of a subject that can be measured and identified prior to participation in the experiment. Subjects in this study participated in an evaluation prior to the experiment, and those having either a cooperative orientation or individualistic orientation were identified. Cooperative subjects are defined as seeking to maximize the collective or joint outcome, and individualistic subjects are defined as seeking to maximize their own outcome (Messick and McClintock 1968; Liebrand 1984).

Resource characteristics in this experiment represent a pair of scope conditions. The first is trend in resource status. Subjects will be faced during the experiment with a renewable resource that is being "depleted" over time. Subjects were not told this, but instead experienced it as it occurred through false-feedback as the experiment progressed. Subjects were led to believe that any increase or decrease in pool size was due to their harvest behavior. At the start of the experiment the resource pool contained 3000 units. This decreased to 2,818 units on the 10th trial, 1,662 units on the 20th trial, 658 units on the 30th trial and 408 units on the final trial (trial 40). The units remaining after each trial, and the depletion curve that results, were patterned after a series of population growth and depletion equations (Clow and Urguhart 1974).

The second resource characteristic was contingent harvest success. This means the number of resource units a subject receives in response to a harvest request is contingent upon the number of units remaining in the resource pool at the time of the request. As pool size went down the number of resource units received in response to units requested also went down. The amount received in relation to amount requested

was proportional to pool size. This provided subjects with feedback information on the condition of the resource pool, and consequently the collective effects of the groups harvesting on the resource pool.

The dependent variable of interest was number of units requested. This could be average units requested per-trial over the full experiment, or average units requested per-trial during each 10-trial stage.

Study Hypotheses

Hypothesis one tested for effects due to motivational orientation on harvest behavior during the full experiment. This hypothesis was the broadest and most general evaluation of motivation effects. This hypothesis established whether or not subjects with different motivational orientations requested different amounts of the renewable common-property resource. It was expected that individualistic subjects, due to their desire to maximize their own outcomes, would request more resources than would cooperative subjects.

HO_1: There is no difference in units requested per-trial by persons having different motivational orientations.

HA_1: Units requested per-trial will be higher for individualistic subjects than for cooperative subjects.

Hypothesis two tested for motivation effects during different stages of the experiment. Upon completion, the 40-trial experiment was segmented into four 10-trial stages for this analysis. The following hypothesis determined whether or not treatment effects were present during all four stages of the experiment, or only during some of the four stages. It was expected that for each stage of the experiment, individualistic subjects would request more resources than would cooperative subjects.

HO_2: There is no difference in units requested per-trial during each stage of the experiment by individuals having different motivational orientations.

HA_2: Cooperative subjects will request fewer resource units per-trial during each stage than will individualistic subjects.

The final hypothesis focused on what effects a declining pool size had on harvest behavior. As the experiment progressed, the resource pool was steadily depleted. It was of interest to know whether or not subject harvest behavior changed over time in response to the depletion of the resource. Hypothesis three examined this question. It was predicted that subjects would reduce their requests as the pool was depleted over time.

HO_3: There is no difference in resource units requested per-trial during each of the four stages during the experiment.

HA_3: Subjects will request fewer resource units per-trial during latter stages of the experiment than during earlier stages.

Methodology

Motivational Orientation

To assess which motive was dominant for a particular subject, several measurement techniques using decomposed games are available (Messick and McClintock 1968; Pruitt 1976; Griesinger and Livingston 1973; Kuhlman and Marshello 1975b). The procedure used in this study to determine a subject's motivation was based upon the geometric procedure originally proposed by Griesinger and Livingston (1973). In their model, the various motivational orientations are represented as motivational vectors extending from the origin of a two-dimensional space. This space is defined by the outcomes to self (horizontal axis) and by the outcomes to the other person (vertical axis) (Figure 1).

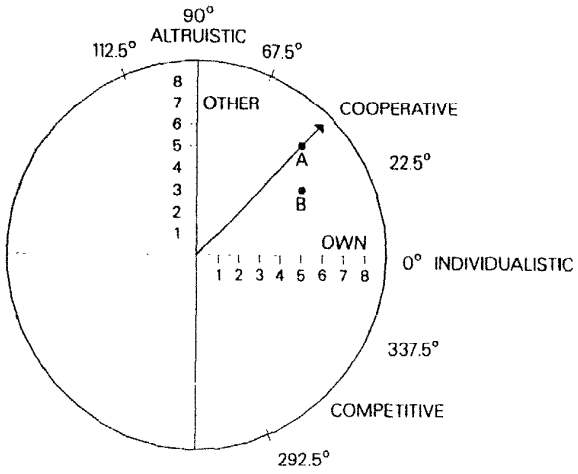

Figure 1. Geometric self-other outcome space. Source: Adopted from Liebrand (1984).

Provided with two self-other alternatives, it is assumed that subjects will choose the alternative with the greatest projection on their preferred motivational vector. For example, a subject with a purely cooperative motivational orientation (a vector with slope = 1) will prefer the outcome of 5 units to self and 5 units to other (A) to the outcome of 5 units to self and 3 units to the other (B), since alternative A maximizes joint gain. By having subjects select preferred alternatives from a series of self-other alternatives, and plotting them on the outcome plane described, it is possible to define a subject's motivational orientation. The

original classification procedure as developed by Griesinger and Livingston (1973) required an on-line computer connection. To avoid this requirement, a paper and pencil version was administered to the subjects. This procedure was administered to subjects in eight recreation and park and sociology classes at Texas A&M University. Each subject was provided an answer sheet on which they could indicate their preferred choice to each set of alternatives. Twenty-four pairs of self-other outcomes were projected one at a time onto a screen at the front of the room. Subjects determined which alternative (A or B) they preferred and marked it on their answer sheet. After all 24 pairs of alternatives were presented and the answers recorded, the answer sheets were collected and the subjects thanked.

Subject's responses were then analyzed using a computer routine developed by Liebrand (1982). This analysis generates the motivational angle vector. Subjects could be classified according to their motivational vector if their choices were consistent with the choice pattern of one of the two motives. Subjects with a motivational vector between degrees 67.5 and 22.5 were labeled cooperative; those with vectors between 22.5 and 337.5 were labeled individualistic (Liebrand 1984).

Experiment Procedure

After the subjects had arrived, the experimenter provided a brief set of instructions concerning operation of the computer terminals, and the nature of the "interactive" computer system. Although the computers were physically linked together, each computer in fact operated as a stand-alone unit. No linkage was necessary since the same false-feedback was being provided to each subject. It was important, however, that the participants believed they were interdependent in the harvesting of resources.

Subjects participated in groups of six, but were led to believe they were part of a much larger group of 24 persons which, when the experiment began, would automatically and randomly be split by the computer into two groups of 12 persons each. This deception was necessary for two reasons. The first was to minimize or eliminate a subject's expectation that a drastic shift in their own harvest requests should result in a noticeable difference in pool size as a result of their action, and second, to remove a person's belief that through strategic harvest behavior they could influence the behavior of others. Several steps were taken to cause people to think they were part of a 24-person group. As each subject arrived, the experimenter conspicuously checked their name off a list containing a total of 24 names. Second, subjects were seated in cubicles numbered 19 through 24. Finally, after all instructions had been given and the subjects were ready to begin the experiment, the experimenter called to the "other" experiment location where the other 18 participants were supposedly located to tell them all was ready. After a minute or two, the phone would ring one time (the call being made by an accomplice) signaling the experimenter the "other group" was also ready, and to begin the experiment.

Once the operation of the computer network had been explained, subjects were seated and provided with instructions concerning the task itself. The instructions were presented on-screen where subjects could read them at their own pace. All subjects received the same information concerning resource harvesting and pool replenishment. Subjects were told they would be participating in a decision-making task in which they and 11 other persons would individually harvest from a renewable resource pool. Each subject was told they had equal access to and shared a resource pool which would initially contain 3,000 units. On each turn (trial) each subject could request up to 20 units for themselves. Once all 12 members of the group had made their requests, the computer would respond, indicating to each subject how many units they individually received in response to their request, and their cumulative, total units harvested.

Total units harvested would then be subtracted from the existing resource pool. Subjects were told the remaining amount would then be multiplied by the replenishment rate of 1.05, thus adding 5% to the pool. This resulted in the new pool size for the next trial. Subjects were told the resource pool could not replenish itself in excess of 3,000 units. These calculations never actually occurred, of course, because the computer program was rigged to provide a preset pool size after each trial. Subjects in fact had no effect on pool size. Subjects were in isolated cubicles, and were not aware of the harvest requests or successes of the other participants. Subjects earned 1.5 cents per unit harvested, making their decisions and the dilemma they faced have real implications.

Upon completion of the instructions and the answering of any questions, the experimenter made the phone call to the other experiment location to inform that group that the experiment could begin. Once the one-ring start signal was received, subjects were told to begin. The experiment lasted 40 trials.

Results

Manipulation Checks

A post-experiment question sought to determine whether or not subjects realized the pool size was decreasing in size over time. Subject responses to the statement "I knew before each turn whether or not the resource pool was increasing or decreasing in size" indicated their understanding of the trend in pool size. Subjects responded on a 7-point scale (1=strongly disagree, 4=neutral, 7=strongly agree). On this item it was important that subjects were aware of

the trend in pool size since subject behavior under the situation of a diminishing pool size was of interest in this study.

An examination of the mean response to this statement ($\bar{x}$=5.88) indicates subjects did understand that the resource pool was decreasing in size over time. Based on these results, it was concluded that subjects were aware of changes in pool size over time.

A manipulation check to determine the effectiveness of the group-size deception was also performed. It was important that subjects believed they were part of an interactive group, and not making requests independently on a stand-alone computer. To assess the effectiveness of the group-size manipulation, subjects were asked on the post-experiment questionnaire "How many other persons were harvesting from the same resource pool as you?" Responses to this question ($\bar{x}$= 10.1) showed that subjects believed they were part of a group having 10 other members. Based upon these results, it is concluded that the group-size deception was also successful.

Motivational Orientation

The classification procedure was administered to 434 students; 329 were identified as being either individualistic or cooperative in orientation (Table 1). The remaining 105 persons

Table 1. Distribution of subjects according to motivational orientation.

Motivational Orientation	Frequency	%
Individualistic	162	37.33
Cooperative	167	38.48
Altruistic	12	2.76
Competitive	45	10.37
Other Orientation	25	5.76
Mid-orientation Vector	19	4.38
Incomplete Data	4	0.92
TOTAL	434	100.00

had other motivational orientations (82), had a motivational vector exactly midway between two orientations (19) or failed to complete the procedure (4). These 105 subjects could not be used in the experiment.

The design called for 72 subjects to participate in the experiment (36 subjects per condition). Unfortunately, some subjects who had agreed to participate in the study failed to appear at the scheduled time and place, and could not be replaced. As a result, only 70 individuals participated, leaving each condition one short (35 subjects per condition).

Hypotheses Testing

The dependent variable of interest is average number of units requested per-trial. Subjects could increase or decrease the size of their request as they wished; this was the only response option open to them. This indicator of harvest behavior has been calculated for five categories; average units requested per-trial during the full 40-trial experiment, and average units requested per-trial during each of the four 10-trial stages. These five dependent measures will be used in testing the study hypotheses.

By convention, the significance level at which a hypothesis is rejected is set at .01 or .05 (Kirk 1982). This is based on the assumption that the costs of making a Type I error are large and serious, and are to be avoided. This assumption may not always be correct, and as a result the significance level may be set too low. In situations where the cost of committing a Type I error is not high, it has been suggested that the level of significance be set at .10, .20 or as high as .30 (Blalock 1979; Kirk 1982; Christensen 1977; Gregoire and Driver 1987).

Because this study has moved into a somewhat new area of inquiry, and because the cost of a Type I error is relatively low, slightly higher significance levels will be used. For the t-tests used to test HO_1 and HO_2, a .10 level will be used as the decision rule. For HO_3 a repeated measures ANOVA procedure will be used. The .05 significance level will be retained as the decision rule in this instance because of the more restrictive set of assumptions attached to the repeated measures procedure.

The maximum number of units that could be requested during any single trial was 20. The average per-trial request for all subjects during the full experiment was 14.24 units (Table 2). Cooperative subjects requested some-

Table 2. Mean units requested according to motivational orientation and stage.

	Stage				
	One	Two	Three	Four	Total
Individualistic	17.43	15.83	13.70	13.61	15.15
Cooperative	16.42	13.60	11.82	11.53	13.32
Total	16.93	14.72	12.76	12.57	14.24

what less (13.32 units), and individualistic subjects somewhat more (15.15 units). Statistically, this result is significant at the .10 level (Table 3). HO_1 is therefore rejected, and because the difference in requests is in the predicted direction, HA_1 is accepted.

For each 10-trial stage this pattern also holds, with cooperative subjects requesting fewer resource units than individualistic subjects. Since differences in harvest behavior are significant in three of the four stages, HO_2 is rejected, and because differences in requests

during stages two, three and four are in the predicted direction, HA_2 is accepted.

Table 3. Tests for differences between cooperative and individualistic subjects on units requested during the full experiment, and during stages one through four.

Stage	Units Requested Individ.	Coop.	t	p
Full Experiment	15.15	13.32	2.257	.027
One	17.43	16.42	1.441	.154
Two	15.83	13.60	2.434	.018
Three	13.70	11.82	1.739	.086
Four	13.61	11.53	1.707	.092

When harvest requests are examined across the four stages, over time, the results show a decline in units requested from stage one to stage four. Results of the repeated measures ANOVA shows a significant finding for the stage effect, and a non-significant finding for the stage by motive interaction (Table 4). These results allow HO_3 to be rejected.

Table 4. Repeated measures ANOVA test for differences in units requested according to stage and motive.

Effect	Wilk's Lambda	F	p
Stage	0.463	25.49	.001
Stage X Motive	0.956	1.02	.392

Between-stage ANOVA contrasts reveal significant differences in units requested between all stages except three and four (Table 5). Because subjects requested fewer units during the latter stages of the experiment than they did during the first and second stages, HA_3 can be accepted.

Table 5. ANOVA contrasts testing for between-stage differences in units requested.

	Stage One	Two	Three	Four
Units Requested	16.93	14.72	12.76	12.57

Stages underscored by same line are not different at .05 level of significance.

Discussion and Conclusions

The purpose of this study has been to examine how differences in motivational orientation and a diminishing resource supply affect the choice behavior of individuals participating in a replenishable resource dilemma. Based on a review of the literature, it was predicted that subjects having a cooperative motivational orientation would exhibit behavior more consistent with collective interests than would subjects having an individualistic orientation. It was also hypothesized that given the situation of a decreasing pool size and the single response option of reducing their harvest requests, subjects would do so.

The results of this experiment support these predictions. Cooperative subjects did behave in a fashion more in line with collective interests than did individualistic subjects, and all subjects, irrespective of motivational orientation, responded to the shrinking pool size by reducing the size of their requests. All three null hypotheses were therefore rejected, and the alternate hypotheses accepted.

This study has a number of implications for the management of recreation resources. Considerable evidence has been developed showing that individuals can differ in their motivational orientation towards the use of a resource, and further, that these orientations are related to specific use or harvest behavior. It is likely that those individuals with a cooperative orientation would respond positively to appeals for voluntary restraint in resource use, or to regulatory restrictions if necessary. This could be valuable and useful information for the agency faced with an overused resource.

Another useful finding of this study is that given a diminishing resource, individuals will respond by reducing their use level. However, individualistic subjects still use greater quantities of the resource than do cooperative persons.

This somewhat abstract study conducted in the laboratory can be extended conceptually to real-world examples. For example, this line of research and the findings of this study can be applied to the management of recreational fish and game stocks or the excessive impacts resulting from the overuse of fragile resources. It can also be applied to the intangible but consumable resource of solitude, an element of a wilderness experience, and a limiting factor in the use and overuse of a wilderness resource.

The goal of obtaining a voluntary reduction in resource use sufficient to avoid the need for restrictive structural solutions is perhaps utopian at best. At worst, however, any voluntary reductions in use will result in less severe imposed restrictions, if necessary.

Future Research

Results of this study suggest that continued research into the relationship between resource characteristics and harvest behavior in a commons dilemma is warranted. Using resource characteristics as defined in this study as a starting point, it is possible to develop a number of related research questions. For example, this study presented subjects with a resource pool that was decreasing in size over time. It would be valuable to conduct a parallel set of experi-

ments in which the resource pool was increasing or perhaps remained constant in size over time. Harvest behavior could then be compared and evaluated under differing resource conditions. Other questions relative to trend in pool size include perceived cause of the decline or increase. Was the decrease due to overharvesting by the subjects, poor resource management or natural disaster? Was the increase in pool size due to voluntary harvest restraint on the part of the subjects, good resource management or favorable environmental conditions? How might subjects modify their harvest behavior in response to different causes for changes in pool size?

Another line of inquiry might focus on the number of resources available to harvest from, the rates of increase or decrease in pool size for each resource and different values attached to each resource. What trade-offs might subjects make?

Motivational orientation and its relationship to harvest behavior can also be examined further. This study looked at cooperative and individualistic motivations. Not considered were individuals with competitive or altruistic predispositions. The more interesting of the latter would be subjects having a competitive motivational orientation, since they by definition seek to "beat" the other persons. They do not attempt to maximize own gain or to maximize collective gain.

It can be argued that individualistic subjects will eventually reduce their own requests, since to continue harvesting excessive amounts would eventually deplete the resource and limit their own total gain. Competitive subjects, on the other hand, would probably harvest less than individualistic subjects in the beginning when the resource pool is in acceptable condition. However, when the pool becomes depleted, competitive subjects will begin to harvest more than the individualistic subjects in order to "beat" them. Competitive subjects view the situation in relative and not absolute terms. This type of comparison would require use of a RRD design of extended duration, and public knowledge of others cumulative harvest.

The laboratory experiment has been the only method used in conducting research into the commons dilemma. It has allowed researchers to control and manipulate the elements of the study, but at the expense of external validity. To extend the results of this and other studies examining behavior in the commons dilemma, a series of studies having external validity will need to be conducted. Techniques appropriate for this purpose include random sample surveys (Rossi 1983), the factorial survey approach (Rossi and Nock 1982), surveys which incorporate scenarios or the policy capturing technique (Christal 1968a, 1968b; Goldberg 1968; Hobson and Gibson 1983; Holland 1985) and quasi-experimentation or field studies (Cook and Campbell 1979).

An effort could be directed, for example, at assessing the motivational orientation of recreational anglers. It is important to know if anglers differ in their predisposition to the catching or keeping of fish, and if so, what orientations are present and in what proportion. In the process of identifying subjects with cooperative or individualistic orientations, this study found that about 10 percent had a competitive orientation. In a population of fishermen, this proportion could be much higher. Evaluating angler motivational orientation would involve the same type of procedure used in this study, except it would be administered as part of a random survey. If it was found that a sizable proportion of the fishing population is competitively oriented, then greater emphasis should be placed on studying competitive persons and their harvest behavior using both experiments and surveys.

In summary, the results from this study demonstrate that further research into motivational orientation and resource characteristics is justified and needed. Other areas where further research use of the laboratory experiment would be appropriate have been suggested. The need to extend this body of literature to the natural setting has also been discussed, with several techniques for doing so suggested. The importance of being able to evaluate, understand and predict the harvest behavior of persons participating in a resource-dependent recreation activity should not be underestimated. The use of valuable resources could be better managed, and the needs of recreationists better served.

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LEVEL OF EXPERIENCE AND PERCEPTION OF CONFLICT AMONG CANOEISTS ON THE DELAWARE RIVER[1/]

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This paper examines conflict among Delaware River canoeists in terms of goal interference attributed to the behavior of others. While previous studies have focused on conflicts between different activities, canoeists in this study attributed interference to many different sources, only some of which were associated with the behavior of others. Relatively few differences were found in goal importance, interference, and reasons for interference between individuals with differing levels of experience when measured by a past participation index or a social-psychological index. However, results suggest that when both aspects of experience are considered simultaneously, a clearer picture emerges.

Introduction

Research focusing on conflict as a negative consequence of increasing recreational activity has evolved in recent years. Early studies examined recreation conflict as simply competition over resources (Devall and Harry 1981) or incompatibilities between groups or their desired goals (Noe, Wellman, and Buhyoff 1982; Bury, Holland, and McEwen 1983).

Most previous recreation conflict research investigated conflict between recreationists practicing different activities. Inter-activity conflict is generally thought to be related to the degree to which various groups lack a shared value system or perceive each other as being dissimilar or incompatible. Interactions between the following activity groups almost inevitably involved conflict: canoeists and motorboaters (Lucas 1964a and b; Lucas and Stankey 1974; Adelman, Heberlein, and Bonnicksen 1982); oar and motor powered raft trip participants (Nielsen and Shelby 1977; Shelby 1980); cross-country skiers and snowmobilers (Knopp and Tyger 1973; Raisch 1982; Jackson and Wong 1983); hikers, horseback riders, bicyclists, and trail bike/motorcycle riders (Stankey 1973; Lucas and Stankey 1974; McCay and Moeller 1976; Bowley 1979; Lucas 1985); water skiers and fishermen (Gramann and Burdge 1981); and even Outdoor Recreation Vehicle (ORV) users and bathers (Noe, Hull, and Wellman 1982; Noe, Wellman, and Buhyoff 1982).

Conflicts between different activities often take the form of an asymmetrical relationship between users differing in styles of use or methods of travel (e.g., motorized versus non-motorized). The most environmentally obtrusive activities, characterized by noise, speed, size, and dominance over a site, are typically disliked and resented by participants in less obtrusive activities (Devall and Harry 1981).

Implied in these studies is that people recreate with a purpose in mind, with expectations of achieving goals. Social interference theory is often used to explain how the number, behavior, and proximity of others can create behavioral crowding by interfering with the attainment of important goals. According to this theory, user dissatisfaction results when actual outcomes do not match desired goals. Conflict, a special case of dissatisfaction, is defined as goal interference due to the behavior of others (Jacob and Schreyer 1980).

When participants in different activities with incompatible goals interact, an obvious breeding ground for conflict is created. Jacob and Schreyer (1980) stress, however, that conflict does not necessarily imply or involve goal incompatability. People may have the same goal and still experience conflict over the means of attaining that goal. Conflict thus involves a complex evaluation of social contacts in various situations. It may occur between participants in different activities or among individuals participating in the same activity.

Previous research suggests that level of experience may be an important means of segmenting user populations to more clearly understand the nature of user conflict. For example, previous studies have shown that goals differ in importance among users of varying levels of experience within a given activity (Heberlein and Vaske 1977; Schreyer and Roggenbuck 1978; Ditton, Fedler, and Graefe 1982). The extent of perceived conflict is dependent upon the importance of the goal being obstructed.

Level of experience could also influence perceptions of interference with desired goal(s). Able to reflect and draw from a greater number of past experiences, veteran users are more familiar with resource conditions and thus are able to formulate more specific expectations and goals for an activity (Schreyer 1982). Because their goals are narrower, highly experienced users are more sensitive and perceptive toward given levels of disturbance which could hamper the achievement of these goals (Hammitt and McDonald 1983).

This heightened awareness could lead highly experienced individuals to be more sensitive not only to interferences or conflict due to the

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behavior of others in incompatible activities, but also to sources of conflict within their own activity. Less experienced recreationists, on the other hand, may be more likely to notice only between-activity sources of conflict or to attribute goal interference to reasons unrelated to the behavior of other visitors.

This study investigates the relationship between level of experience and perceptions of conflict among canoeists on the Delaware River. Level of experience, represented by two different indices (one measuring past participation and the other measuring social-psychological perceptions which result from participation), is studied as it relates to Delaware River canoeists' perceptions of the importance of certain goals, interference with those goals, and reasons for goal interference. Such knowledge could alert management to the potential for and underlying causes of conflict.

Methods

Data for this study were collected during the summer of 1986 through on-site exit interviews including both closed-ended written items and open-ended tape recorded questions. A sampling schedule was devised to achieve a representative sample of canoeists aged 14 years and older using the Upper Delaware Scenic and Recreational River and the Delaware Water Gap National Recreation Area. Of the 157 canoeists who were sampled, 90 percent (142) provided usable data for this study.

Canoeists rated the importance of 10 trip goals on 5-point scales ranging from 1 (of no importance) to 5 (of utmost importance). The 10 goals, based on Driver's (1977) 46 Recreation Experience Preference Scales, included: being close to nature, developing skills, thinking about personal values, having thrills and excitement, getting away from other people, getting away from the usual demands of life, being with family and/or friends, getting physical exercise, learning more about things here, and getting social recognition. Several phrases were provided to characterize each goal, but the canoeist recorded only one rating for each goal. Canoeists were also able to write in additional goals using an "other" category.

Canoeists then reported the degree to which they had achieved each goal which was of at least some importance (a rating of 2 or higher as determined in the previous step). Canoeists rated each eligible goal on a 5-point scale ranging from 1 (no interference) to 5 (total interference).

For each goal that had been assigned at least some interference (a 2 or higher), the canoeist was asked to describe the reason(s) for the reported interference. This section utilized open-ended questions, the responses to which were tape recorded.

The final section of the interview contained a series of written questions designed to create two indices measuring canoeist's level of experience. The participation index included four questions, which measured the number of years and frequency of participation in canoeing overall and on the Delaware River, and an additional question identifying the number of related activities the canoeist had participated in at least once over the past year. The social-psychological index was composed of nine questions: two measuring perceived skill level, two dealing with attachment to the resource, three measuring the relative importance of canoeing compared to other aspects of life, and two measuring the influence of canoeing on choice of residency and occupation.

Cronbach's alpha was used to test for inter-item reliability for the two indices (Table 1). One variable (number of related activities) was deleted from the participation index because it correlated weakly with the other participation items. With this adjustment, an overall alpha coefficient of .82 was computed for the participation index, and the social-psychological index yielded an alpha of .73.

Two levels of canoeing experience were defined for each item included in the indices, categorizing canoeists into approximately equal halves. Criteria levels for "low experience" for items included in the participation index were defined as follows: having canoed 1 to 4 years on any resource and/or 1 to 2 years on the Delaware River and having canoed an average of 0 to 2 times per year on any resource and/or 0 to 1 time per year on the Delaware River. For the social-psychological index, "low experience" was defined as being a novice or advanced novice; feeling in control of the canoe none or some of the time; having no or some attachment toward the Delaware River; wanting no or some say in how the river is managed; rating canoeing as being less important than one's job, other recreational activities, and/or family responsibilities; and responding that canoeing has had no influence on one's choice of occupation and/or residence. "High experience" was defined as anything above these criteria levels for each item.

When the assigned scores for each item (1=low, 2=high) were totaled, participation index scores ranged from 4 to 8 and social-psychological index scores ranged from 9 to 18. Two levels of approximately equal numbers of canoeists were formed, with scores ranging from 4 to 5 and 6 to 8 defining the low and high participation index categories, respectively, and 9 to 12 and 13 to 18 representing the low and high social-psychological index categories, respectively. Because of the relatively small sample size, a significance level of .10 was selected for all statistical comparisons.

Results

Goal Importance

As a whole, the canoeists of this study rated being with family and/or friends (mean = 4.1) slightly higher than they rated being close to nature (4.0) and getting away from the usual demands of life (3.9) as the most important goals of their trips (Table 2). Social recognition, on the other hand, received a mean score of only 1.4, almost a full point below any other goal in importance. Although the latter finding is consistent with many studies, the importance of social interaction as the

Table 1 Summary Statistics for Items Included in the Experience Indices

Variable	$\bar{x}$	sd	Item-Total Corr.	Alpha if Item Deleted
PARTICIPATION INDEX (alpha = .82):				
Overall years	8.0	9.2	.61	.67
Delaware years	4.4	5.5	.47	.73
Overall days	6.3	14.0	.74	.62
Delaware days	3.9	12.4	.79	.57
Number of related activities	3.4	1.9	.	.80
SOCIAL-PSYCHOLOGICAL INDEX (alpha = .73):				
Perceived skill[a]	2.7	1.2	.57	.65
Control over boat[b]	2.9	0.7	.53	.67
Attachment to resource[c]	2.8	1.1	.61	.64
Input to management	2.4	1.0	.43	.69
Canoeing vs. job[d]	1.4	0.7	.25	.71
Canoeing vs. activities	1.8	0.6	.35	.67
Canoeing vs. family	1.2	0.5	.29	.70
Influence on occupation[e]	1.1	0.4	.34	.70
Influence on residence	1.2	0.3	.25	.71

[a] Variable coded on a 5-point scale ranging from "novice" (1) to "expert" (5).

[b] Variable coded on a 4-point scale ranging from being in control "none of the time" (1) to "all of the time" (4).

[c] Two variables coded on 4-point scales ranging from "no" (1) to "a great deal of" attachment/say in management (5).

[d] Three variables coded as canoeing is "less important" (1), "about equal" (2), and "more important" (3) than job/other recreational activities/family responsibilities.

[e] Two variables coded as "no" (1) and "yes" (2) in response to whether canoeing has had as influence on choice of occupation and residence.

Table 2 Summary Statistics and Frequency Distribution of Goal Importance Scores for All Canoeists

			of no importance → of utmost importance frequency (percent)				
Goal	$\bar{x}$	sd	1	2	3	4	5
Family	4.1	1.0	3 (2)	12 (9)	14 (10)	53 (37)	59 (42)
Nature	4.0	0.9	3 (2)	4 (3)	23 (16)	67 (47)	45 (32)
Escape Demands	3.9	1.2	8 (6)	12 (9)	20 (14)	47 (33)	55 (39)
Thrills	3.5	1.2	11 (8)	17 (12)	33 (23)	45 (32)	36 (25)
Escape People	3.1	1.4	25 (18)	27 (19)	28 (20)	32 (23)	30 (21)
Exercise	3.1	1.1	12 (9)	36 (25)	39 (28)	41 (29)	14 (10)
Values	2.7	1.2	26 (18)	42 (30)	39 (28)	23 (16)	11 (8)
Learn	2.6	1.1	23 (16)	44 (31)	44 (31)	24 (17)	7 (5)
Skills	2.3	1.3	46 (32)	41 (29)	26 (18)	18 (13)	11 (8)
Recognition	1.4	0.8	108 (76)	21 (15)	8 (6)	3 (2)	2 (1)

number one goal is more unusual. Another unexpected finding concerned the goal which was second lowest in importance: skill development. With one-third of all canoeists rating skills as having no importance, this goal received a mean score of just 2.3.

Goal Interference

As a general rule, Delaware River canoeists did not experience much interference in achieving their goals. On a 5-point scale ranging from "no interference" (1) to "total interference" (5), the mean scores ranged from 1.2 to 1.9 (Table 3). The goal that had been rated highest in importance, to be with family and/or friends, was rated lowest in interference. To get away from other people, on the other hand, received the highest interference score but was only fifth in importance.

For every goal, more than half of all canoeists either had no interference or did not rate the goal for interference since it was not important to their trips (i.e., they were not looking to achieve that goal). Those who did report some goal interference tended to report relatively low levels of interference.

Table 3 Summary Statistics and Frequency Distribution of Goal Interference Scores for All Canoeists

Goal	$\bar{x}$	sd	no interference → total interference frequency (percent) 1	2	3	4	5	missing[a]
Family	1.2	0.5	115 (81)	21 (15)		2 (1)		4 (3)
Nature	1.5	0.8	87 (61)	39 (28)	4 (3)	6 (4)	1 (1)	5 (4)
Escape Demands	1.2	0.6	89 (63)	34 (24)	8 (6)			11 (8)
Thrills	1.7	1.0	71 (50)	38 (23)	11 (8)	6 (4)	3 (2)	13 (9)
Escape People	1.9	1.0	54 (38)	33 (23)	22 (16)	7 (5)	2 (1)	24 (17)
Exercise	1.3	0.6	100 (70)	19 (13)	6 (4)	2 (1)		15 (11)
Values	1.7	0.9	61 (43)	32 (23)	17 (12)	2 (1)	1 (1)	29 (20)
Learn	1.5	0.7	70 (49)	32 (23)	11 (8)	2 (1)		27 (19)
Skills	1.4	0.6	60 (42)	29 (20)	5 (4)	1 (1)		47 (33)
Recognition	1.3	0.6	25 (18)	8 (6)		1 (1)		108 (76)

[a] Missing category includes missing answers plus scores of 0 (those who rated the goal as not important to their trip, and were thus not looking to achieve the goal).

Table 4 Summary Table: Reasons for Interference with Each Goal

Goal	Number of Reasons for Interference (percent of respondents)[a] Non-conflict: Non-human	Self-created	Conflict: Intra-activity: Inter-group	Intra-group	Inter-activity	Non-specific	Total
Family (n=20)	4 (20)		1 (5)	13 (65)		3 (15)	21 (105)
Nature (n=46)	20 (44)	1 (2)	7 (16)	5 (11)	5 (11)	17 (38)	55 (122)
Escape Demands (n=36)	11 (32)	4 (11)	4 (11)	16 (46)	1 (3)	3 (9)	39 (112)
Thrills (n=53)	39 (74)	3 (6)	5 (10)	6 (12)	2 (4)		55 (106)
Escape People (n=59)	4 (7)	1 (2)	16 (27)	12 (21)	2 (3)	27 (47)	62 (107)
Exercise (n=25)	15 (60)	5 (20)		5 (20)			25 (100)
Values (n=47)	11 (23)	5 (20)	2 (4)	24 (50)	1 (2)	7 (14)	50 (103)
Learn (n=40)	21 (56)	9 (23)	3 (8)	10 (26)			43 (113)
Skills (n=32)	15 (47)	8 (25)	2 (6)	10 (31)		1 (3)	36 (112)
Recognition (n=7)	2 (29)			3 (42)		2 (29)	7 (100)
Total (n=365)	142 (39)	36 (10)	40 (11)	104 (28)	11 (3)	60 (16)	393 (107)

[a] Totals may be more than 100 percent due to multiple answers.

Reasons for Interference

Respondents offered a wide variety of reasons for interference with their various goals. Nearly one-half of the reasons had nothing to do with others encountered on the river and could thus be classified as non-conflict (Table 4). More than one-third (39 percent) of all reasons given for goal interference involved non-human factors related to the canoeing situation (e.g., characteristics of the river, the weather). Another 10 percent of the respondents actually attributed the cause of goal interference to themselves.

The other half of the reasons given did indicate various types of conflict among river users. One-third (39 percent) of the reasons centered on other canoeists. Within this intra-activity conflict, nearly three-fourths of the reasons involved conflicts from the respondents' own canoeing parties and the remaining one-fourth (40 reasons) involved conflicts caused by other groups of canoeists. Only 3 percent of the canoeists identified visitors practicing activities other than canoeing as the cause of the interference. Finally, although the last 16 percent of all responses did attribute goal interference to others on the river, no specific type of activity was mentioned. Instead, people in general were the target of blame.

The relative importance of these reasons for goal interference varied for different goals of the experience. Non-human factors were cited most often as the reason for interference with five goals: to

be close to nature, to have thrills and excitement, to get physical exercise, to learn more about things here, and to develop skills. Intra-activity conflict was the reason cited most often for interfering with being with family and/or friends, getting away from the usual demands of life, thinking about personal values, and getting social recognition. Unexpectedly, intra-group conflict occurred more often than inter-group conflict for all but two goals (being close to nature and getting away from other people). The presence or behavior of other visitors in general interfered most often with getting away from other people. Self-created interference tended to be cited more frequently for the goals of getting physical exercise, learning more about things here, and developing skills.

Level of Experience

Goal importance. Surprisingly, using independent t-tests, no significant differences were found between mean goal importance scores of canoeists in the low and high participation index categories. However, when canoeists were categorized using the social-psychological index, canoeists differed on mean importance scores for four goals (having thrills and excitement, learning more about things here, thinking about personal values, and developing skills). In all cases, canoeists with high social-psychological index scores rated the goal significantly higher than those with low scores (Table 5).

Table 5 Means and T-test Results of Goal Importance Scores by Experience Level

	Participation Index			Social-psychological Index		
Goal	Low (n=68) $\bar{x}$	High (n=74) $\bar{x}$	t	Low (n=68) $\bar{x}$	High (n=74) $\bar{x}$	t
Family	4.1	4.1	0.38	4.2	4.0	1.21
Nature	3.9	4.1	-1.39	3.9	4.1	-1.40
Escape Demands	3.9	3.9	0.18	3.9	3.9	0.32
Thrills	3.7	3.4	1.63	3.4	3.7	-1.87*
Escape People	3.2	3.0	0.82	3.1	3.1	0.34
Exercise	3.1	3.0	0.55	3.0	3.1	-0.34
Values	2.7	2.6	0.32	2.4	2.9	-2.60***
Learn	2.7	2.6	0.75	2.5	2.8	-1.89*
Skills	2.4	2.3	0.07	2.0	2.7	-3.25***
Recog-nition	1.5	1.3	1.07	1.3	1.5	-1.24

* $p \leq .10$
** $p \leq .05$
*** $p \leq .01$

Goal interference. Two slight significant differences were found using independent t-tests to compare mean interference scores of canoeists based on level of participation (Table 6). Canoeists with high participation index scores had slightly higher mean interference scores for getting away from the demands of life ($t = -1.78$, $p \leq .10$) and getting away from other people ($t = -1.83$, $p \leq .10$).

Table 6 Means and T-test Results of Goal Interference Scores by Experience Level

	Participation Index			Social-psychological Index		
Goal	Low $\bar{x}$	High $\bar{x}$	t	Low $\bar{x}$	High $\bar{x}$	t
Family	1.2	1.2	-0.31	1.2	1.2	0.00
Nature	1.4	1.6	-0.90	1.6	1.4	1.84*
Escape Demands	1.3	1.5	-1.78*	1.4	1.4	0.56
Thrills	1.7	1.7	0.42	1.8	1.6	0.67
Escape People	1.7	2.1	-1.83*	2.1	1.8	1.59
Exercise	1.3	1.2	0.82	1.4	1.2	1.53
Values	1.7	1.6	0.80	1.7	1.6	0.66
Learn	1.5	1.5	-0.08	1.7	1.4	1.97**
Skills	1.5	1.4	0.21	1.5	1.4	0.57
Recog-nition	1.3	1.4	-0.27	1.4	1.3	0.72

* $p \leq .10$
** $p \leq .05$
*** $p \leq .01$

Two significant differences in mean interference scores were also detected between canoeists in low and high social-psychological index categories. In this case, however, canoeists with lower, not higher, social-psychological index scores had greater interference with being close to nature ($t = 1.84$, $p \leq .10$) and learning more about things here ($t = 1.97$, $p \leq .05$).

Reasons for interference. When level of experience was measured with the social-psychological index, canoeists of both levels of experience tended to give similar reasons for interference with their goals. There were two slight variations: for being close to nature, canoeists with low social-psychological index scores listed non-specific conflict most often and those with high index scores blamed non-human factors most often; and for getting social recognition, less experienced canoeists were equally divided between non-human and intra-group reasons for interference, while those with more experience listed intra-group and non-specific conflict equally often.

More variation in reasons given for interference with each goal was detected by classifying canoeists according to participation index score. Canoeists with high levels of experience differed from those with low levels of experience for five goals. While less experienced canoeists were equally divided between non-human factors and intra-group conflict for interfering with being with family and/or friends, a majority of those with high levels of experience listed intra-group conflict. As detected by the social-psychological index, canoeists with low participation index scores tended to blame others in general for interfering with being close to nature, while highly experienced canoeists most frequently attributed this interference to non-human factors. For getting away from the usual demands of life, canoeists with low participation index scores listed intra-group conflict most frequently, but highly experienced paddlers again blamed non-human factors. The exact opposite occurred for learning more about things here, where canoeists with the least experience tended to blame non-human factors most frequently, but highly experienced canoeists blamed intra-group conflict most often. Finally, for getting social recognition, canoeists with low experience tended to list non-human factors most frequently, but highly experienced canoeists either named intra-group or non-specific conflict as their reason for interference.

Combining the experience indices. Interestingly, although a few differences between canoeists with low and high levels of experience were detected using the two experience indices, the results rarely overlapped. Only the social-psychological index was able to uncover differences in goal importance scores. When comparing goal interference scores, each index uncovered two differences, but on two different pairs of goals. Thus, as a final step in the data analysis, the two experience indices were considered simultaneously. Perhaps canoeists existed who were low on one index but high on the other, which might better explain why these two indices were sensitive to different aspects of the canoeing experience. As shown in Table 7, two-thirds of the canoeists fell into the same level of experience on both indices. The other third, however, was evenly split between Low participation/High social-psychological and High participation/Low social-psychological index scores.

Table 7 Cross-tabulation of Experience Indices

		Social-psychological: Low	Social-psychological: High	
Participation	Low	44 (31%)	24 (17%)	68 (48%)
	High	24 (17%)	50 (35%)	74 (52%)
		68 (48%)	74 (52%)	142

When comparing these four cross-tabulated categories, it would seem probable that the Low/Low category and the High/High category would differ most from each other. However, when comparing goal importance scores for these two groups, only one significant difference was detected (Table 8). Canoeists who were high on both indices tended to rate the importance of developing skills higher than canoeists who were low on both indices. Surprisingly, canoeists in the Low participation/High social-psychological group (i.e., those who were strongly committed to canoeing but either were new to the activity or were unable to canoe as often as desired because of some perceived barrier to participation) differed significantly from all other groups on two goals (having thrills and excitement and getting social recognition). This Low/High group also differed from all groups except the High/High category on three additional goals: thinking about personal values, learning more about things here, and developing skills. In all cases, canoeists in this Low/High category rated the goal significantly higher than the other canoeists. On the other hand, canoeists in the Low/High group rated the importance of being with family and/or friends significantly lower than canoeists in the Low/Low category.

Table 8 Means and T-Test Results of Goal Importance Scores by Cross-tabulated Participation and Social-psychological Indices

	Participation/Social-psychological Indices			
Goal	Low/Low	Low/High	High/Low	High/High
Family	4.3[a]	3.8[b]	4.0[ab]	4.1[ab]
Nature	3.9	4.0	4.0	4.2
Escape Demands	4.0	3.9	3.9	3.9
Thrills	3.5[a]	4.2[b]	3.1[a]	3.5[a]
Escape People	3.1	3.4	3.2	2.9
Exercise	3.1	3.1	2.9	3.1
Values	2.4[a]	3.2[b]	2.4[a]	2.7[ab]
Learn	2.5[a]	3.0[b]	2.3[a]	2.7[ab]
Skills	2.1[a]	2.8[b]	1.8[a]	2.6[b]
Recognition	1.3[a]	1.7[b]	1.3[a]	1.3[a]

Means with different superscripts are significantly different at the .10 level.

Thus, even when the two groups which had a high social-psychological component (i.e., Low/High and High/High) were compared, two significant differences still emerged. This finding reinforces

the notion that the presence of high social-psychological experience alone is not sufficient; it is important to look at a combination of the two indices in order to make finer discriminations among the importance of various trip goals.

On the other hand, when comparing goal interference scores among the cross-tabulated groups, canoeists in the Low participation/High social-psychological category had significantly lower goal interference scores than at least one other group for four goals (being close to nature, getting away from the usual demands of life, getting away from other people, and learning more about things here; Table 9). In all cases, canoeists in the High participation/Low social-psychological category (i.e., those who were not particularly interested in the activity of canoeing but participated in it frequently, perhaps as a means of escape or to be with friends) had the highest levels of interference. Again, a more revealing picture of differences among canoeists' goal interference scores emerged when the two experience indices were combined. For instance, when the social-psychological index was considered alone, no difference was uncovered for the goal, getting away from other people. However, when comparing canoeists in the Low participation/High social-psychological and Low participation/Low social-psychological categories, those in the former category still reported significantly greater interference with getting away from other people than canoeists in the Low/Low category.

Table 9 Means and T-test Results of Goal Interference Scores by Cross-tabulated Participation and Social-psychological Indices

Goal	Participation/Social-psychological Indices			
	Low/Low	Low/High	High/Low	High/High
Family	1.2	1.1	1.1	1.3
Nature	1.5[ab]	1.3[a]	1.9[b]	1.4[a]
Escape Demands	1.3[ab]	1.2[a]	1.6[b]	1.4[b]
Thrills	1.7	1.8	1.9	1.6
Escape People	1.9[a]	1.5[b]	2.4[a]	1.9[a]
Exercise	1.4	1.2	1.3	1.2
Values	1.8	1.7	1.7	1.6
Learn	1.6[a]	1.3[b]	1.7[a]	1.4[ab]
Skills	1.5	1.4	1.4	1.4
Recognition	1.4	1.2	1.4	1.3

Means with different superscripts are significantly different at the .10 level.

When examining categories cited most frequently as reasons for goal interference, many more differences among groups emerged when canoeists were categorized based on a combination of the two experience indices than when either the participation or the social-psychological index was used alone. Regardless of experience, all canoeists listed the same reason for interference for only one goal: non-human factors were blamed most often for interfering with having thrills and excitement. By using the different experience level combinations, self-created interferences and inter-group conflict also emerged for certain canoeists as the reason cited most frequently for interference with some goals. For instance, canoeists in the High/High category blamed themselves most often for interfering with learning more about things here. Inter-group conflict was cited most frequently by canoeists in the Low/High and High/Low categories for interfering with getting away from other people and getting away from the usual demands of life, respectively.

Conclusions and Implications

Goal Importance

Surprisingly, there were not as many differences among goal importance scores as usually found in most studies of varying levels of experience. In fact, when experience was measured by traditional levels of past participation, no significant differences were uncovered. Consequently, at first glance Delaware River users seem to be a more homogeneous group than users of other areas. These findings suggest that Delaware River canoeists as a whole are not as interested in the activity of canoeing or the feelings of personal competence derived from canoeing as they are in the recreational "by-products" or secondary benefits of the activity: socializing or temporary escape in a natural environment.

However, when social-psychological factors are used, visitors who are more committed to and value the activity of canoeing on the Delaware River differed significantly from those who are less psychologically committed to canoeing. These canoeists value learning more about the resource, experiencing thrills and excitement, and improving themselves in both paddling skills and spiritual values significantly higher than less committed paddlers.

Goal Interference

Generally, Delaware River canoeists perceived fairly low levels of interference with their goals. Moreover, these levels varied only slightly from goal to goal. Perhaps this reflects that the Delaware River population has evolved over time to presently include generally satisfied visitors. Any highly dissatisfied canoeists may have already been displaced to other rivers or may have compensated in other ways, e.g., they now canoe during the week to avoid the weekend crowds. Perhaps those who are new to this type of activity and environment accept the conditions of this experience as what is and should be "normal".

Again, deviating from what was expected, there was little relationship between level of experience and goal interference scores. Interference with the two escape goals, getting away from other people and getting away from the usual demands of life, was slightly higher for canoeists with high participation index scores. This finding suggests that canoeists with higher levels of participation probably had more specific expectations concerning the number and/or frequency of social interactions during their trips, as well as more specific expectations of how they envisioned they would escape life's usual demands. These expectations consequently led to higher levels of interference with these goals.

On the other hand, although canoeists who were low on social-psychological factors placed significantly less importance on learning more about things here, they reported significantly greater levels of interference with this goal. These paddlers also experienced more interference with being close to nature. Perhaps they were experimenting with canoeing as a means of learning more about the Delaware River area and being close to nature, but were disappointed because their experiences did not match up to their preconceived images of "exploring an untamed wilderness."

Reasons for Interference

By responding to open-ended questions to describe their reasons for interference, respondents provided many unique and unusual insights into recreation, goal interference, and conflict. An important finding of this study is an expanded view of goal interference to include both conflict and non-conflict reasons. For instance, uncontrollable conditions of nature tended to be blamed just as often, if not more, than human factors for interference with getting physical exercise, having thrills and excitement, and developing skills. These findings reflect both a general disappointment with the calmness of the Delaware River, as well as a general belief that canoeing is not a very strenuous activity.

Conflict occurred within canoeing as well as between different activities on the river. Unlike most studies, intra-activity conflict occurred more often than inter-activity conflict for every goal but two (being close to nature and escaping other people). Interestingly, within canoeing, intra-group conflict occurred more often than inter-group conflict for all but these same two goals. These findings throw a new light on the character of recreation conflict. Many studies conclude that people want to escape from others and crowds, but want to do so in a personally defined, small group. Results of this study imply that the members of these small groups can potentially be even more responsible for goal interference or dissatisfaction than outsiders. Some canoeists even took the blame for creating some of their own interferences, a unique finding which has also been overlooked by many studies.

As noted above, the social-psychological index tended to discriminate slightly better among users (particularly when comparing goal importance scores) than the more traditional participation index. However, canoeists of varying levels of the social-psychological index differed only slightly in whom or what was blamed for interfering with each of the various goals. More differences emerged when canoeists' reasons were compared based on their participation index scores.

For being close to nature, canoeists with high participation or high social-psychological index scores generally blamed non-human factors most often for their interferences, while canoeists with low scores listed non-specific conflict most frequently. Bryan's (1979) theory of specialization might best explain this finding. On the lower end of the specialization continuum, participants are expected to be more concerned with and focused on the activity itself, causing less experienced canoeists (in this case) to notice other river recreators as interfering with their limited perception of nature: the river itself. As canoeists become more experienced, however, their attitudes and values about the sport supposedly change, shifting in focus from the sport to emphasize the natural setting. Man-made structures would therefore be more of an intrusion to these canoeists, whose widened perceptions of the natural setting include the surrounding environment as well as the river itself.

For learning more about things here, canoeists with high participation index scores cited intra-group conflict most often as the cause of goal interference while those with less experience tended to blame non-human factors. This result does support the hypothesized sensitivity of highly experienced canoeists to interferences due to other canoeists.

Experience Indices: Which One is Best?

Although experience level is not as discriminating as expected when measured by a participation index or by a social-psychological index, interesting results occur when the two indices are combined together. Certain goals take on greater importance to those with Low participation/High social-psychological scores, but goal interference tends to be higher for certain goals for those in the High participation/ Low social-psychological category. For a more revealing picture of a recreator's experience, researchers and managers alike should consider all aspects of level of experience.

Management Implications

These findings suggest some implications for the management of the river. For instance, managers could work with the canoe liveries in designing and recommending different trip routes to satisfy both the active, committed, interested canoeists and the casual recreators (who happen to be canoeing to escape for a while). Dissemination of information could also be vital in shaping canoeists' expectations to decrease goal interference. For instance, if the source of disappointment in the Delaware River's rapids is due to misleading information on the character of the river, information could increase satisfaction by not fostering unrealistic expectations of river conditions.

Managers should also be aware of all sources of goal interference. Landscape screening could help create a more "wilderness-type" setting by reducing traffic noise and hiding evidence of roads, powerlines, buildings, and railroad beds. To alleviate the small levels of inter-activity conflict, trip routes could be designed to minimize canoeists' contact with tubers, rafters, jetboaters, waterskiers, and fishermen.

The presence of intra-activity conflict suggests at least two implications for management. First, canoeists wishing to see lower numbers of other groups of canoes could be directed to less populated areas or informed of low use times. Secondly, the fact that many canoeists experienced conflict with the people in their very own group implies that recreators may need to choose with whom they recreate more carefully. Leisure education and counseling could help people make choices of activities, places, and co-recreators more satisfying. Since leisure counseling would not likely be a function of river managers, other professionals and recreators themselves need to be aware of the potential for self-created interferences as well as intra-activity conflict.

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The proceedings contains 23 papers covering the following topics: recreation priorities in the Northeast, outdoor recreation and recreation management, socio-economic aspects of recreation, travel and tourism, and the psychological aspects of leisure.