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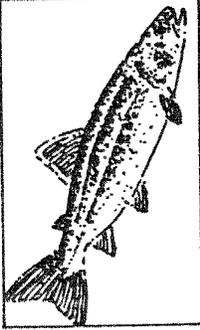
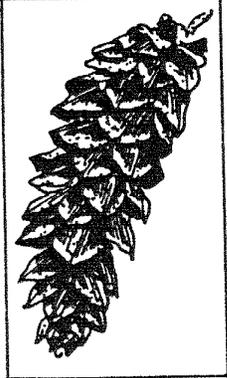
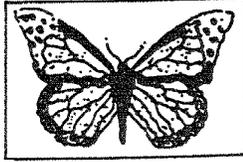
Northeastern Forest
Experiment Station

General Technical
Report NE-185



PROCEEDINGS of the 1993 NORTHEASTERN RECREATION RESEARCH SYMPOSIUM

April 18-20, 1993
Saratoga Springs, New York

Environmental Awareness
 HUNTING
 CAMPING sailing
 fishing  HIKING
 BOATING
 Wildlife Management  Picnicking
 MODELING
 bicycling
 FORESTS
 observing Nature  FORESTS
 Historic Places lakes  NATIONAL PARKS
 ECONOMICS
 Travel
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NORTHEASTERN RECREATION RESEARCH MEETING POLICY STATEMENT

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

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PROCEEDINGS of the 1993 NORTHEASTERN RECREATION RESEARCH SYMPOSIUM

April 18-20, 1993

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

Compiled and Edited by:

Gail A. Vander Stoep
Michigan State University
Park and Recreation Resources Department

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MANAGEMENT ROUNDTABLE SESSION

The Role of Social Science Research: A) Should recreation researchers adopt a more explicit role of advocacy? B) Pandering to the public: do visitor surveys undermine recreation management? Tom More, USDA Forest Service.

GREENWAYS

Scenic Roads: Access to an Educational Opportunity. Steven Brower, Burlington, IA.

Seaway Trail: A Scenic Byway Teresa Mitchell, Seaway Trail, Inc.

LANDSCAPE / VISUAL PERCEPTIONS

Landscape Perceptions: Understanding Viewer Needs and Desires. Steven Brower, Burlington, IA.

OUTDOOR RECREATION MANAGEMENT AND PLANNING

Testing an Evolutionary Model of Recreation Partnerships. Steve Selin, West Virginia University; Debbie Chavez, USDA Forest Service.

SOCIAL PSYCHOLOGY

Boating Identity and Behavioral Change: Self-referent Behavior or Discursive Outcome? Walter Kuentzel, University of Vermont.

Recreational Fishermen and Their Preferred Fish Species: An Exploratory Analysis of Angler Characteristics. David Loomis and Robert Muth, University of Massachusetts.

The Conscious Experience of Recreation. Tom More, USDA Forest Service; James Averill, University of Massachusetts.

ECONOMIC DEVELOPMENT ASPECTS OF TRAVEL AND TOURISM

Whitewater Rafting as a Tool for Economic Development. Sharon Hurt, West Virginia University.

*OUTDOOR RECREATION
PLANNING AND MANAGEMENT*

FOSTERING ENVIRONMENTAL STEWARDSHIP OF THE NEW YORK STATE PARK SYSTEM

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During the decade of the 1980s, state and national park administrations in the United States have become increasingly aware of problems and threats to the natural and cultural resources of their respective park systems. This paper summarizes key findings and recommendations of the most recent study of these concerns that pertain to the management and protection of state parks and historic sites in New York State.

Background and Statement of the Problem

The mission of the NYS Office of Parks, Recreation and Historic Preservation (OPRHP) is to provide safe and enjoyable recreational and interpretive opportunities for all New York State residents and visitors, and to be responsible stewards of the valuable natural, historic and cultural resources of the New York State Park System. One of the guiding principles fundamental to the successful achievement of this mission is a commitment to preservation. Indeed, New York's 150 state parks and 34 historic sites are recognized as unique and irreplaceable public assets.

The early and great development of interest in parks throughout the state in the early part of the 20th Century has been attributed to the inadequacy of city parks, the increased interest in conservation and recreation generally, the enormous increase in use of the automobile, and at least in part, to the remarkable success of the Palisades Interstate Park System.

While the State of New York remains today one of the foremost states of the U.S. in the number and character of its state park developments, the initial assumption of most of these activities did not come about as the result of any actual plan or policy. Prior to 1924, the year of the establishment of the NYS Council of Parks, over 40 parks and places of scenic and historic interest had been established, partly upon the initiative of the state, but largely on account of private initiatives and gifts supplemented by state aid.

Since the acquisition of the Niagara State Reservation in 1885, and the establishment of the New York State Forest Preserve in the Adirondack and Catskill Mountains that same year, New York State manages the oldest, and one of the largest and most diverse state park systems in the United States.

Due, in part, to the nature of this early history, the New York State Park System has evolved to include units known by, or classified by varying names. These include parks, preserves, scenic areas, reservations, historic sites, refuges and memorials. To simplify, they are generally referred in this paper as "parks", or components of a comprehensive system of state parks.

In recent years, OPRHP has become increasingly concerned about the condition of the park and recreation estate under its administrative jurisdiction. Much like state and national parklands throughout the United States, it is a park system that is experiencing a deterioration of its natural and cultural

resource base as well as the recreational infrastructure that supports public use.

In order to address concerns of resource degradation, OPRHP initiated a systematic study of the problem in response to Governor Mario Cuomo's directive for a ten-year stewardship action plan that would do more today to assure proper preservation and maintenance of our State Park System (Cuomo 1990).

The study was also undertaken as part of the process for periodically updating the New York Statewide Comprehensive Outdoor Recreation Plan (SCORP) required under statutory provisions of the Land and Water Conservation Act of 1965 (PL 88-578, as amended).

The two major purposes of this study -- "Fostering Environmental Stewardship: A First Report on Managing and Protecting the Natural and Cultural Resources of the New York State Park System" (OPRHP 1993) -- were: (1) to provide a preliminary evaluation of the condition of the state parks; and, (2) to provide management with a comprehensive set of recommendations and action strategies for advancing stewardship ideals.

It was further intended that the study establish a framework for additional dialogue and appropriate follow-up action on a regional and park-specific basis.

The study defines environmental stewardship as those policies, programs and resource management functions which serve to inventory, assess, protect or enhance the natural, cultural, scenic and recreational resources of New York's system of state parks and historic sites.

Implicit to this definition is the recognition of outdoor recreation as a beneficiary of clean water, clean air, pleasing landscapes and healthy ecosystems; that the state parks themselves are perceived as benchmarks and standards for environmental quality.

Importance and Uniqueness of Park Resources

The New York State park and recreation estate encompasses nearly 260 thousand acres of land and water resources generally characterized as "natural" open space (Figure 1, next page). This variously includes upland forest, mountain, riverine, marine and coastal environments which allow for hiking, camping, fishing, picnicking, golfing, and a broad spectrum of other active and passive recreational opportunities to a large and growing number of visitors each year (Figure 2, next page).

The New York State Park System has traditionally served the general welfare of people for purposes of health and recreation as well as other benefits generally associated with the enjoyment of scenery, nature, history and outdoor education. There are, however, a number of other related and important benefits of public parklands. Over 160 lakes and ponds, and about ten thousand acres of freshwater and tidal wetlands, for example, add to the diversity of ecosystems of state parks. These provide a range of ecological and recreational benefits, including boating, swimming and maintaining habitat for fish and wildlife.

In addition, the New York Natural Heritage Survey has documented some 400 locations within or near state park boundaries that contain rare plant and animal species, or exemplary natural communities. These constitute an important, though poorly recognized part of the biodiversity of eastern North America.

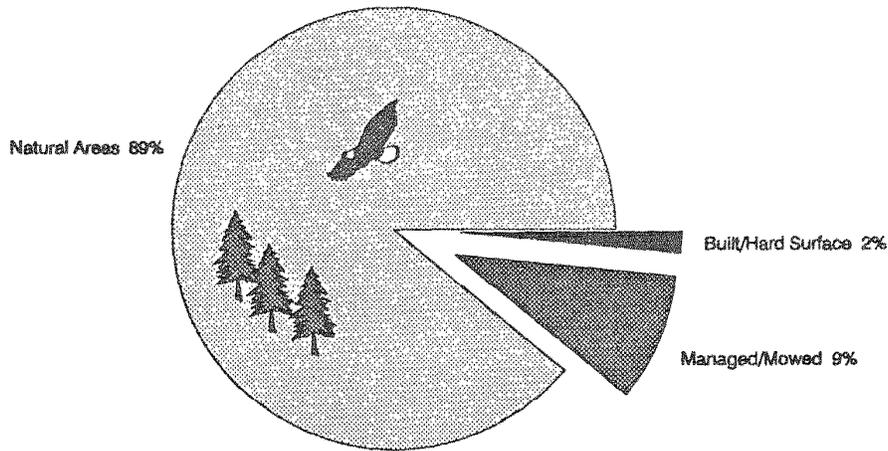


Figure 1. Most state park lands remain as open space resources.

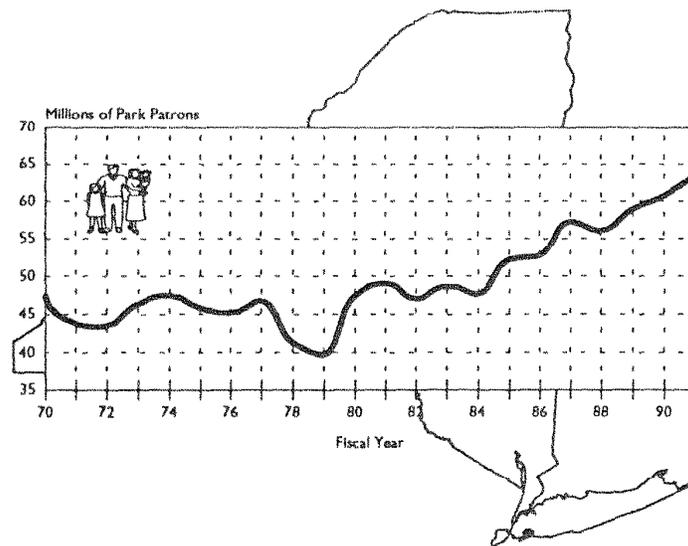


Figure 2. Annual attendance at state parks & historic sites (1970 -1991).

Similarly, the New York State Geological Survey has identified 67 unique geologic features associated with Niagara Falls, Chimney Bluffs, Minnewaska and a number of other units of the State Park System (Rogers, et al. 1990). Those features located in Bear Mountain, Green Lakes, Orient Point and Nyack Beach State Parks have been designated National Natural Landmarks. Scientific studies conducted in Letchworth State Park, commonly known as the Grand Canyon of the East,

have resulted in important contributions to the earth sciences as well as botany and ornithology. The high percentage of breeding bird species in Letchworth is cited as one measure of the parks great diversity of natural habitats. This includes 25 species of nesting wood warblers, claimed to be among the best concentrations in the world (OPRHP Birdlife Advisory Committee 1991).

Together, these biological resources and geologic features offer expanded opportunities for outdoor education, including the development of appropriate interpretive materials.

Parks and historic sites also contribute to the enrichment of the American culture. All or portions of 56 units of the New York State Park System are listed on State and National Registers which formally document important resources of cultural significance. This includes several worthy of designation as National Historic Landmarks. One of these, Washington's Headquarters in Newburgh, resulted from the States pioneering efforts in historic preservation that culminated in the acquisition of this site in the year 1849. Over 100 park units are known also to contain important archeological resources.

In addition to extensive economic activities of private concession operations in state parks, the park system itself generates about \$35 million annually from vehicle entrance fees, golf courses, camping and similar revenue sources. OPRHP employs about 1,600 permanent staff, and hires approximately 4,700 additional people each year as part of a temporary and seasonal work force that helps sustain local and regional economies.

Other benefits of parks and recreation include helping prevent crime, contributing to civic pride and social unity, and providing a stimulus for tourism (Godfrey, Graefe and James 1993; PCAO 1987).

Methodology

This investigation on the state of the New York State Park System was conducted, in part, as a synthesis of OPRHP technical documentation that included the New York State Open Space Conservation Plan (DEC and OPRHP 1992) and the State Park Infrastructure Fund, or SPIF (OPRHP 1992).

The Open Space Plan identified specific properties of statewide significance that should be protected as state parks and historic sites, and was largely a product of recommendations of regional advisory committees as well as public information meetings and workshops held throughout New York State.

SPIF and other fiscal management data provided a basis for assessing the problem of rehabilitating and maintaining park and recreation facilities associated with an aging infrastructure and conditions of high user demand.

The study also incorporated environmental audit data for a three-year period (1989-1991) to assess compliance of park facilities and operations with the regulatory provisions of the New York State Environmental Conservation Law. These audits were based on responses to questionnaires made available to each of OPRHP's 11 administrative regions (Table 1). A separate problems-and-threats questionnaire provided more comprehensive information on pollution, visitor impacts, non-conforming land uses and other types of internal and external problems associated with environmental stewardship. Workshops were held with OPRHP facility managers to enhance their understanding of potential issues and concerns.

Table 1. Identification of high priority areas of environmental concern in New York state parks and historic sites.

Park Region	Problem or Threat Category						
	Water Quality	Lack of Biological Surveys	Critical Habitat	Adjacent Land Uses	Scenic Resources	Lack of Training	Overuse
Allegany	X	X	-	X	X	X	X
Central	X	X	X	X	X	X	X
Finger Lakes	X	X	-	X	X	X	X
Genesee	X	-	X	X	X	X	X
Long Island	X	-	-	X	-	-	X
New York City	-	-	-	X	-	-	-
Niagara	-	X	-	X	X	X	X
Palisades	X	-	-	X	-	-	X
Saratoga-Capital	X	X	-	X	-	-	X
Taconic	X	-	-	X	-	-	-
Thousand Island	X	-	-	X	X	X	X

Other technical reports and literature sources established the rationale for protecting wetlands (U.S. Fish and Wildlife Service 1991) and biodiversity (Salwasser 1991), the role of environmental education and interpretation in protecting natural and cultural resources (Sharpe 1983); and, the integration of ecology, history and cultural values in the management of protected areas (Feller 1992; McBain 1992; Mitchell 1992).

Following the lead of the U.S. National Park Service in documenting and mitigating threats to the National Parks (U.S. GAO 1987; U.S. NPS 1981; Wauer 1983), three states -- California (DPR 1983), Pennsylvania (DER 1989) and Missouri (DNR 1992) -- have conducted parallel studies on the condition of their respective park systems. The State of Florida provides a case model for resource management and

protection of the state parks and other lands administered by its Department of Natural Resources (MacLaren 1992).

A preliminary survey of international parks (Lucas 1992; Machlis and Neuman 1987) suggests shared concerns of park and protected area management on a more global scale.

The information and findings of these studies and reports have allowed for an important comparative analysis of resource management issues and problems. They have strengthened also the rationale for suggesting possible action strategies for advancing environmental stewardship in the New York State Park System, including cooperative park studies and the associated need for basic and applied recreation research.

Summary of Findings

Table 1 identifies seven areas of environmental concern evidenced in OPRHP's respective regions. In relative order of significance, these are:

1. encroachment of residential and commercial development on park boundaries;
2. high levels of visitation and overuse;
3. degradation of water quality;
4. deficiencies in staff development and training in natural and cultural resources management;
5. impairment of visual qualities;
6. incomplete survey data on biological resources; and,
7. loss of critical wildlife habitat areas.

The situation of large numbers of people putting increased stress on an aging infrastructure is an inadvertent, but characteristic challenge to environmental stewardship. Since 1970, annual attendance at state parks and historic sites has increased about 35 percent, with a record number of 63 million visitors experienced in 1991 (Figure 2). Typical problems of overuse are soil compaction, vegetation loss and erosion of trails, picnic areas, campgrounds and other intensive use or ecologically fragile areas. Conditions of crowding can also degrade the quality of the outdoor recreation experience

In addition to identifying important priorities of properties that should be added to the state park system, the NYS Open Space Conservation Plan reaffirmed the importance of perpetual stewardship of existing holdings to ensure that important characteristics or resource values are not diminished over time. Lack of a stable and permanent source of funds to acquire critical natural, historic and recreational resources was identified as the major impediment to conserving open space.

A further finding was the need to strengthen environmental education and interpretive programs in state parks and historic sites as a means of not only enriching the visitor experience, but also to instill a greater understanding and appreciation of such resources as unique and irreplaceable public assets. New York States Governor Mario Cuomo has given strong support to environmental education as the key to protecting New Yorks natural resources for future generations (Cuomo 1990).

Ecological restoration of landfills, upgrading wastewater treatment plants, code compliance and historic structure renovations were among key priorities of environmental remediation of park and recreation infrastructure. The average state park facility is over 50 years old, and about \$300 million is required over the course of the next decade to address needs of restoration and rehabilitation.

Camping in the Palisades Interstate Park, for example, began in 1913 with the majority of the camp buildings built from 1910 to 1929. The Harriman State Park Group Camp Program is the U.S. pioneer for this type of recreation, and is closely allied to social well being of under privileged children. Many of the children who participate in this camp program gain relief from adverse urban conditions, while learning the value of the natural environment and gaining respect for it.

Today there are 35 group camps in Harriman State Park, which have an instant capacity of 6,200 campers. This physical plant, however, is in poor condition and very large, with 1,300 buildings, four water treatment plants, four sewage treatment plants, a network of roads and powerlines, swimming cribs, boat docks, beaches, court games and play fields.

Significance of the Problem

The state parks of the United States, like the national parks, have never been free from threats of adverse uses that could destroy, or at least impair the very qualities which led to their preservation for recreation uses. Except in rare instances, the state parks are considered more vulnerable to environmental incursions (Tilden 1962).

The number of such threats variously distributed across the state park systems of California and Missouri suggest the contemporary significance of the problem. About 8,700 known or suspected threats were identified as adversely affecting the 267 units of the California System. Similarly, more than 1,500 threats were found to be impacting the 77 state parks and historic sites of Missouri, a system characterized as "... the very heart of our land, our people, and the events that shaped them...."

In general, these threats related to high levels of visitation; physical, chemical and biological intrusions; multiple, and often conflicting demands for use of park resources; incompatible adjacent land uses; the isolation of park ecosystems; and, the debasement of park scenery.

A survey of state park directors conducted by The Conservation Foundation (Meyers and Reid 1986) found that beyond serious funding deficiencies, the greatest resource issue of concern to the directors was the need to identify and extend greater protection to sensitive ecological areas. About half of the state park directors identified degradation of resources caused by heavy visitor use as a significant problem, with rehabilitation of neglected facilities also a major concern.

On a broader scale, the President's Commission on Americans Outdoors (PCAO), in its 1987 report, sounded a serious warning about the condition of the nations parklands. After meeting with park and recreation officials throughout the country, the PCAO concluded that the nation faces a deterioration of the natural resource base of parklands and its supporting recreation infrastructure. The PCAO challenged American institutions to implement policies that would ensure long-term conservation of recreational resources and also to confront pervasive long-term environmental threats such as toxic chemicals, water pollution from non-point sources, groundwater contamination and acid precipitation.

Similarly, in a study of major issues identified in recent SCORPs (Caneday 1991), protection and management of natural resources and inadequate funding were the most frequently cited issues identified by the policy and planning sectors of state park administrations in the United States.

A review of the findings and concerns identified in this OPRHP environmental stewardship study shows consistency with problems and threats being experienced by other local, state as well as national park administrations.

Key Recommendations and Conclusion

This study on the condition of the New York State Park System, though preliminary in nature, suggests that problems and threats to the integrity of the system are real; that they are manifest, and will continue to pose challenges for effective stewardship. These challenges appear to be shared by park systems throughout the country, and are likely to become increasingly apparent in the course of the next decade. The scope of the problem further suggests the desirability of cooperative action among and between the states, possibly in partnership with the U.S. National Park Service that shares similar concerns.

New York State initiatives to protect unique or significant components of its natural and cultural heritage, however, are not new. The first State Park Plan for New York prepared for the 1924 bond issue, for example, noted that The movement for the rescue of Niagara Falls from the hands of those who were spoiling its natural beauties began over 40 years ago. The same plan explained how the Palisades Interstate Park was created in 1900 by the States of New York and New Jersey to stop the destruction of the Palisades of the Hudson and preserve them for a park.

Since this time, the New York State Park System has grown in scale and diversity, and is called upon to have an expanded role in meeting the varying needs of many more millions of people. Riverbank State Park, a 28 - acre recreation area on the roof of the North River Sewage Treatment Plant in Manhattan, adds a unique new dimension to this system (Holloway 1993).

To address the challenges associated with protecting the unique and irreplaceable public assets entrusted to the care of the New York State Office of Parks, Recreation and Historic Preservation, a comprehensive set of 50 recommendations and action strategies has been proposed for upholding OPRHP mandates and mission statements, as well as for strengthening the policy and long-range planning framework of SCORP. Key recommendations include:

1. Amend the Parks, Recreation and Historic Preservation Law (Article 3) to provide a declaration of the value of natural, historic, cultural and recreational resources contained within the state park, recreation and historic site system to the quality of life, and a declaration that the stewardship of these resources is a primary responsibility of the state.
2. Establish an environmental and natural resource conservation assistance fund at the State level, and a similar dedicated trust fund at the national level, to provide a permanent source of funding for environmental stewardship and open space conservation.
3. Provide facility managers and other OPRHP staff with natural and cultural resource management training on a continuing basis, while recognizing that the environmental resources of certain parks may be of such sensitivity and significance that regional park administrations should employ staff and encourage volunteers with backgrounds and expertise in ecological park management.
4. Develop or expand, as needed, a basic information system for natural and cultural resources, including minimum baseline inventories and monitoring systems in designated state parks and historic sites.
5. Prepare a statement for management for each state park and historic site that identifies their respective goals and objectives, as well as specific laws, unique features, classification and other considerations that guide protection and management, and ultimately master plans and the environmental review process.
6. Encourage cooperative partnership ties between park management and local government and landowners; facility managers should be more informed about, and involved in local land-use planning and zoning decisions that directly or indirectly affect stewardship ideals.
7. Incorporate resource management and environmental stewardship responsibilities into job descriptions of facility managers, and upgrade park ranger positions to require skills and training in resource management and interpretation.
8. Expand the number of environmental education programs and interpretive positions in state parks and historic sites to help instill an understanding and appreciation of the value of parks and their resources; to develop public support for protecting park resources; and, to encourage appropriate, safe and minimum impact use of these assets.
9. Assess on a park-by-park basis the opportunities that exist for environmental education and interpretation, and develop a statewide interpretive plan for the state park system.

10. Establish an interdisciplinary advisory task force to address specialized or significant resource management problems associated with natural disasters, pollution abatement and control, insect and disease infestations, habitat protection and management, vandalism, ecological restoration of landfills, conserving biological diversity, poor management practices on adjacent lands, beach sand erosion, nuisance wildlife, fire ecology, conducting resource inventories, protecting viewsheds, restoring historic landscapes, demarcating park boundaries and ecosystems, et al.
11. Complete or update master plans, with resource management and interpretive components, for all state parks and historic sites on a prioritized basis.
12. Expand the scope of OPRHP's environmental audit process to include a more comprehensive, and more participative assessment of problems and threats to specific units of the New York State Park System, and that these be monitored accordingly on an annual, or at least biennial basis.

A number of the recommendations and action strategies for fostering stewardship of the State Park System have been, or are in the process of being advanced. This includes legislation establishing a New York natural heritage program for identification, research, and conservation of the state's biodiversity. As proposed, park preservation areas would be designated within qualified units of the state park system to help protect outstanding ecological values (LBDC 1993).

Other legislation -- A. 7008 (Pillittere 1993) and S. 4552 (Sheffer and Johnson 1993) -- introduced at the request of the Office of Parks, Recreation and Historic Preservation, would amend the parks, recreation and historic preservation law in relation to the conservation of natural, cultural and recreational resources. This stewardship bill reaffirms, as a guiding principle, that: "The office shall operate and maintain the state park, recreation and historic site system to conserve, protect and enhance the natural, historic, cultural and recreational resources contained therein, and to provide for the public enjoyment of, and access to these resources in a manner which will leave them unimpaired for future generations."

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PUBLIC / PRIVATE PARTNERSHIPS IN NATURAL RESOURCES

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This paper evaluates partnerships between natural resource agencies and private businesses / other organizations, identifying characteristics and processes which underlie successful partnerships. Characteristics included types of participating partners, nature of administrative structures, funding structures, time span of operation, and types of projects. Processes included evidence of vision / mission statements, goal statements, written plans of operation, long range plans, economic statements, stated alternatives to the partnerships, stated roles of the partners, impact statements, and public support. The data were obtained from a content analysis of 25 chronicled case studies. Findings suggested that even with a wide variety of characteristics among the partnerships studied, there are processes that management can utilize to generate the development of more successful partnerships. Recommendations for future research are included.

Introduction

Many of this country's most significant cultural and natural resources have been preserved for perpetuity by federal agencies such as the National Park Service, the USDA Forest Service, the Bureau of Land Management, and the US Fish and Wildlife Service. Areas of local, regional, or even national significance, however, remain unprotected. These resources often have not been incorporated into existing programs because they have not lent themselves to the use restrictions which preclude the existence of living, working communities within the resource boundaries. Partnerships between natural resource agencies and private business have emerged as an innovative method to preserve natural and cultural resources, while providing recreational opportunities.

Given the financial constraints faced by public land management agencies, alternatives to traditional management processes have come under consideration. It has become incumbent upon management to expand programs and increase personnel, while reducing administrative costs and eliminating duplication. Natural resource agencies in partnerships with businesses and other organizations offer a potential solution.

Public-private partnerships involving natural resources have a long history with all of the national land management agencies. The National Park Service, for example, has over 400 partnership agreements including programs such as recycling in the parks, historical preservation, and environmental education. Most of these public-private partnerships have not been chronicled. Without written evidence, it is difficult to identify the criteria needed to create and maintain a successful partnership. Moreover, because unsuccessful partnerships are rarely discussed, much less chronicled, it is difficult to identify techniques and strategies to be avoided.

The limited number of natural resource investigations examining the characteristics (LaPage, 1992) and processes (Selin and Chavez 1992, 1993) of public-private partnerships report findings similar to the studies in the business management literature. This literature is largely limited to individual case studies without a comparison between partnerships (Waddock 1989). While this information is useful, applying the outcomes to newly developing partnerships is complex. The study reported here compares the characteristics and processes between partnerships to identify common elements.

Twenty-six characteristics and 9 processes were identified from the business management and natural resource literature. Partnership characteristics were grouped according to 5 criteria: types of participating partners, administrative structures, funding structures, time span of operation, and types of projects.

Process elements included evidence of a written mission or vision statement which helps to guide the overall direction of the partnership (Lynch 1989; Kitchell and Kraayenbrink 1992; Kent and Hellriegel 1991; Dent 1990; Selin and Chavez 1992). Vision statements lay the groundwork for formulating goals or objectives which serve as concrete directional statements for the partnership (Crossley 1986; Lewis 1990; Lorange and Roos 1992; Badarocco 1991). To create a map for reaching determined goals, successful partnerships also establish operational plans (Collins 1991; Kent and Hellriegel 1991). The development of a business plan provides a "litmus test" for judging potential success (Lynch 1989). In addition to this operational plan, strategic long range plans help to stabilize the partnership through a period of time working together (Lorange and Roos 1992; Lynch 1989; Selin and Chavez 1993). These plans should include a realistic economic statement which matches resources to goal achievement (Lynch 1989; Geringer 1988; Lorange and Roos 1992; Crossley 1986), and alternative operational plans (Collins 1991; Selin and Chavez 1992), including a plan for termination of the partnership (Slowinski 1992). To avoid confusion, successful partnerships clarify the role each partner will play in the alliance (Collins 1991; Lewis 1992).

Because the business management literature focuses on private business joint ventures and strategic alliances, public support is not recognized as a success factor. Given that the public is a customer in natural resource management, public involvement becomes crucial to successful public-private partnerships (Selin and Chavez 1993). Finally, an impact statement was identified as a critical process element of partnerships because of the role of environmental and social impacts in natural resource management.

Methodology

The data were obtained from a content analysis of 25 chronicled case studies from the National Park Service in Denver, Colorado. The sample included those that reported partnership characteristics, as well as the processes involved in the partnership. Two independent raters evaluated each case study. Judgments regarding the presence / absence of a characteristic or process were largely consistent between the raters. If an inconsistency was noted, the final judgment was

based on a review by a third individual. Each partnership was analyzed on 26 characteristics and 9 processes. Matrices were developed to summarize partnership characteristics (Table 1) and the process elements evident in each partnership (Table 2).

Characteristics were divided into 5 parameters: types of participating partners, administrative structures, funding structures, time span of operation and types of projects. Types of participating partners included private citizens, private industry, local government, state government, federal government, and conservation groups. Administrative structures concerned non-profit groups, federal commissions, state commissions, citizens' advisory councils, boards of directors, task forces, and regional coalitions. Funding structures included local bonds and/or taxes, government grants, private grants, partner investments, matching funds, and government appropriations. Time span of operation describes the dates through which the partnerships operated. The types of projects included cultural resources, natural resources, natural disaster projects, local recreation projects, urban renewal, and scientific research.

Nine processes were examined: a mission/vision statement, a goals statement, an operational plan, a long range plan, a documented economic statement, stated alternatives to the main plan, stated roles of the partners involved, written impact statements, and public support / involvement.

Results

Partnership Characteristics

Participating partners included government agencies, private businesses, and other organizations (Table 1). Partners ranged from philanthropic individuals to large corporations to small volunteer community groups. Broad-based participation appeared to be associated with successful partnerships. With only one exception (Charles River, MA), all of the case studies involved at least three partners. Nine of the 25 had four contributing partners, and 12 partnerships reported more than four types of partners.

The leadership role was generally assumed by a government agency (6 - local, 6 - state, and 5 - federal). Private citizens took the lead in 4 cases. The involvement of several levels of government helps to secure diverse sources of funding such as government grants and appropriations. Support from private industry and conservation groups opens other sources of funding. Groups that profit from a successful partnership often invest their own funds, creating a feeling of "ownership" in the partnership.

A task force was the most often used administrative structure (13 of 25 case studies). Similar to the types of partners, a combination of administrative structures was evident (Table 1). Eight case studies reported 2 different types of administrative structures, 4 had 3, and 2 had 4. Because each partnership was somewhat unique, the structure was tailored to achieve the partnership's goals. It should be noted that the descriptions of function and composition of the administrative body was often not well defined. Two organizational structures may actually have had similar administrative structures, but be labeled differently (e.g., board of directors versus task force).

It was also possible that the same organizational structure (e.g., task force) may not have had the same meaning or function. More study is needed to determine the role administrative structure plays in partnerships.

Government appropriation was the most common source of funds (Table 1). Nineteen case studies reported at least partial government funding. With decreased funding on the part of government, however, alternative funding methods are becoming more popular. Nine of the studies received partial funding from private grants and 7 from partner investments. In some cases, government funds provided "start-up" moneys, with the expectation that the park or resource would assume funding responsibilities once established.

The earliest partnership began in 1968 (Table 1). Eight of the 25 partnerships are still in existence. The time span of operation, when it was reported, varied between 2 and 5 years per partnership project. This is consistent with operational time spans reported in the business management literature.

The most common purpose for establishing a partnership was natural resource protection (15 of 25). Cultural resources and local recreation projects were each noted by 9 of the partnerships. Once established, the park often served a variety of functions. For example, a park developed to minimize natural disaster by removing structures from a flood plain and restoring the area to natural conditions, can then be used for local recreation. The removal of structures and restoration of the area can also serve to protect the riparian zone and provide opportunities for scientific research. Parks established to revitalize an urban environment can provide economic benefits through the remodeling of historic structures. Cultural and natural resource protection can serve to facilitate one another. The preservation of an historic structure can result in the protection of the surrounding landscape.

Partnership Processes

Although all of the partnerships had written goal statements (Table 2), just over half (14 of 25) reported a vision or mission statement from which goals are developed. Fifteen indicated a long range plan for achieving these goals. Seventeen of the partnerships demonstrated evidence of alternative operational plans. Sixteen of the partnerships outlined the roles of each of the partners. The more recent case studies were more likely to identify these processes.

Economic statements which identified costs and benefits of the partnership were noted in 13 of the 25 case studies. The remaining partnerships may have chosen not to report financial statements in the material analyzed for this paper.

Public support and involvement was prevalent (21 of 25). This grassroots support was found in the number of citizens advisory councils involved in partnership management and the number of partnerships that received some funding through local bonds or taxes. Allowing private citizens to have more direct input into the activities of their communities may have increased their willingness to pay for partnership efforts. The importance of grassroots support should not be underestimated when creating a partnership.

Table 1. Partnership characteristics.

Partnerships	Types of Participating Partners						Administrative Structures						
	Private Citizens	Private Industry	Local Gov't	State Gov't	Federal Gov't	Conservation Groups	Nonprofit Group	Federal Comm.	State Comm.	Citizens Advisory Council	Board of Directors	Task Force	Regional Group
Bay Area Trail, CA	XX	X	X	X	X	X	X			X	X		X
Boulder Creek, CO	X	X	XX			X						X	
Charles River, MA	X					XX			X				X
Chattahoochee River, GA	X	X	X	XX	X			X					
Delaware Lohigh Canal, PA	X		X	X	X	XX		X	X			X	
Erie Canal, NY	X	X	X	XX								X	
Falls of the Ohio, IN			X	XX	X	X						X	
Genesee River Corridor, NY	X		XX	X					X				
Hinton, WV	X	X	X		XX							X	X
Hudson River Valley, NY			X	XX	X	X		X	X			X	X
Kickapoo River, WI	XX	X			X				X				
Kissimmee River, FL	X	X	X	XX	X	X			X				
Lackawanna Heritage, PA	X	X	XX	X	X			X				X	X
Lowell Heritage, MA	X	X	XX	X	X			X					
Matewan, WV	X	XX	X	X	X		X				X	X	
Maurice River, NJ	X		X	X	XX							X	X
Mingo Creek, OK	X		XX		X	X						X	
Rincon Institute, AZ	X	X	X	X	X	XX	X				X		
Salem Project, MA	X	X	X	X	XX	X	X						X
Sonoran Institute, AZ	X	X	X		X	XX	X						X
South Platte River, CO	XX	X	X		X	X						X	
Thousand Islands, NY	X		X	XX	X		X		X				
Upper Delaware, NY	X		X	X	XX				X			X	
Wheeling Heritage Project, WV	XX	X	X	X	X							X	
Wildcat & San Pablo Creeks, CA	X		XX		X		X		X	X			

XX = Lead Partner

Table 1. continued

Partnerships	Funding Structures						Time Span	Types of Projects					
	Local Bond/Tax	Gov't Grant	Private Grant	Partner Investment	Matching Funds	Gov't Appropriations		Cultural	Natural Resources	Minimize Disaster	Local Recreation	Urban Renewal	Scientific Research
Bay Area Trail, CA			X			X	Began 1987				X		
Boulder Creek, CO			X	X		X	1977-1987		X	X	X	X	
Charles River, MA						X	1968-1984		X	X			
Chattahoochee River, GA						X	Began 1979		X	X	X		
Delaware Lehigh Canal, PA				X	X	X	Began 1988	X	X			X	
Erie Canal, NY				X		X		X	X				
Falls of the Ohio, IN			X	X		X			X				
Genesee River Corridor, NY			X	X			1983-1991				X	X	
Hinton, WV	X		X			X	1987-1989					X	
Hudson River Valley, NY	X					X		X	X				
Kickapoo River, WI	X	X	X				1969-1978			X	X	X	
Kissimmee River, FL						X	1976-1990		X				
Lackawanna Heritage, PA		X				X	1989-1991	X					
Lowell Heritage, MA		X	X	X		X	1978-1979	X				X	
Matewan, WV	X	X	X				1987-1990	X				X	
Maurice River, NJ						X	1987-1991		X		X	X	
Mingo Creek, OK	X					X	Began 1985			X			
Rincon Institute, AZ	X								X			X	
Salem Project, MA				X		X	1987-1991	X				X	
Sonoran Institute, AZ									X			X	
South Platte River, CO	X					X	1971-1985		X	X	X		
Thousand Islands, NY							Began 1981		X				
Upper Delaware, NY						X	Began 1978	X	X				
Wheeling Heritage Project, WV						X	Began 1990	X	X		X		
Wildcat & San Pablo Creeks, CA		X	X		X	X	Began 1985			X	X	X	

Table 2. Partnership process elements.

Partnerships	Mission/ Vision Statement	Goals Statement	Written Plan	Long Range Plan	Economic Statement (Costs & Benefits)	Stated Alternatives	Stated Roles of Partners	Impact Statements	Public Support/ Involvement
Bay Area Trail, CA	X	X	X	X			X	X	X
Boulder Creek, CO	X	X	X		X	X	X	X	X
Charles River, MA		X	X		X	X		X	X
Chattahoochee River, GA		X	X	X				X	X
Delaware Lehigh Canal, PA	X	X	X	X		X	X	X	X
Eric Canal, NY		X					X		X
Falls of the Ohio, IN	X	X					X		
Genesee River Corridor, NY	X	X	X	X	X	X	X	X	X
Hinton, WV		X	X	X		X	X		X
Hudson River Valley, NY	X	X							X
Kickapoo River, WI		X	X		X	X		X	X
Kissimmee River, FL	X	X	X	X	X	X	X	X	
Lackawanna Heritage, PA	X	X	X	X	X	X	X	X	X
Lowell Heritage, MA	X	X	X	X	X	X	X	X	X
Matewan, WV	X	X	X	X		X	X	X	X
Maurice River, NJ		X	X	X		X	X	X	X
Mingo Creek, OK	X	X	X			X		X	X
Rincon Institute, AZ	X	X	X	X	X			X	
Salem Project, MA	X	X	X	X	X	X	X	X	X
Sonoran Institute, AZ		X							
South Platte River, CO		X	X		X	X		X	X
Thousand Islands, NY		X	X	X	X	X	X		X
Upper Delaware, NY		X	X	X	X	X	X	X	X
Wheeling Heritage Project, WV	X	X	X	X		X	X	X	X
Wildcat & San Pablo Creeks, CA		X	X		X			X	X

Conclusions

Results from this study should be interpreted cautiously due to 2 limitations of the data. First, most of the case studies had National Park Service involvement. The extent to which these findings can be generalized to other natural resource agencies remains an empirical question. Second, identifying strategies and techniques to avoid in forming partnerships cannot be reliably determined from this sample of successful partnerships. Additional research including both successful and unsuccessful partnerships is necessary to address this issue.

With these limitations in mind, the data suggest some interesting observations. Successful partnerships typically include a range of contributing members and funding structures. The administrative structure appears to be partnership specific. A task facing participating members is the development of an administrative structure appropriate for the situational constraints. Although all partnership projects involved cultural and/or natural resources, spin off benefits such as local recreation opportunities or urban renewal are likely to occur.

Analysis of the process elements suggested that successful partnerships include: a mission or vision statement, goal statements, written operational plans, long range plans including strategies for terminating the partnership, a delineation of the roles of contributing members, and a description of the potential impacts. In addition, involving the public in the decision making processes associated with public-private partnerships appears to be a key element.

The findings also highlight the need for a theory based approach to partnership evaluations. At present, the natural resource partnership literature is devoid of theory. Existing theories in social psychology such as exchange theory or equity theory may provide the structure necessary for a more systematic evaluation of partnerships. The business management literature focusing on the formation of joint ventures and strategic alliances may also provide direction. The testing of these and other organizational theories within the management structure of natural resource agencies could highlight the similarities / differences between successful and unsuccessful partnerships.

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LAND USE AND PUBLIC ACCESS TO LAKE CHAMPLAIN

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Study of a portion of Lake Champlain's shoreline confirmed that public recreation access is limited. Ninety percent of the shoreline was found to be in private land uses having physical, legal and economic constraints that result in public use restrictions. A few remaining, undeveloped sites should be protected in the public interest.

The Problem

A Vermont lakes management study (Gilbert et al 1982) found that an intensive recreation use zone existed along a portion of the Lake Champlain shoreline.¹ Water sport activities were most abundant within 400 yards of shore and decreased rapidly as distance from the shoreline increased. Recreation use of the shoreline also extended only a few hundred yards inland but this narrow strip of land and water was an extremely valuable resource for both public and private outdoor recreation. Gilbert also examined this same section of shoreline in 1986 for potential, commercial marina sites. He concluded that of the 60 miles of shoreline studied, there were only 10 feasible development sites and all but one of these would result in serious environmental impacts during construction. He concluded that "...it becomes intuitively clear that the few remaining potential marina sites should be given careful consideration in the Lake Champlain planning process. If these sites are lost to alternative uses, additional marina development on Lake Champlain will require extraordinary effort and high social costs". Even though Lake Champlain is listed in the 1989 World Almanac as the 7th largest natural freshwater lake in the continental United States and has a 587-mile shoreline, (Table 1), existing and potential recreation access to its shoreline is limited (Vermont Agency of Natural Resources 1990).

The objective of this study was to assess existing and potential public recreation access to a section of Lake Champlain's shoreline. The segment studied included the contiguous shorelines of four Vermont towns located in Chittenden County (See footnote, Table 2). This segment was chosen for assessment because it was located along the shoreline of the only major metropolitan region in the Champlain basin where public demand for lake access is known to be the highest (State of Vermont 1988).

Table 1. Lake Champlain size statistics.

Statistic	Measurement	
	(Miles)	(Percent)
Shoreline length	587	100
Vermont	381	65
New York	182	31
Quebec	23	4
Length	109	
Maximum width	11	
Area	495 sq.mi.	

Source: Lake Champlain Basin Study 1978.

Method

A 60 mile long, 2000-foot-wide² segment of Vermont's Lake Champlain shoreline (Fig. 1) was studied using remote sensing techniques. Land uses were identified on 1981 black and white, 1"=1000' scale aerial photographs. The photographs were annotated with land use symbols and the resulting classifications field verified. Land use data were transferred onto 1:5000 orthophoto base maps, digitized and processed using Arc Info³ geographic information software. The data files produced study zone maps, land use acreages and the shoreline composition figures shown in Table 2.

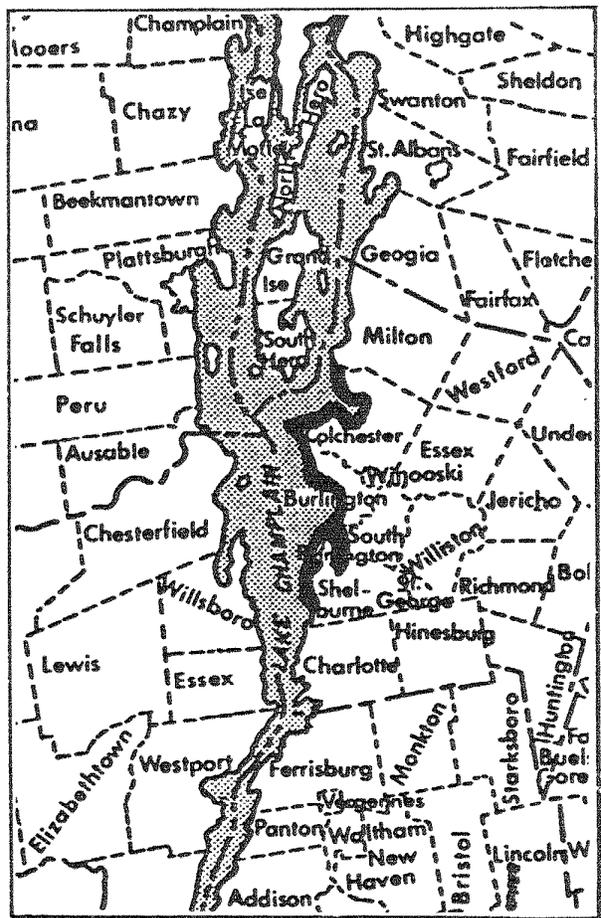


Figure 1. Study shoreline.

1/ The portion of Lake Champlain studied included the shorelines of Colchester, Burlington, South Burlington and Shelburne, Vermont.

2/ Shoreline zoning districts proposed by Vermont's Department of Environmental Conservation call for shore land districts to be between 500 and 1000 feet wide.

3/ Arc Info software, ESRI, Inc., Redlands, California.

Table 2. Per capita park and recreation space standard comparisons in the study zone.

Study Zone Town	Population (1990)	Recreation Acreage in Study Zone (Acres)	NRPA Space Standard (50 ac./ 1000 pop.)	Comparison to Standard (%)
Burlington	37130	183	1850	10
Colchester	14731	91	735	12
Shelburne	5871	996	290	334 ^a
S. Burlington	12240	108	610	18

^a Shelburne's abnormally high percentage of park and recreation space is due to the inclusion of a long segment of private estate shoreline that is partially accessible to the public and the town's relatively small population.

Existing Public Access

Most land uses, in the shoreline zone studied, precluded public recreation access except for the obvious public parks, beaches and a few public fishing access points. Public park and recreation acreage comprised 10 percent of all the land uses mapped. That figure when compared to national park and recreation space standards (NRPA 1983) was, on the average, 65 percent below national guidelines recommended for recreation lands serving regional populations. Individual shoreline towns varied from 90 percent below to 234 percent above standard. Three of the four town shorelines studied were significantly below national park and recreation space standards while the fourth was found to be well above NRPA guidelines (Table 2).

Potential Public Access

Potential public recreation access was determined by discounting land use acreages that precluded recreation and shore frontages that presented natural barriers to public recreation access.⁴ Permanent and seasonal housing represented over half (54%) of land uses in the shoreline study zone. Under Vermont private land and public waters statutes, private property boundaries extend to Lake Champlain's mean low water line thus prohibiting public access to recreation resources above that point. Industrial and commercial shoreline uses, including private marinas, consume 9 percent of the shore also excluding public access to the Lake in those locations. Agricultural lands are a noticeable component of the shoreline (6 percent) and represent privately owned open space that could possibly be converted to public recreation access and use. Marinas (1%) provide valuable boating access to thousands of customers but the demand for commercial boat mooring space is high which places cost constraints on most potential users (Gilbert 1986). Commercial marinas, therefore, are not usually considered as public recreation access facilities to the Lake.

Finally, the land use classification "Forest", which comprised 14 percent of the study zone, was more difficult to assess for its public recreation access potential. Even though the land, in this category, was tree covered and free from development, it was mostly privately owned and located predominately on steep soils and rock outcrops perched high above the study shoreline. Even though some of it would provide quality scenic views of Lake Champlain, direct access to the water was severely limited primarily due to the nature of its topography (Table 3).

⁴ Physical barriers to recreation access were defined as wetland edges and rock bluffs and ledges over six feet in height.

Table 3. Land use in the study zone.^a

Use	Frontage (ft)	%	Acres	%
Residential	103,923	40	2,126	42
Forest	39,416	14	819	16
Vacation Homes	32,531	13	357	7
Parks	28,315	10	486	10
Wetlands	20,596	8	439	9
Agricultural	14,707	6	310	6
Industrial	9,599	4	201	4
Commercial	9,261	4	191	4
Marinas	4,146	1	56	1
Totals	262,494	100	4,985	100

^a The study zone is defined as a 2000' wide and 60 mile long strip of land and water extending along the Lake Champlain shoreline located in the towns of Colchester, Burlington, South Burlington and Shelburne, Vermont.

Conclusion

Not unlike other Vermont land, the section of the shoreline studied is 90 percent privately owned. As a result, public access to this major water body is restricted by private property rights. While some municipal governments have done a reasonable job in meeting national public access standards, others have had economic and political problems providing public access to the Lake. While the State of Vermont has protected wetlands, provided public fishing access sites and has assisted local governments attempting to protect Lake Champlain's shoreline, the effort to provide additional public access remains a difficult and expensive one. Even with what seems to be prohibitive barriers to creating additional public access, the limited remaining opportunities should be secured in the public interest. As time advances, increasing pressure for private development of the shoreline will intensify thus raising public acquisition costs and eventually eroding the public interest.

Some limited land uses like agriculture and forest hold potential for public recreation access to the Lake although physical barriers are common in these land use types. Shoreline reclamation and renewal programs could present other opportunities but private land values and reclamation costs are all but prohibitive. Lake Champlain's long shoreline and its vast surface acreage are deceptive indicators of its public recreation availability. While its waters are public its shoreline is predominately private thereby creating a public access dilemma. The only way this dilemma can be solved is by taking every opportunity to create and protect public access to Vermont's most important outdoor recreation resource, Lake Champlain.

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PUBLIC ACCESS TO PRIVATE LAND FOR HUNTING IN NEW YORK: 1991

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We surveyed a sample of private landowners to measure incidence of land posting and compare posting and non-posting landowners. In 1991, 63% of private owners posted (up 13% since 1980). Public access restriction was associated with perceived personal safety risks, personal liability for hunting accidents, and desire for exclusive recreational use of one's property.

Introduction

Wildlife management agencies across the U.S. have long recognized the critical role that private landowners play in both wildlife conservation and provision of hunting access (Berryman 1981, Wright et al. 1988a, Jahn 1989, Wright 1989). Many agency administrators have come to regard hunter access to private lands as a subject of major concern (Wright and Kaiser 1986). Wildlife management agencies must understand landowner decisions about public access in order to predict or influence the total availability of hunting opportunity. The New York State Department of Environmental Conservation (DEC) has demonstrated its concern about access problems through support for periodic monitoring of landowner attitudes toward hunting, landowner-recreationist conflicts, and access to private lands for hunting. Between 1962 and 1980, DEC sponsored 3 access-related studies in New York (Waldbauer 1966, Brown and Thompson 1976, Brown et al. 1983). In 1991, DEC contracted with Cornell's Human Dimensions Research Unit (HDRU) to provide a 1991 update on landowner access policies.

The purpose of the 1991 private landowner study was to provide current indices of hunting access on private lands and to further refine understanding about the determinants of landowner access decisions. In this manuscript, we report findings from the 1991 private landowner survey and compare 1991 findings to those obtained in previous studies of access to private lands in New York.

We express our appreciation to the New York State landowners who participated in this study. We gratefully acknowledge Wayne Jones, Kathy O'Brien, Gary Parsons, and Pat Vissering (Division of Fish and Wildlife, DEC) for their contributions to instrument review. This project was funded by New York State through Federal Aid in Wildlife Restoration Project W-146-R.

Methods

The target population for this study was private, non-industrial owners of 10 or more acres of rural land in upstate New York. Rural land was defined as land in townships having a density less than 150 people per square mile. The land area and population of incorporated villages were subtracted from township figures in calculating population densities. Upstate New York was defined as all of the state except the New York City Standard Metropolitan Area (i.e., New York City, and Nassau, Putnam, Rockland, Suffolk, and Westchester Counties).

DEC partitions New York State into 9 administrative regions (Siemer and Brown 1993). For purposes of program planning and implementation, it also divides the state into 26 wildlife management units (WMU's), based on similarities in biotic, physical, and land use patterns. To ensure obtaining a sample that was representative of upstate New York, we stratified our sample by DEC region and aggregated WMU's. We grouped landowners into the 7 upstate DEC regions and 11 aggregated WMU's (Siemer and Brown 1993) to provide regional information within the limits of our sample size.

We identified a landowner sample using a two-stage cluster sampling approach (Scheaffer et al. 1979:201). New York State townships served as sampling clusters; individual landowners represented elements within each cluster. We randomly selected 37 eligible townships in 30 counties (4-8 townships were sampled in each DEC administrative region). With one exception, 50 landowners were randomly chosen from each township using county tax assessment rolls. Only owners of 10 acres or more with land-use classification of residential, agricultural, forest, or vacant lands were considered eligible. Owners of commercial, municipal, industrial, recreation and entertainment, and public service lands were excluded. The number of eligible owners in the 37 sample townships ranged from 46 to 706, with a mean of 273. This resulted in sampling rates per township ranging from 7 to 100%, with a mean of 18%.

Data were collected through the use of a 10-page self-administered mail-back questionnaire containing 143 variables. Items were developed to address 4 topic areas: (1) posting behavior, (2) personal access policies, (3) determinants of access decisions, and (4) landowner behavior and attitudes related to provision of fee access opportunities to hunters. In each topic area items were designed to provide information comparable to that obtained from 1980 landowners by Brown et al. (1983). Items were also developed to explore the 3 categories of access decision determinants (i.e., landowner attributes, user behavior, and resource attributes) proposed by Wright et al. (1988a). The survey was implemented in the fall of 1992, using the four mailing approach suggested by Dillman (1978). An original sample of 1,846 landowners resulted in 79 undeliverable questionnaires and 25 contacts with ineligible landowners. An adjusted sample of 1,742 yielded 1,056 usable returns (61% response). Follow-up telephone interviews were conducted with 100 nonrespondents to estimate nonresponse bias on key items.

Landowners who reported that the property specified in their questionnaire had been posted during the 1991-92 hunting license year (October 1, 1991 - September 30, 1992) were defined as posting landowners. Data on access policies were weighted to adjust for variability in landowner sampling rates by town (Siemer and Brown 1993). Nonresponse data was used to provide adjusted estimates of the proportion of posting landowners, the proportion of landowners who allowed access to friends and neighbors or strangers, and the proportion of posting landowners who posted due to hunter-related problems. Chi-square and Student's *t* statistics were used to test for differences between landowner subgroups. Statistical differences were measured at the $P < 0.05$ level. Findings pertaining to individual WMU's are reported elsewhere (Siemer and Brown 1993).

Results

Incidence of Posting

Of 1,033 responding landowners, 65% posted some part of their property in 1991. This yielded a 63% statewide posting rate after the data were weighted and adjusted for nonresponse. Posting landowners held title to 71% of the land in the sample and posted 86% of their total acreage. Thus, 61% of the private acreage in the sample was posted. In every region more than half of all landowners posted. More than 70% of landowners posted in heavily populated southeastern New York (i.e., DEC

Regions 3 and 4). Posting was lowest (<60%) in more sparsely populated areas of northern New York (i.e., Regions 5 and 6).

The proportion of posting landowners increased between 1980 and 1991 at an annual average rate of 1.2%. The proportion of posting landowners increased 5-30% by region and 13% statewide (Table 1). The average annual rate of increase in posting rose 60% over the last measurement period (i.e., for 1972 to 1980 the average annual increase was 0.75% [Brown et al. 1983]). The rate of increase in posting slowed somewhat during the 1970's, but accelerated during the 1980's.

Table 1. Change in the percentage of landowners who posted in 1980 and 1991, according to New York State Department of Environmental Conservation administrative region.^a

Region	Posting Landowners		Percent Change	
	1980	1991	Absolute	Proportional ^b
3	--- ^c	73	---	---
4	53	72	19	36
5	28	58	30	107
6	51	56	5	2
7	47	66	19	40
8	55	69	14	25
9	43	58	15	35
Statewide	48	63	15	31

^aData for 1980 from Brown et al. (1983).

^bRepresents: absolute change + 1980 value x 100.

^cSample size too small in 1980 study to allow comparison.

^dData for Region 3 included in computing statewide figures.

Hunting on Private Land

Some hunting occurred on the majority of private lands during the 1991-92 hunting license year. In 1991, about 75% of posting landowners (after adjustment for nonresponse) allowed friends and neighbors to hunt. There was no difference in the proportion of posted and unposted lands closed to all hunting ($X^2 = 0.517$, 1 df, $P > 0.97$).

The proportion of landowners who allow strangers to hunt on their land provides one index of access availability across the state. Statewide, about 22% of respondents (35% of all landowners after adjustment for nonresponse) said they would allow strangers to hunt on their lands. Public access was most available to strangers who asked permission in northern and western New York (Regions 6 and 9). Access was least available to strangers who asked permission to hunt in southeastern New York and the Adirondacks (i.e., Regions 3, 4, and 5).

Reasons for Posting

We replicated an effort by Brown and Thompson (1976) to estimate the influence that interactions with recreationists had on landowners' decisions to post. Each landowner was asked if particular experiences or concerns about hunters, anglers, snowmobilers, or "other" recreationists caused them to post. Of these recreationist groups, hunters were most likely to have influenced posting decisions.

A majority of landowners (69% after adjustment for nonresponse) had posted, at least in part, because they felt unsafe when hunters used their land and because they wanted to control access by hunters. Nearly half of all posting landowners (47% after nonresponse adjustment) noted that a previous bad experience with hunters contributed to their decision to post. About 18% (after nonresponse adjustment) posted because a friend or neighbor had experienced a negative interaction with a hunter.

A desire to control land use by snowmobilers also contributed to posting by some landowners. About 1 in 5 landowners posted due to a bad personal experience with snowmobilers and

concerns about associated risks to the landowners' personal safety or property. About 1 in 5 landowners also posted due to bad experiences with recreationists other than hunters, snowmobilers, or anglers. Past problems with anglers were relatively uncommon (64% of all respondents reported no use of their land for fishing).

Fifty-one percent of all posting landowners (n=346) reported "other" reasons for posting. Their responses covered a range of concerns, which we placed in 67 categories. Most concerns could be aggregated into a few broad topic areas: problems with hunters/hunting (27%); liability (16%); property damage (14%); exclusive use of the land (14%); control of access (8%); landowner privacy (7%); and protection of wildlife (6%).

Reasons Why Land Was Left Unposted

We asked nonposting landowners why they left their lands unposted in 1992. Responses were as follows: "people who use the land have always been cooperative and careful not to damage the property" (45%); "I appreciated using other private lands for recreation, and therefore feel I should not post my lands" (33%); "no one has ever asked to use this land for recreation" (33%); "there is nothing on this property that anyone could damage" (14%); "I am cooperating with state efforts to keep lands open for hunting and fishing" (13%); or "other reasons" (20%). The only "other" reasons cited by more than 4% of respondents were: posting takes too much time and effort (19%); posting is ineffective (14%); and posting is too expensive (5%).

About 1 landowner in 8 (12%) had posted at some time in the past, but did not post in 1991-92. Most (60%) of these landowners had stopped posting because they perceived it as ineffective in controlling access. Seventeen percent had stopped posting because recreationist demand to use their land had decreased. One in three cited other reasons for posting discontinuation, the most frequent being: posted signs were stolen (21%); posting was ineffective (10%); posting took too much time and effort (7%); posting was too expensive (7%); the landowner wanted to encourage higher deer harvest (7%); and the landowner was physically unable to post the land (7%).

Comparison of Posting and Nonposting Landowners

Posting and nonposting landowners were compared with regard to both their property characteristics and their own attitudinal, socio-economic, demographic, and recreational characteristics in order to better understand determinants of posting and access restriction.

Property characteristics. The percentage of open land, brushland, woodland, and wetland was similar on posted and unposted lands. Posting landowners were no more likely to use their land for production of agriculture ($X^2 = 0.64$, 1 df, $P > 0.97$) or forest products ($X^2 = 0.97$, 1 df, $P > 0.97$). However, posting landowners were more likely to own large parcels (122 acres vs. 96 acres; $t = -2.51$, 1012 df, $P = 0.012$). The ratio of the mean acreage held by posting and nonposting landowners was greatest for Regions 3, 6, and 7, and lowest for Region 4. On average, posting landowners also reported more hunting access requests (4.1 requests vs. 2.3 requests; $t = -2.51$, 1012 df, $P = 0.012$) and more incidents of hunting-related trespass (4.2 incidents vs. 2.7 incidents; $t = -2.51$, 1012 df, $P = 0.012$).

Landowner attitudes. Most landowners (84%) agreed that hunting was appropriate if done lawfully and with respect for landowners' rights. Over 50% also believed most hunters are responsible people. However, posting landowners differed from nonposting landowners with respect to several attitudes and perceptions related to hunters, hunting, and liability. Posting landowners were more likely to disagree that hunting is appropriate ($X^2 = 5.94$, 2 df, $P = 0.051$) or that hunters are responsible people ($X^2 = 18.39$, 2 df, $P < 0.001$). Posting landowners also were more likely to perceive that posting was necessary to control access ($X^2 = 214.57$, 2 df, $P < 0.001$).

Finally, posting landowners were less aware of (or more skeptical of) laws that limit landowner liability to recreationists and permit legal public access to private lands that are not surrounded by a substantial fence ($X^2 = 22.65$, 2 df, $P < 0.001$). Perhaps related to these perceptions, posting landowners were more likely to perceive a high potential for personal liability if a hunter was injured on their land ($X^2 = 41.6$, 2 df, $P < 0.001$).

Landowner recreation. For 9 out of 10 outdoor recreation activities explored, posting landowners were more likely to have a participating adult family member. This finding is consistent with the fact that 65% of posting landowners maintained exclusive hunting access for family and neighbors, and that posting landowners were more likely to report such exclusive use of their land for hunting ($X^2 = 60.62$, 1 df, $P < 0.001$).

Landowner socio-economic characteristics. Posting landowners were more likely to have grown up in a suburban or urban area ($X^2 = 18.84$, 4 df, $P < 0.001$). However, no differences were found between posting and nonposting landowners with respect to age ($X^2 = 7.33$, 5 df, $P = 0.19$), gender ($X^2 = 0.30$, 1 df, $P = 0.57$), education ($X^2 = 8.37$, 5 df, $P = 0.13$), or income ($X^2 = 2.93$, 7 df, $P = 0.89$).

Absentee ownership (i.e., ownership by persons living outside the county in which their rural property was located) was 12% higher statewide in 1991 than in 1980. Absentee ownership was least common in western New York (Regions 8-9). The percentage of resident and absentee landowners who posted differed by region, but we found no pattern of posting rate and residency status across regions. The statewide rate of posting was not different between resident and absentee landowners ($X^2 = 0.169$, 1 df, $P = 0.68$). On the other hand, access policies were different between resident and absentee owners ($X^2 = 14.19$, 3 df, $P = 0.002$). Absentee owners were less likely to permit access to strangers. Moreover, the regions with the highest rate of absentee land ownership (i.e., Regions 3 and 4) also were the regions where landowners were least likely to grant hunting access to strangers.

Conclusions and Implications

This study shows that the proportion of private landowners who posted their land continued to climb between 1980 and 1991. Over 60% of all private lands in upstate New York are now posted. Posting continues to be most pervasive in the heavily populated areas of southeastern New York and least common in the sparsely populated border areas of northwestern and northeastern New York. Increasingly, private landowners are posting their lands to control access by hunters, avoid perceived liability, protect their personal safety, and provide exclusive recreational privileges to family and friends. Statewide, nearly a quarter of all private lands are essentially closed to hunting and an additional 56% are maintained for the exclusive use of relatively few people. In some regions, hunters seeking access are likely to be turned away by 9 out of 10 private landowners.

These data hold important implications for both wildlife managers and hunters. The fact that we documented some determinants of access restriction that were recognized more than 50 years ago (Leopold 1991), shows both the persistence of access-related problems and the limited progress hunters and natural resource managers have made toward resolving those problems.

(1) The majority of landowners believed hunting was appropriate, that most hunters were responsible people, and that hunting was necessary to keep deer populations from growing too large. Yet, previous experience with hunters led many to become apprehensive about allowing hunter access in

the future. Posting landowners perceive hunters as a threat to personal safety, recreation, and property. A strong relationship between access restriction and concerns about hunter-related problems has emerged consistently in studies of hunter-access in New York (Waidbauer 1966; Brown and Thompson 1976; Brown et al. 1983, 1984) and elsewhere (Kelley 1981, Kirby et al. 1981, Guynn and Schmidt 1984, Wright et al. 1988b). As a key determinant of access restriction, hunter behavior should be accorded more attention by both hunters and natural resource managers. Hunter behavior that is consistently legal, ethical, and respectful of landowners is essential if hunters and natural resource agencies hope to stem the increasing restriction of public hunting access. Natural resource managers may be able to address this need through expanded or revised hunter education opportunities. Hunters must also take collective and individual actions to address landowner concerns about hunter behavior.

(2) This study indicated that posting landowners are unaware of, or lack confidence in, the New York State laws that exist to protect them from legal action by recreationists. While the actual risk of litigation by an injured hunter is very low, landowners appear to perceive that allowing hunting access is likely to expose them to a costly and disruptive lawsuit. These concerns have persisted despite legislation that affords substantial protection to private landowners who allow public access for recreation. For the majority of private landowners, financial remuneration alone is not sufficient to override interests in personal and family safety, property, and recreational pursuits. Thus, any effort to increase public access to private lands should include a package of landowner incentives that are both monetary and nonmonetary (e.g., landowner services, tax incentives, increased hunter education, etc.).

(3) Past landowner studies have produced recommendations for efforts to inform landowners of the positive values of hunting and the need for public access to private land to control wildlife populations. Our findings that over 80% of posting landowners approved of hunting, and over 50% believed hunting was necessary to control deer populations call into question the need to convince landowners that hunting is appropriate and necessary to control particular wildlife species (i.e., white-tailed deer). More importantly, persuading landowners of the value of hunting may do little to convince them that they are in any way obligated to provide the public with recreational opportunities, even at risk to their own financial and personal interests.

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SOCIAL PSYCHOLOGY

EFFECTS OF SEASONALITY AND TIME OF WEEK ON HIKER MOTIVATIONS AND SATISFACTIONS IN THE HIGH PEAKS WILDERNESS AREA

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A study of wilderness hikers was conducted to evaluate the effects of season and time of week on visitor motivations and degree of satisfaction with their experience while hiking in the High Peaks Wilderness Area of the Adirondack Forest Preserve in New York. A questionnaire mailed to 653 wilderness users measured ideal, expected, and actual conditions, and level of satisfaction with the wilderness experience based on 9 sociological indicators. Results of the study indicate that, while there are some statistical significance temporal differences between the indicators measured, there does not appear to be a manageable difference between the temporal distribution of users in the High Peaks Wilderness Area.

Introduction

The 196,685 acre High Peaks Wilderness Area (HPWA), largest of the Adirondack Forest Preserve Wilderness Units, encompasses parts of Essex, Franklin, and Harrison Counties in northern New York. The topography ranges from low lying swampland to high alpine summits. This wilderness area includes Mt. Marcy (5344 ft. elev.) and some of the most rugged terrain in the eastern United States (New York State, 1989) and as such attracts a large and diverse user group.

Existing unit management plans of Forest Preserve Wilderness Areas suggest that there is little information available regarding sociological aspects of recreational users in the Forest Preserve in New York State (New York State, 1985; New York State, 1987a; New York State, 1987b). Virtually all wilderness management plans on Forest Preserve lands have focused on either the biological or physical impacts of recreation. Similarly, there have been very few sociological studies of eastern wilderness area users. Hendee et al. (1990) discusses, at great length, the necessity of incorporating the sociological aspects of recreational use in planning for wilderness management.

The proximity of the six million acre Forest Preserve to large metropolitan areas allows access for a very diverse range of users. The HPWA lies within a single days travel of 70 million people. The unique character of the HPWA attracted over 110,000 users in 1991; many of whom may be seeking an experience that could better be provided in an equally scenic but less primitive Recreation Opportunity Spectrum (ROS) class area (e.g., non-wilderness).

Few studies of users in Adirondack wilderness areas exist (ORRRC, 1962; Snowden, 1976). The proximity to large urban populations suggests that user motivations to visit and expectations for wilderness areas may be significantly different from their more remote western United States counterparts. This study explores the satisfaction of users as

measured by several sociological indicators, based on the season and time when the visit to the HPWA occurred.

One goal of wilderness management is to manage the resource to promote wilderness dependent activities (Hendee et al., 1990). Solitude and undisturbed environment are two important traits commonly attributed to wilderness (Hendee et al., 1990; Public Law 88-577; Nash, 1967). As one extreme in the ROS, wilderness areas are managed for uses that require these wilderness dependent characteristics. User activities that can achieve user satisfaction in a more intensively managed or modified environment (e.g., a wild forest in the Adirondack Forest Preserve) should be directed to use these areas.

The crowding model advanced by Manning (1986) suggests that perceived crowding is affected by contacts between users as well as various situational variables. Contacts are evaluated in the context of the characteristics of the individual and the parties contacted. The level to which these contacts were perceived as favorable, or unfavorable, is based on many variables including weather, quality of the resource, and others.

Various theories have been advanced to describe behavior change to maintain satisfaction when crowding has occurred. Users may change their behavior by altering the length of time or time periods during which they visit the area. Examples of this behavior could be taking longer trips to get into more remote parts of the wilderness area, or altering the time of year in which they visit the area. In both these instances, the user has changed his/her visit temporally based on personal beliefs about when and where the conditions of the wilderness will provide a more satisfying experience. An example of this displacement behavior is evidenced by the users choosing other areas. Users who can not mitigate their dissatisfaction by temporal modification of their visits will find other areas which will better suit their needs.

The motivations of recreationists who visit the HPWA are based, in part, on the social benefits that are derived from the outdoor experience. Snowden (1976) observed that satisfaction of winter users of the HPWA could be measured by the congruence of pre-trip expectations and on-site experiences. This paper applies this theory to "warm season" users of the HPWA. Use of the HPWA during the months of May through October fluctuates greatly based on season and time of week. The premise of this study was that HPWA users were temporally self-selecting in response to their expected level of various sociological conditions in the HPWA.

Ideally a wilderness area, such as the HPWA, will be self-selecting for user groups over time. Experience in the area should allow the user the ability to select his/her time of visit based on the sociological conditions present in the area. If Snowden's (1976) thesis is accurate during higher use periods, users who return to an area would expect a given set of conditions to exist, and then would be satisfied if the expected level of these conditions were met. Users who visit during the summer or on weekends would expect to experience a higher level of congestion based on more users being in the HPWA during these times than would be experienced during the spring or during the week. User displacement theory (Manning, 1986) suggests that if an area was self regulating, then users requiring more solitude during their wilderness experience would be expected to visit the area during periods when use is low; whereas, users seeking a less solitary experience would be expected to visit the area during heavier use days.

Hikers may anticipate differing levels of sociological conditions based on the time (weekday versus weekend), and season (spring, summer, or fall) of their visit. If user satisfaction can be estimated by congruency of pre-trip expectations and on-site experiences, managers may be able to better direct users to areas that could provide a more satisfying experience for the individual recreationist. By knowing the

expectations of potential users and the attributes and opportunities of the unit, management techniques may be used to redirect some use to other ROS areas that will better meet the users' sociological expectations and potentially reduce the degradation to areas located in fragile ecosystems or those currently receiving an excess of users, such as the HPWA. Trailhead registrations in the HPWA prior to the study indicated that use levels were quite variable both by season and by time of the week. User density was considered to be higher: (1) during the summer season (June 15th through September 7th), than during the Spring or Fall, and (2) during the weekend (Friday through Sunday) rather than during the week.

Methods

The study area consisted of the eastern half of the High Peaks Wilderness Area. This zone, bordered on the west by the Indian Pass trail, receives the majority of use in the HPWA. Due to the few trails and difficulty of access to the western area, it was excluded from this study. Sampling of users occurred at the three major trailheads (Adirondack Loj, The Garden, and Upper Works) of the eight trailheads in the eastern HPWA. These three trailheads receive over 80% of the present use in the HPWA (New York State, 1992). Sites were systematically selected so that two out of the three sites were sampled every six days throughout the three sampling periods of spring, summer, and fall from May 15th through October 7th, 1992.

Each sampling day consisted of two four-hour sessions. Hikers were interviewed at trailheads where data was collected regarding type of trip, length of stay, trailhead registration compliance, and home address. A questionnaire was mailed to each individual, with the target delivery date of one week from interview date. The questionnaire collected data on their trip in the context of the following sociological indicators:

1. the beauty of the mountains and forests;
2. amount of undisturbed nature in the area;
3. level of solitude, getting away from others;
4. challenge and adventure;
5. number of other parties encountered on trails;
6. number of other parties encountered at overlooks;
7. number of other parties encountered on summits;
8. number of other parties encountered at campsites; and
9. litter and garbage.

The respondents were asked to describe their ideal wilderness setting, the level expected to be observed during this trip, the actual level experienced, and the level of satisfaction for each of these indicators on a 5-point Likert type scale. Data was collected regarding experience in hiking and camping, experience in wilderness and primitive areas, and respondent reaction to a series of potential future management restrictions.

The three trailheads were sampled on 25 days over the 150-day survey period. Interviews were conducted with and questionnaires were mailed to 643 individuals. The initial mailing and two follow-up reminders resulted in a response rate of 76%.

Hiker Characteristics

Survey respondents represented 20 states in the United States and 2 foreign countries. Approximately half of respondents were New York residents (Figure 1). The other 19 states accounted for 32% of the respondents, with 15% from New England states, and 11% from Mid-Atlantic states other than New York. Canadian residents represented 17% of respondents, mostly from the provinces of Ontario and Quebec. Approximately 0.5% were from foreign countries other than Canada.

A majority of respondents (62%) were interviewed during a summer trip to the HPWA, with 16% interviewed during a spring trip and 22% in the fall. The typical hiking party averaged 3.6 people, but ranged in size from 1 to 19. These

groups spent an average of 2.4 days in the HPWA, ranging from 1 to 12 days. Males accounted for 74% of the total respondents. Individuals who complied with voluntary trailhead registration accounted for 89% of the respondents (measured by direct observation).

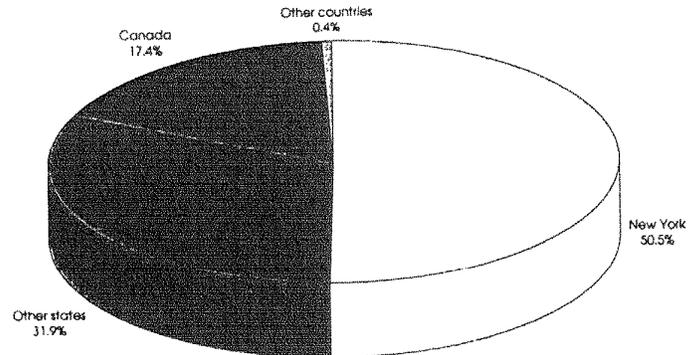


Figure 1. Residence of Respondents, HPWA, 1992.

The type of activity that hikers and campers took part in tend to become of a more primitive and independent nature over time, based on their experience camping or hiking (Table 1). Respondents tend to have nearly equal general camping and hiking experience, but tend to have more experience hiking in primitive/wilderness areas or the HPWA than camping in these areas. In both hiking and camping, respondents had more experience in the activity in general than experience in the activity in a wilderness/primitive environment. These findings suggest that as a hiker/camper's experience increases, they may tend to seek out more independent or dispersed activities.

Table 1. Experience of respondents, HPWA, 1992.

Type of Experience	Experience (Years)	Range (Years)
Hiking - general	14.7	0 -- 60
Camping - general	15.0	0 -- 60
Hiking - wilderness / primitive areas	11.3	0 -- 50
Camping - wilderness / primitive areas	9.8	0 -- 50
Hiking - HPWA	6.3	0 -- 50
Camping - HPWA	4.8	0 -- 40

Sociological Characteristics

The summer season was considered to be the highest use period in the HPWA. During this period as many as several hundred hikers may pass through a trailhead during a given day. This is contrasted with the spring and fall periods where use levels were measured at 0 to 3 persons using the trailhead per day. Use of the area during these times is discouraged by environmental and other factors, such as weather, trail

conditions and an abundance of biting flies. A Chi-square analysis (Table 2) of variation of the sociological variables measured indicated that there was a statistically significant difference between season or day for some variables. In only one variable, the actual level of other parties encountered on trails, did both season and day of week indicate a statistical difference at the $p < 0.10$ significance level. Several other variables had a statistically significant ($p < 0.10$) difference in either season or day of week, but not both. A review of the Chi-square statistics (Table 2) suggests that although a statistical significance was evident in some instances, no trends could be established that would indicate manageable

sub-populations based on either the season or day of week that individuals visited the HPWA. For example, although the actual level of the variable 'others encountered on trails' was statistically significant across both season ($p = 0.02$) and day of week ($p = 0.04$), there was not an observable trend that would suggest that users during spring or fall experienced a lower level of encounters than their summer counterparts. Similarly, weekend users did not indicate more encounters than their weekday counterparts. Since no temporal trends could be established by either day of week or season, the variables have been treated as homogenous groups within the context of this study.

Table 2. Statistically Significant sociological indicators by season and time of the week visited (Chi-square, $p < 0.10$), HPWA, 1992.

Sociological Condition	Ideal Wilderness		Expected in HPWA		Actual in HPWA		Satisfaction	
	Season	Day	Season	Day	Season	Day	Season	Day
Natural beauty ^a	--	--	--	--	--	--	--	--
Others on trails ^a	--	--	--	--	0.020	0.040	0.060	--
Others at overlooks ^a	--	--	--	--	--	--	0.022	--
Others at summits ^a	--	--	--	0.067	--	0.092	0.003	--
Others at campsites ^a	--	--	0.020	--	--	0.007	--	0.029
Get away / solitude ^a	--	0.039	--	--	--	--	--	--
Garbage ^b	0.097	--	--	--	--	0.017	--	--
Nature ^a	--	0.020	0.005	--	0.020	--	--	--
Challenge ^c	--	0.009	--	--	--	0.096	--	0.093

a: d.f. = 8 $\chi^2 = 13.36$

b: d.f. = 2 $\chi^2 = 4.61$

c: d.f. = 6 $\chi^2 = 10.64$

The sociological conditions measured were sub-divided into two groups, positive and negative attributes, determined by whether an increase in the variable would increase (positive attribute) or decrease (negative attribute) the quality of the wilderness experience. Respondents reported lower levels of all positive attributes were expected during their trips to the HPWA than would be found in an ideal wilderness setting (Table 3). The respondents accurately reported the level of natural beauty and the challenge that the area offered. The levels of undisturbed nature and solitude were slightly over

estimated by respondents. The level of satisfaction for each condition varied in proportion to variation in the expected and actual levels of positive attributes. Respondents reported higher levels of all negative attributes were expected and experienced than would be found in an ideal wilderness setting (Table 3). Expected and actual levels of sociological conditions were similar for all negative attributes except that slightly more other groups were encountered on trails and at overlooks than were expected.

Table 3. Level of sociological conditions in ideal wilderness, expected in HPWA, actually experienced, and level of satisfaction (mean Likert scores), HPWA, 1992.

Sociological Condition	Ideal Wilderness ^a	Expected in HPWA ^a	Actually Experienced ^a	Level of Satisfaction ^b
Positive Attributes				
Natural Beauty	3.88	3.75	3.71	1.76
Challenge	3.21	3.06	3.03	1.41
Undisturbed Nature	3.29	2.70	2.52	0.88
Solitude	3.14	2.48	2.24	0.59
Negative Attributes				
Others - summits	1.52	2.33	2.32	0.32
Others - campsites	1.56	2.31	2.43	0.09
Others - trails	1.55	2.29	2.46	0.38
Others - overlooks	1.15	2.23	2.11	0.48
Garbage	0.10	1.18	1.19	0.81

Likert scales:

a: 0 to 4, where 0 = "none" and 4 = "very much".

b: Satisfaction -2 to +2, where -2 = "very dissatisfied" and +2 = "very satisfied".

Differences in levels of ideal, expected and actually experienced conditions were analyzed for each of the sociological conditions (Table 4). A disparity index value was determined for each variable by subtracting the Likert value for the actual level of each sociological condition from the ideal level (Table 4, Column 2) and expected level (Table 4, Column 3). Distribution of ideal and expected disparity indices for positive conditions were similar. Disparity indices for all

positive attributes were positive, indicating that the actual levels of attributes was less than the level expected and the level occurring in an ideal wilderness area. Satisfaction levels were positive despite a disparity between expectations and actual levels, although satisfaction did increase as disparity decreased.

Table 4. Level of disparity between ideal, expected and actual conditions and level of satisfaction (mean Likert scores), HPWA, 1992.

Sociological Condition	DISPARITY INDEX		Level of Satisfaction
	Ideal vs. Actual ^a	Expected vs. Actual ^b	
Positive Attributes			
Solitude	0.90	0.24	0.59
Undisturbed Nature	0.76	0.19	0.88
Natural Beauty	0.18	0.04	1.76
Challenge	0.18	0.03	1.41
Negative Attributes			
Others - overlooks	-0.61	0.11	0.48
Others - summits	-0.80	0.01	0.32
Garbage	-0.92	-0.02	0.81
Others - campsites	-0.87	-0.10	0.09
Others - trails	-0.91	-0.17	0.38

a: Disparity Index (DI) = (level of Ideal) - (level of Actual)

b: Disparity Index (DI) = (level of Expected) - (level of Actual)

Respondents slightly over estimated three of the five negative attributes of wilderness: (1) Amount of garbage, (2) Others at campsites, and (3) Others at trails (Table 4). Respondents under estimated the amount of (1) Others at overlooks, and (2) Others at summits. Satisfaction was expected to be inversely related to the Disparity Index (DI) for negative attributes; as DI decreased individuals would experience less of the negative attribute than was expected and a more satisfying experience would result. This relationship was congruent with three of the five negative attributes measured. The two exceptions, 'amount of garbage' and 'number of others on trails' were conditions primarily experienced en route to a destination (campsite or summit) and may not have as great an impact on satisfaction than attributes which primarily occur at destination areas.

In both positive and negative attributes, satisfaction was elastic with respect to DI. Activities were reported to contribute positively to satisfaction despite the observation that a higher or lower level of a condition was experienced than was expected for negative and positive attributes, respectively.

Discussion

The results of this study have implications for wilderness management in the Adirondack Forest Preserve. The sociological conditions that were used as indicators of solitude in the HPWA indicate that "warm season" HPWA users are not self-selecting the times of their visit based on the expected levels of these indicators. Hikers and campers also continue to have an satisfying experience even though the levels of use are greater than expected. The results of this study indicates at least four possible observations why temporal displacement is not evident in the HPWA:

1. Solitude may not be a driving factor in choice of activity. Drury (1990) indicates that existing information available to recreationists tends to concentrate on those areas of the Forest Preserve that are designated wilderness areas. The results of this study indicate that many users may be seeking an activity not dependent on the wilderness setting.
2. Traditional displacement theories may not adequately describe distribution of users in the HPWA. While similar data is non-existent for other units in the Forest Preserve, users seeking an experience with a high degree of solitude may be avoiding the HPWA, in favor of other areas in the Preserve which provide a greater wilderness experience.
3. Present behavior of users may be a result of adaptation to present conditions. Users may rationalize that their experiences are producing satisfaction even though expectations are not being met. Over time users may adapt their definition of wilderness, through rationalization or cognitive dissonance, based on their experiences in the HPWA.

4. The experience that some users are seeking in the HPWA might be better met in another, less primitive ROS class, area. By educating potential users of other areas and opportunities in wild forest areas, managers might redistribute use in a manner that both increases user satisfaction and protects the natural resource from overuse.

Further research is needed on other Forest Preserve units to determine to what degree geographic displacement exists within the Adirondack Park and how managers can best redistribute use in the Forest Preserve to better protect the resource while maintaining user satisfaction and providing a true wilderness experience.

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GENERAL RESPONSIBLE ENVIRONMENTAL BEHAVIOR AMONG BOATERS ON THE CHESAPEAKE BAY

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The purpose of this study was to determine the degree of environmental concern among boater's on the Chesapeake Bay and to investigate the relationship of representative indicators of the three components of McGuire's (1969) attitudinal model to positive environmental action among boaters. The findings show that there is a relationship between the cognitive, represented by perceived knowledge of ecology, the affective, represented by environmental concern, and the conative, represented by verbal commitment, components of an attitude construct with pro-environmental behavior among boaters on the Chesapeake Bay.

Introduction

Since the early to mid-1970's, the concern for the environmental quality of our planet has grown rapidly, thereby generating a tremendous body of research in the environmental and social sciences. "Social and behavioral scientists have been actively involved in developing techniques for measuring environmental concern" (Scott and Willits, 1991, p. 4). Recent research efforts have focused more on the use of multiple-item measures of environmental behavior versus single-items, thereby improving the reliability of those measures and increasing the application of advanced statistical methods (Van Liere & Dunlap, 1981; Graefe et al., 1988).

According to Ajzen & Fishbein (1973), several studies (e.g. Allport, 1935; Campbell, 1963) have focused on attitudes as an explanatory device for a change in human behavior when subjected to external stimuli or control measures in quasi-experimental research. Unfortunately, the premise that a strong relationship exists between attitudes and overt behavior has not been supported in a number of studies (e.g. Berg, 1966; Bray, 1950; Kutner, Wilkins, & Yarrow, 1952) reviewed by Ajzen & Fishbein (1973). Recently, McGuire and Walsh (1992, p. 1) state that, "the results of the research regarding attitudinal relationships have varied and have been inconclusive." Of primary concern has been the question of whether or not attitudes, positively or negatively, influence overt behavior (Manfredo, Yuan, and McGuire, 1992). In support, Manfredo et al. (1992, p. 158) wrote that, "research in the late 1960s and early 1970s showed weak attitude-behavior relationships, and psychologists debated the utility of the attitude concept." Attitudes are multidimensional, consisting of a number of interrelated constructs, i.e., cognitive (knowledge), affective, and conative (intentions) components (McGuire, 1969; Rosenberg & Hovland, 1960). Human behavior is difficult to predict and single constructs such as attitudes cannot accurately forecast behavior (Ajzen & Fishbein, 1973; Heberlein and Black, 1976; Hines, 1985). Nevertheless, Manfredo et al. (1992) argue that improvements

have been made in both theory and methodology that have led to improved predictions of behaviors from attitudes, and a further acceptance of the attitude-causes-behavior relationship. Research efforts, now, are apt to focus more on the question of *when* do attitudes predict behavior rather than questioning *if* attitudes predict behavior.

In review of the multidimensional aspects of the attitude construct (McGuire, 1969; Rosenberg & Hovland, 1960), the cognitive component of this concept consists of the knowledge facet of an attitude. Personal thoughts and ideas also contribute to this entity. The affective component includes those variables that measure feelings and beliefs about certain issues. In support, Fishbein and Ajzen, (1975) claim that an attitude consists of *belief strength*, denoting that objects may have certain attributes and that individuals *generally evaluate* each of these attributes. McGuire (1992, p. 15) states that "a person's attitude toward any object is a function of belief (belief strength) in regard to the object's attributes, as well as a personal evaluation of these attributes." Thus, information about an object influences the formation of a belief about that object which, in turn, is based upon the object's attributes, thereby resulting in the formulation of an attitude about it (McGuire, 1992; Fishbein and Ajzen, 1975; McGuire, 1969). Finally, the conative component "refers to the action or behavioral tendencies of an individual regarding an object" (McGuire, 1992, p. 15).

Recently, an examination of environmental attitudes among college students at the Pennsylvania State University was completed (McGuire, 1992). This study investigated two entities, affective and conative, of an attitudinal construct in order to measure the strength of a third entity, the cognitive component. The findings indicated that environmental concern was a reasonable predictor of environmental behavioral intention and that socio-demographics have relatively little or no influence on environmental attitudes (p. 1). This study builds on McGuire's (1992) investigation by focusing on the examination of all three components of McGuire's (1969) attitudinal model (cognitive, affective, and conative) to measure the relationship of those variables representing each of these components to actual responsible environmental behavior.

Purpose

The purpose of this study was to determine the degree of environmental concern among boaters on the Chesapeake Bay and to investigate the relationship of representative indicators of the three entities of McGuire's (1969) attitude construct to positive environmental action among boaters. Several sociodemographic variables such as income, age, education, and stand on political issues were also tested against environmental concern, verbal commitment, perceived knowledge of ecology, and general responsible environmental behavior among boaters.

Methodology

A mail survey using multiple mailings was sent to a sample of 751 boat owners in Maryland with vessels 22 feet or larger used on the Chesapeake Bay following the 1992 boating season. The sample was stratified and drawn at random from state boat registration records provided by the Maryland Marine Trades Association. With nine refusals and twenty-nine survey returns because of an insufficient address, the total sample was reduced to 713. A total of 291 usable surveys were returned representing a 41 percent response rate. In order to assess nonresponse bias, a phone interview was made to a random sample of nonrespondents (N=30). Of those phone survey respondents who recalled receiving a mail survey last fall (54%; N=19), 63 percent were classified as *nonusers* based on their reason for not completing the survey, i.e., they did not go boating in 1992.

Instrumentation

An eight-page, self-administered, mail-back questionnaire was comprised of several items that have been tested in previous research (Dunlap and Van Liere, 1978; Maloney, Ward, and Braucht, 1975; Price Waterhouse, 1991). The structure and format of the instrument was developed for dissertation research at Pennsylvania State University by the author to test a conceptual framework of responsible environmental behavior (adapted from Hines, Hungerford, & Tomera, 1987; Sivek & Hungerford, 1989/90; Hungerford & Volk, 1990).

The dependent variable, general responsible environmental behavior (GREB), is defined as any individual or group action aimed to do what is environmentally right to help protect the environment (Sivek & Hungerford, 1989/90). A true/false ten-item actual behavior scale, developed by Maloney, Ward and Braucht (1975) was used to measure boater actions towards protecting the environment (Table 1).

Several independent variables, which represent the three components of McGuire's (1969) attitude construct, were used in this examination. First, a true/false ten-item verbal commitment scale, developed by Maloney, Ward and Braucht (1975) was used to measure boaters' willingness to participate in certain environmental protection activities as a measure of the conative component (Table 2). Secondly, environmental concern, a compassionate perspective or concern for the natural environment, was measured by twelve items (i.e., one = "strongly disagree" and five = "strongly agree") devised by Dunlap and Van Liere (1978) (Table 3). Considered to be a multidimensional measure of the affective component, this scale attempts to assess the acceptance of the ideas of the need to preserve the balance of nature, the belief that growth should be limited, and the notion that humans are a part of, rather than the ruler of nature. Thirdly, a one-item statement was used to measure respondent perceived knowledge of ecology (Table 4). This variable, measured on a five-point scale (i.e., to what extent are you knowledgeable) with one being "not at all" and five "to a great extent," represents one measure of the cognitive component.

Treatment of Data

Following a descriptive profile of the respondents, several indices were created to represent each of the variables subject to examination. The dependent variable (GREB) and the verbal commitment scale, each consisting of ten true-false items, were created as the sum of the items divided by ten to compute an overall score. The environmental concern scale was computed as the mean of twelve items to calculate a concern score. Cronbach's alpha was used to check the internal consistency of each index. Although modest, the reliability for both the GREB (Cronbach alpha=.68) and verbal commitment (Cronbach alpha=.63) scales were acceptable and consistent with prior research. For the environmental concern index, the reliability coefficient (.82) was relatively higher than reported in other studies using this scale. The sub-scales of environmental concern had the following alpha coefficients: balance of nature, .72; humans-over-nature, .65; and limits to growth, .62. Finally, each of these variables were entered into a stepwise multiple regression model to determine the strongest predictor of GREB. From the multiple regression procedure, zero order correlations, standardized beta coefficients and a model to graphically illustrate the relationships between the variables are presented.

Analysis and Findings

Tables 1 through 4 show the frequency distribution of each item used to create indices used in the regression analysis. As expected, the mean score for pro-environmental behavior (mean=4.9; Table 1) was lower than the mean for verbal commitment (mean=5.4; Table 2). This finding indicates that boater willingness to participate in pro-environmental activities was greater than their actual behavior. The mean score for level of environmental concern among boaters was

3.9. Boaters' perceived knowledge about ecology was moderate (mean=3.4; Table 4).

Table 1. Frequency of responses to general responsible Environmental behavior (values in percent).

	N	RESPONSE	
		True	False
I have switched products for ecological reasons	285	89.1	10.9
I subscribe to ecological publications	285	21.8	78.2
I have never joined a clean-up drive ^a	285	45.6	54.4
I have never attended a meeting ^a related to ecology	285	52.3	47.7
I have never written a congressman ^a concerning pollution problems	283	74.6	25.4
I keep track of my congressmen's and senators' voting records on environmental issues	284	41.5	58.5
I have attended a meeting of an organization specifically concerned with bettering the environment	285	32.3	67.7
I have contacted a community agency to find out what I can do about pollution	284	15.8	84.2
I have never actually bought a ^a product because it had a lower polluting effect	284	12.3	87.7
I do not make a special effort to ^a buy products in recyclable containers	284	26.4	73.6

^a Item reverse coded prior to further analysis. Scale Mean = 4.9 Std=2.18

To better understand the ways the independent variables relate to general responsible environmental behavior (GREB), a series of multiple regression equations were conducted. This was necessary to control for possible interrelationships among the independent variables and to identify those variables that contribute most to the total variance explained for GREB. All possible two-way interactions involving the GREB variable were tested for statistical significance as well. Three regression models examined the relationship between sociodemographics and three general environmental dependent variables: environmental concern, verbal commitment, and knowledge of ecology. A fourth regression model examined the influence of sociodemographics on GREB. The fifth model included sociodemographics, three general environmental variables and the dependent variable (GREB). The results of the regression analysis are shown in Table 5.

Pertinent to the multiple regression analysis, stand on political issues ($B=.146$), age ($B=-.161$), and income ($B=-.185$) are significant predictors of environmental concern ($R^2=.091$; $p<.000$). In addition, all four independent sociodemographic variables were significant correlates of environmental concern. Income ($r=-.208$) was the strongest followed by age ($r=-.175$), stand on political issues ($r=.166$) and education ($r=-.161$). These findings indicate that as income, age and education increase environmental concern decreases; meanwhile, liberals have greater concern for the environment than do conservatives.

Table 2. Frequency of Responses to Verbal Commitment (Values in Percent)

	N	RESPONSE	
		True	False
I'd be willing to ride a bicycle to work in order to reduce air pollution	284	26.4	73.6
I would probably never join a ^a group or club which is concerned solely with ecological issues	285	52.3	47.7
I would be willing to use a rapid transit system to help reduce air pollution	285	74.0	26.0
I'm not willing to give up driving ^a on a weekend due to a smog alert	285	38.2	61.8
I'm not really willing to go out ^a of my way to do much about ecology since that's the government's job	284	3.5	96.5
I would donate a day's pay to a foundation to help improve the environment	282	44.0	56.0
I would be willing to stop buying products from companies guilty of polluting the environment, even though it might be inconvenient	283	87.3	12.7
I'd be willing to write my congressman weekly concerning ecological problems	283	19.8	80.2
I probably wouldn't go house ^a to house to distribute literature on the environment	285	81.8	18.2
I would not be willing to pay ^a a pollution tax even if it would considerably decrease the smog problem	284	37.0	63.0

^a Item reverse coded prior to further analysis.
Scale Mean = 5.4 Std=2.11

The relationship between these four variables and verbal commitment was weaker than with environmental concern. Stand on political issues ($B=.264$), based on a conservatism-liberalism continuum, was the only significant indicator of verbal commitment in the multiple regression ($R^2=.070$; $p<.000$). Liberals expressed more commitment to proactive behavior than conservatives. Also, two correlates of verbal commitment were identified, income ($r=-.143$) and stand on political issues ($r=.264$). The regression equation including perceived knowledge of ecology as the dependent variable shows education as a predictor variable ($R^2=.030$; $p<.05$). To explore the relationship between sociodemographic variables and GREB, a separate regression was performed. As expected there was no direct relationship between these variables.

Next, a regression model to include the relationship of the three general environmental variables to GREB was conducted. Verbal commitment ($B=.386$) and perceived knowledge of ecology ($B=.238$) were predictors of GREB ($R^2=.218$; $p<.001$). All of the bivariate relationships examined between environmental concern, verbal commitment, perceived knowledge of ecology, and GREB were positive, linear, and significant at the .05 level or greater. For these items the

findings imply that as the concern for the environment, perceived knowledge of ecology, and willingness to take pro-environmental action of boaters increases, there is a simultaneous increase in their actual environmental behavior. For instance, the relationship between verbal commitment and GREB was strongest ($r=.40$; $p<.001$). This indicates that as verbal commitment towards pro-environmental behavior increases, actual pro-environmental behavior is likely to increase (i.e., one more is likely to switch products for ecological reasons).

When the sociodemographic variables were added to the regression model, once again, all three general environmental variables were shown to be significantly related to GREB by the bivariate analyses. When the interrelationships among these variables were controlled using multiple regression, two of the three general environmental variables were significantly related to GREB at the .001 level. Verbal commitment was again the best predictor indicating that intentions/willingness to act in a pro-environmental manner are predictors of overt behavior. Perceived knowledge of ecology was also significantly related to GREB. In addition, one sociodemographic variable, stand on political issues contributed to the regression model. This was the weakest of the three predictors and added only .5 to the percentage of variance explained in GREB ($R^2=.223$; $p<.001$). Figure 1 was developed to graphically depict the results of this analysis.

Discussion

To date, researchers have examined the relationship of several variables (e.g., environmental attitudes, intention to act, knowledge of issues) to responsible environmental behavior. In this study, verbal commitment (intentions) was noted as the strongest indicator of behavior. Ajzen and Fishbein (1973) depict behavioral intention as the strongest predictor of overt behavior. They argue that the predictive strength of the intention construct of overt behavior is dependent upon the strength of the interaction between its component variables (i.e., attitude and normative beliefs) and the impact of other external/situational variables (e.g., personality traits, locus of control, etc.). In this study, the predictive strength of verbal commitment increased when sociodemographic variables were added to the regression model.

Many studies of environmental behavior have found very little evidence that knowledge influences actual behavior. Conversely, perceived knowledge of ecology was noted to predict behavior in this study. As self-perceived knowledge of ecology increased, there was a subsequent increase in proactive behavior. These results echo findings of other studies showing that relationships between various indicators of the cognitive, affective, and conative aspects of attitudes provide a better understanding of why people do what they do. The attitude-behavior relationship is, indeed, complex and a more sophisticated operationalization of indicator variables is necessary. Attitudinal research should follow Manfredo et al.'s (1992) contention that research efforts should focus on the question of "when do attitudes predict behavior" rather than "if attitudes predict behavior."

In summary, this study has shown that there is a bivariate relationship between each of the scales representing the three components of McGuire's (1969) attitudinal model. As the level of environmental concern among boaters in Maryland increases, so does the overall score for general responsible environmental behavior. This relationship is true for the other two scales (i.e., perceived knowledge of ecology and verbal commitment) examined as well. The strongest of the bivariate relationships was between verbal commitment and GREB. Verbal commitment was, also, the strongest predictor of GREB followed by the perceived knowledge of ecology. These findings support Fishbein and Ajzen's (1975) conclusion that intentions to comply is the strongest predictor of actual behavior.

Table 3. Frequency of responses to items of environmental concern (values in percent).

	Strongly Disagree 1	Disagree 2	Un-decided 3	Agree 4	Strongly Agree 5	Mean
<i>Balance of Nature</i>						
The balance of nature is very delicate and easily upset.	0.0	11.1	13.5	43.9	31.5	4.0
Mankind is severely abusing the environment.	0.0	6.6	11.8	40.1	41.5	4.2
When humans interfere with nature, it often produces disastrous consequences.	2.1	13.5	11.8	47.1	25.6	3.8
Humans must live in harmony with nature in order to survive.	0.7	1.4	4.5	48.1	45.3	4.4
<i>Humans Over Nature</i>						
Plants and animals exist primarily to ^a be used by humans.	40.5	37.7	8.3	9.7	3.8	4.0
Mankind was created to rule over the ^a rest of nature.	31.8	36.4	12.2	12.6	7.0	3.7
Humans have the right to modify the ^a natural environment to suit their needs.	29.1	40.5	10.7	17.3	2.4	3.8
Humans need not adapt to the natural ^a environment because they can remake it to suit their needs.	57.4	35.3	5.2	1.0	1.0	4.5
<i>Limits to Growth</i>						
There are limits to growth beyond which our industrialized society can't expand	6.9	17.6	22.5	28.0	24.9	3.5
The earth is like a spaceship with only limited room and resources.	2.4	6.2	6.2	42.2	42.9	4.2
To maintain a healthy economy, we will have to develop a steady-state economy where industrial growth is controlled.	5.9	15.2	19.4	35.6	23.9	3.6
We are approaching the limit of the number of people the earth can support.	6.3	31.8	27.3	23.1	11.5	3.0

^a Item reverse coded prior to further analysis (i.e., mean scores represent the data after a recode).
N=289 Scale Mean = 3.9

Table 4. Frequency of responses to perceived knowledge of ecology (values in percent).

	N	Not at all 1	2	3	4	To a Great Extent 5
To what extent do you believe that you are knowledgeable about ecology?	288	3.8	12.8	36.5	31.9	14.9

Scale Mean = 3.4

Std=1.02

Environmental matters remain a grave concern and may constitute a serious threat to human survival. If policy makers are to adequately deal with environmental problems they will benefit from up to date information on public opinion as well as on factors that tend to influence responsible environmental behavior in a number of different recreational settings.

The environmental quality of our planet depends on a continual effort to protect our natural resources. To do so, a better understanding of human behavior and the influences that contribute to or deter pro-environmental behavior are necessary.

Table 5. The effect of socio-demographics and general environmental variables on general responsible environmental behavior.

Independent Variables	Dependent Variables								
	Environmental Concern (N=202)		Verbal Commitment (N=200)		Knowledge of Ecology (N=201)		General Responsible Environmental Behavior		
	r	Beta	r	Beta	r	Beta	Reduced Model (N=200)	Total Model (N=199)	
Sociodemographics									
Income	-.208**	-.185**	-.143*	-.119	.009	-.030	ns	-.007	.039
Age	-.175*	-.161*	-.066***	-.057	.012	-.008	ns	.039	.059*
Stand on Political Issues	.166*	.146	.264	.264***	.058	.046	ns	-.024	-.146*
Education	-.161*	-.122	.057	.038	.174**	.174*	ns	.087	.035
R² Sociodemographic Model									
		.091***		.070***		.030*	ns		
General Environmental Variables (N=225)									
Verbal Commitment							.402***	.396***	.421***
Knowledge of Ecology						.264***	.238***	.221***	
Environmental Concern						.182**	.029**	.050	
R² General Environmental Variables Model									
							.218***		.223***

*** Significant at .001

** Significant at .01

* Significant at .05

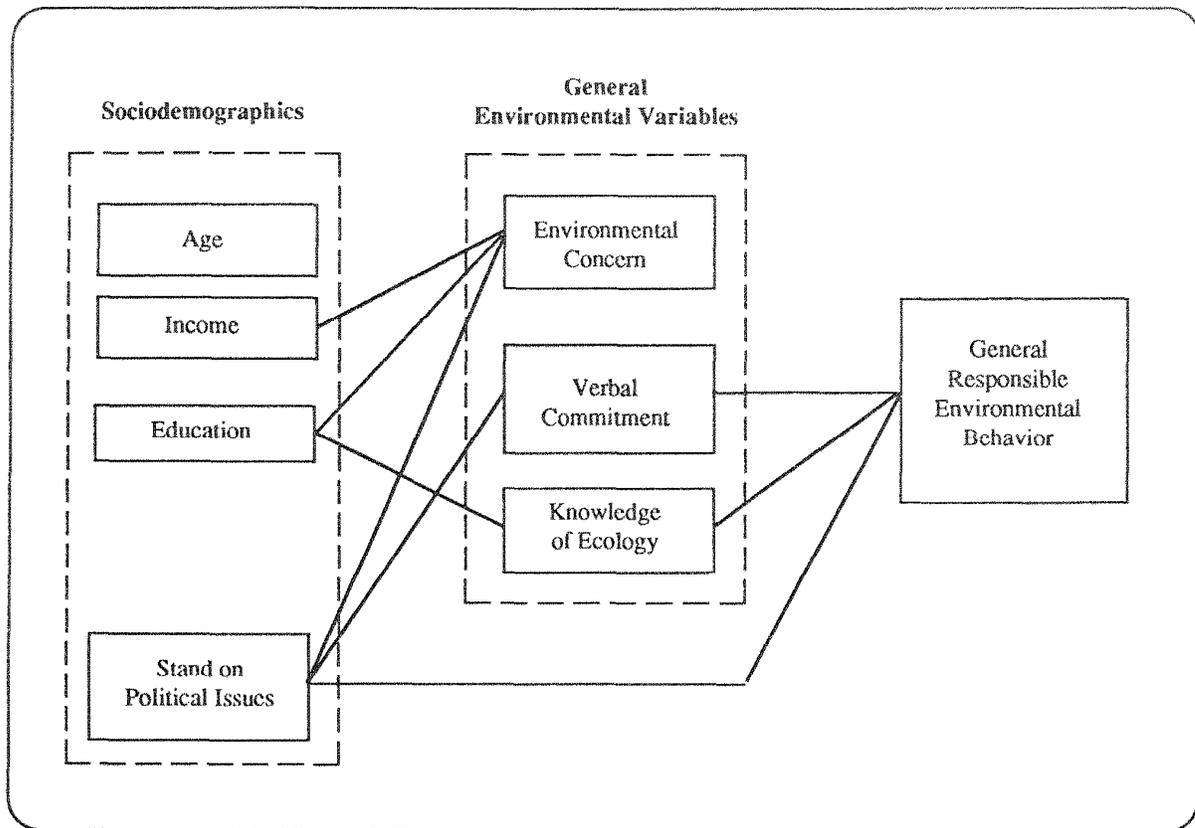


Figure 1. Model of general responsible environmental behavior.

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**THE IMPACTS OF MARINE DEBRIS,
WEATHER CONDITIONS, AND
UNEXPECTED EVENTS ON RECREATIONAL
BOATER SATISFACTION ON THE
DELAWARE INLAND BAYS**

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Maintaining boating quality requires attention to the inter-related set of indicators that are most strongly associated with overall visitor satisfaction. This study of boaters was conducted on the Delaware Inland Bays during the summer of 1991 as an extension of satisfaction studies done at Lake Raystown in 1987 and Berlin Lake in 1990. In an attempt to better understand and explain satisfaction, the pool of experiential impact factors was expanded to include marine debris, weather conditions and unexpected events. Though the overall explanatory power of this study was slightly less than that in previous studies, the variables of wind and weather conditions and unexpected events were shown to add directly to overall satisfaction.

Introduction

More than one-half the population of America (53%) lives within 50 miles of the coast, crowding people into less than ten percent of the nation's land. The percentage is expected to continue to grow, with some demographers predicting that, 80% of the population will crowd into coastal communities by the year 2000 (Lewis 1989). As the shorelines become more crowded, recreation usage can be expected to continue growing accompanied by multiple demands on the resource (e.g., industrial development, residential development, recreation, and preservation). Between the mid 1950s and mid-1980s nearly 5,000,000 acres of tidal wetlands were lost to development (Delaney and Wiggen 1989). This propensity of humanity to live near the water has great implications for the recreation manager who will have to balance conflicting demands and maximize appropriate use.

Satisfaction has often been identified as the principle product of the recreation experience, the major goal of recreation resource management (Driver and Tocher 1970), and the most commonly used indicator of quality in the recreation experience. Though little research directly ties coastal impacts to recreation satisfaction, there is considerable research linking various types of social and environmental impacts to recreation satisfaction (Cheek and Field 1977; Dorfman 1979; Titre and Mills 1982; Cole 1981; Graefe and Fedler 1986; Williams 1988).

Graefe and Drogin (1989) integrated two lines of previous research to study satisfaction among boaters at Raystown Lake. These included studies focusing on the identification of determinants of satisfaction (e.g., Peterson 1973; Ditton, Graefe and Fedler 1981; Graefe and Fedler 1986) and studies focusing more specifically on the influence of crowding and other density related impacts on satisfaction (Graefe Vaske and Kuss 1984; Manning 1986; Shelby and Heberlein 1986). In the Raystown study, it was found that 42 percent of the variance in boater satisfaction could be explained from a pool of independent variables that included measures of crowding, conflict, displacement, and safety related considerations. A replication and extension was performed at Berlin Lake incorporating the full range of experiential impacts from the Raystown study as well as additional indicators dealing with certain types of encounters between boating parties (Drogin, Graefe and Titre 1990).

From a practical and theoretical standpoint, other factors appear to potentially impact coastal ecosystems and boater satisfaction. Dire predictions have been made about the impact of debris on marine life (both fish and marine mammals), and the predicted negative impacts of debris on the economies of coastal communities - particularly as related to tourism. Weather conditions may have differing impacts upon boater satisfaction depending upon the particular boating activity (e.g., calm air benefits the water skiers, yet has a negative impact on sailors). During the course of a boating activity one is likely to experience unexpected events, positive and negative. An engine problem could be seen as an unexpected negative event that would block the participant from completing other expected activities therefore confirming expectancy theory. But what are the potential impacts of an unexpected positive event (a serendipitous event) (e.g., viewing dolphins, catching a new species of fish etc.)?

The intent of this study was, therefore, to investigate the role marine debris, wind and wave conditions and unexpected events, in addition to previously utilized experiential impacts, play in determining the satisfaction of recreational boaters. This study was based, in part, on the Expectancy Theory which postulates that the recreationist enters into an activity with certain expected experiences and outcomes. The level of congruence between the expected experiences and outcomes and the perception of the actual experiences and outcomes determines the level of satisfaction.

Project Background

This study took place on the Delaware Inland Bays; an estuarine area in coastal Sussex County, Delaware. The bays are located in southeastern Delaware and are separated from the Atlantic Ocean by narrow land masses (essentially barrier islands). There is one pass to the ocean, but for purposes of this study, only Inland Bay boaters were considered.

This research was part of an overall boating assessment of the Delaware Inland Bays system conducted during the summer boating season of 1991. The assessment was administered through the University of Delaware, College of Marine Studies with the support of the Delaware Department of Natural Resources and Environmental Control and the United States Environmental Protection Agency. The purpose of the overall study was multifaceted, combining an assessment of those factors that affect the bays' recreational carrying capacity, a study of environmental impacts on the bays as perceived by the boaters and a survey of attitudes toward potential environmental protection actions. Particular focus was given to social considerations such as crowding, conflict between users and boater safety. Environmental impacts studied included marine debris, perceived water quality, and perceived impacts on living resources (fish, crabs, clams etc.). In addition to making capacity related recommendations, users' perception of the environmental condition of the bays and the impacts those perceptions have on recreation satisfaction were determined.

Data Collection

Data were collected in several ways. First, personal surveys of 442 boaters were conducted at marina, boat ramp and shoreline communities around the bays from 11:00 a.m. to dusk on three weekends during July and August, 1991. Each weekend survey was conducted by trained interviewers stationed at selected spots around the Inland Bay area. Boaters were contacted as they left the boat ramp or dock area at the end of their trip. To obtain a representative sample of the boating population, interviewers attempted to interview as many boaters as possible at each location during the study period. A randomly chosen person from each boat was asked to answer the survey questions. Boaters who went out multiple days were interviewed only once during each weekend survey period. In order to account for varying crowding and density levels, on-site surveys and boater counts were additionally conducted during selected weekdays.

An additional twenty-nine sailboarders were contacted and administered a similar survey. This procedure was implemented because sailboarders generally did not use ramps and marinas, but rather launched from shore in a designated sailboarding area located within the Delaware Seashore State Park.

Additionally, selected dock holders and residents owning land adjacent to the Inland Bays and their tributaries were contacted by mail immediately after weekends in which on-site surveys took place. This technique accounted for the many boaters who do not use boat ramps and marinas. Names and addresses taken from dock, pier and bulkhead permits and county tax roles were organized by bay system. Two hundred names were selected from Rehoboth Bay and its tributaries, two hundred were selected from Indian River Bay and its tributaries, and 200 were selected from Little Assawoman Bay and its tributaries. A total of 290 usable responses were received.

Description of Sample

Data for this study were collected using three survey methods: Mail (39% of respondents), on-site interviews of boaters (57%), and on-site interviews of sailboarders (4%). Respondents were asked to identify themselves as permanent residents (i.e. those residing in the Inland Bays area on a year-round basis); seasonal residents (i.e. persons who lived in the area on a seasonal basis, whose primary residence was not in the Inland Bays area); and seasonal visitors (i.e. persons visiting the area on a short term basis - tourists). Of those who responded, 42% were permanent residents, 37% were seasonal residents, 15% were seasonal visitors and 6% did not indicate their user group.

Results

Boating Use Patterns

Boaters reported an average of slightly over 20 years of boating experience per person and indicated a moderate skill level (2.7 on a scale with 1 = novice and 4 = expert). Boaters reported an average of 41 days total boating during the 1990 boating season with most of those days (34) spent on the Inland Bays. The most common boating group reported was family followed by family and friends. The boaters surveyed reported operating runabouts (53%) followed by pontoon boats (19%) and cabin cruisers (11%). There were also a variety of boating activities taking place on the Inland Bays. Fishing was the most popular activity, reported by 37% of those surveyed, followed by powerboating (20%) and crabbing (14%).

Measures of Marine Debris

Marine debris was reported to exist, though not in great amounts, by boaters on the Delaware Inland Bays. The most often reported debris observed at least occasionally was plant material (47%), followed by plastic (35%) and paper material (35%). It should be noted that both plastic and paper materials are high on the list of the Center for Marine Conservation's "Dirty Dozen" list of marine debris types (O'Hara and Younger 1990).

Most respondents indicated that the observation of debris had little impacts on their enjoyment. Fifty-nine percent indicated that there was no debris-influenced impact on satisfaction. It is interesting to note that for some boaters the amount of debris seen (or not seen) actually increased their enjoyment. Those who reported seeing no debris further noted an increase in satisfaction. While boaters who reported low levels of satisfaction essentially felt no impact from debris, those who reported moderate levels of debris did report decreased satisfaction.

Measures of Weather

Impacts of weather on boater satisfaction were measured in two ways. First, specific weather conditions were collected from the U.S. Coast Guard Station located on the Inland Bays for those days of on-site interviewing. This allowed for the study of how specific weather conditions impacted boater satisfaction. Secondly, boaters were asked "How did the wind and waves on the bay impact your enjoyment of the day's trip?" This permitted the investigation of individual boater's perceptions of the days' weather. Due to wide variability in weather conditions from day to day, as well as variability within the perceived quality of weather conditions it was not possible to develop an objective scale of good to bad weather days.

With reference to weather variables, sunny days increased satisfaction, partly cloudy and cloudy days were more neutral in their impact. Light winds (0-7 mph) had positive impacts on satisfaction. Gentle breezes (8-12 mph) had essentially neutral impacts while moderate winds (13-24 mph) had negative impacts. Calm wave conditions tended to have positive impacts on satisfaction, light chop had neutral impacts and heavy chop had negative impacts. There appeared to be no pattern in the relationship between temperature and satisfaction. Generally, 75° was considered cold and decreased enjoyment, while 80° tended to give the highest reported satisfaction.

Slightly more than 50% of the respondents indicated that wind and waves impacted their enjoyment. Twenty two percent indicated that the weather had some positive impact on their enjoyment while 30% indicated that wind and wave conditions had negative impacts on their overall satisfaction.

Measures of Unexpected Events

Boaters were asked if they had experienced any unexpected events. The existence of unexpected events during a trip was reported by 12% of the boaters surveyed. Of those describing their unexpected events, slightly over 1/3 of the respondents noted that these events enhanced their enjoyment. These events were seen as consumptive based (e.g., catching more fish than expected); new experiences (e.g., first time up on jet ski); or humorous events (e.g., falling off a dock). Nearly 2/3 of the boaters describing their unexpected events as decreasing enjoyment. These events were primarily related to boat maintenance (e.g., engine broke down), boater behavior (e.g., confrontation with other boaters) and consumptive activities (e.g., not catching fish).

Experiential Impacts

Survey respondents were asked a series of questions about the quality of their boating experience and the various types of impacts that might interfere with a satisfactory boating experience. These questions were based on previous boating capacity and related studies. Perceptions of crowded conditions were assessed through two 9 point scales. Responses to these items showed that boaters tended to feel the bays were moderately crowded, but the number of boats on the bays had no effect on most people's enjoyment levels.

Displacement refers to various behavioral adjustments in response to unacceptably high density levels. In this study, boaters were asked if they avoided certain places, stayed off the bays during certain times, or gave up any planned activities in response to crowded conditions. The majority boaters indicated that they had not experienced these types of displacement, although they were more likely to have avoided certain places or times than to have forgone any planned activities.

Several questions probed boaters perceptions of safety on the Inland Bays. Most respondents agreed that conditions on the bays on the day they boated were safe, and less than a majority of boaters said that they had observed any unsafe boating situations. A few boaters acknowledged that they nearly had an accident, while most felt there were adequate law enforcement patrols on the bays. Respondents were more evenly split relative to an item asking whether other boats had come too close to them.

Finally, two items focusing on boating noise and inappropriate boater behavior were included to assess possible conflicts between types of boaters. Over one third of the sampled boaters indicated that the behavior of others (e.g., boats too close, rudeness, disobeying boating rules) interfered with the quality of their experience. Noise was also a problem, reducing the enjoyment of nearly one-third of those surveyed.

Satisfaction

The satisfaction index used in this study was patterned after indices that have been used successfully in other studies. The index includes five statements that are in essence different ways of measuring the the extent of satisfaction with the overall boating experience. The index was computed as the mean of response to the individual items. All of the items in the satisfaction index were strongly inter-correlated resulting in an overall reliability coefficient (Cronbach alpha) of .74. This level of reliability was consistent with that found in other studies using similar indices.

The multiple item satisfaction index was shown to correlate significantly with single item measures of satisfaction based on specific boater impacts such as impacts of debris on enjoyment, impacts of wind and waves on enjoyment and impacts of unexpected events on enjoyment. Overall satisfaction was seen to be positively correlated with a single item measure of perceived overall satisfaction ($r = .53$) and negatively correlated with questions concerning the individual impacts on enjoyment of the number of boaters ($r = -.30$), the amount and types of marine debris observed ($r = .13$), wind and waves conditions ($r = -.34$) and the existence of unexpected events ($r = -.27$). Boaters on the Inland Bays were generally satisfied with their overall experience (3.4 on the five point satisfaction scale, 1=low and 5=high), although for many the sampled trip did not measure up to their ideal or best ever boating outing.

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. Zero order correlations were also reported to illustrate the bivariate relationship between key study variables. Results of the regression are shown in Table 1.

Table 1. Summary of multiple regressions of selected boating impact variables on primary boating impacts and satisfaction on the Delaware Inland Bays.

INDEPENDENT VARIABLE	DEPENDENT VARIABLE:											
	Place Displacement		Total Displacement		Impact of wind and waves on enjoyment		Behavior of others		Unexpected events impacted enjoyment		Satisfaction Index	
	r	Beta	r	Beta	r	Beta	r	Beta	r	Beta	r	Beta
Impact of number of boaters on enjoyment	.33		.27		.19	.18	.37		.02			
Impact of debris on enjoyment	.16		.15		.26	.24	.17		-.02			
Wind conditions	.03		.15		.42	.33	.04		.01			
Other boaters came too close	.38		.28		.14		.64	.37	.15			
Boating conditions were unsafe	.25		.11		.03		.53	.24	.05			
Wave conditions	-.06		.09	.27	.32		.01		-.07			
Perceived crowding	.34	.13	.21		.05		.33		.10			
Noise of other boaters	.43	.18	.32		.08		.44	.12	.17			
Conditions were safe	-.33	-.10	-.38	-.19	-.01	.13	-.43	-.16	-.09			
Crowding almost caused an accident	.29	.10	.44	.32	.07		.37	.16	.29	.27		
Temperature	.13		.09	.22	-.16		-.02		.11	.13		
Activity displacement due to weather	.10		.22		.36	.30	.17		.13	.11		
Activity displacement due to water quality	.25		.22		.04	-.10	.24		.08			
Activity displacement due to crowding	.56	.37	.42	.29	.02		.39		.16			
Place displacement											-.36	-.14
Total displacement											-.50	-.29
Impact of wind and waves on enjoyment											-.34	-.27
Behavior of others											-.36	-.13
Unexpected events impacted enjoyment											-.23	-.10
Percent of Variance Explained (R SQUARED)		.39		.38		.34		.55		.11		.40

In combination, the series of regressions form a basis for the model illustrating how people perceive satisfaction with the boating experience (Figure 1). The paths shown indicate the significant relationships found between the variables.

Results showed that 40% of the variation in satisfaction could be explained by the pool of variables used in this study. These findings compare with explained variances of 42% at Lake Raystown and 44% at Berlin Lake.

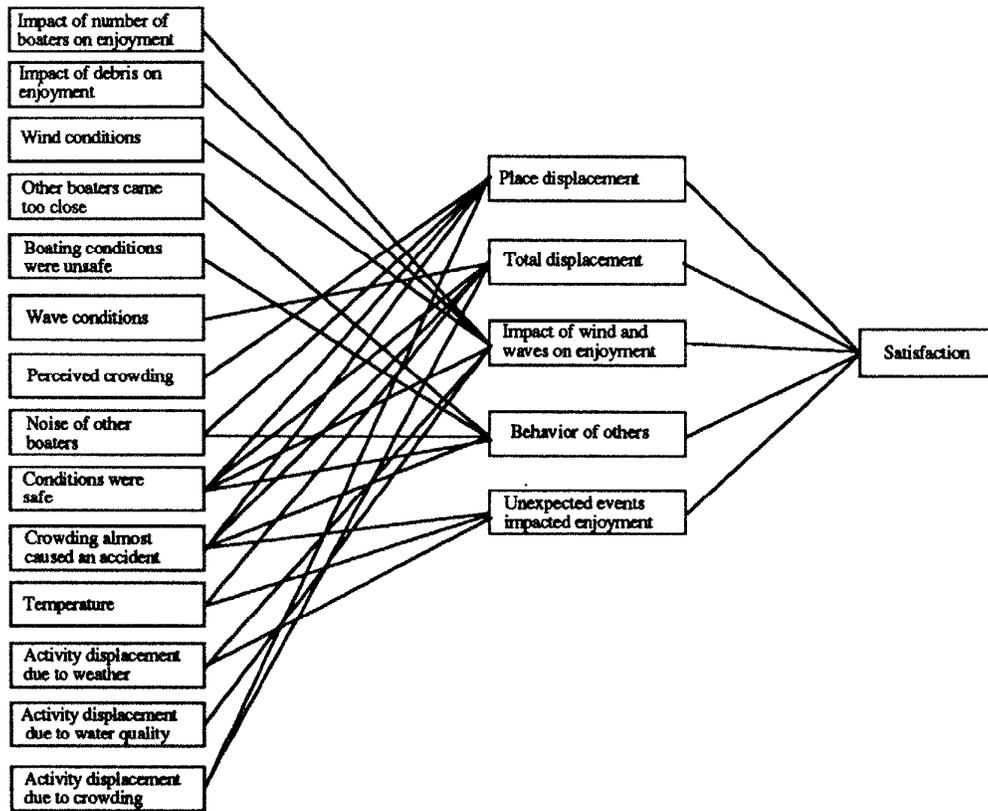


Figure 1. A model of boater impact variables on overall boater satisfaction on the Delaware Inland Bays

The low levels of marine debris reported seemed to have positive impacts on overall satisfaction (as the amount of debris reported increased, satisfaction declined.) Persons experiencing unexpected events tended to report subsequent negative impacts on satisfaction. The impact of weather conditions on overall satisfaction varied depending upon the primary activity chosen. Fishermen, sunbathers, crabbers, and swimmers reported more negative impacts of weather than powerboaters and clammers. Sailboaters reported the most positive impacts of weather conditions while waterskiers reported the most negative impacts.

The primary impacts on boater satisfaction included total displacement, the impacts of wind and waves, place displacement, impacts of others and unexpected events. In each of these cases, the variables were shown to have a negative impact on overall satisfaction.

Management Implications

A primary implication for managing a multiple use resource is understanding that many of the variables that impact boater satisfaction are out of the control of the manager. In this study, weather was shown to be an important factor influencing overall boater satisfaction, yet it is most certainly beyond the control of the resource manager. What could be controlled, however is an understanding of how various user groups relate to certain conditions which in turn impact participation patterns, crowding, and user conflict in certain areas, (e.g., strong winds might force waterskiers and fishers into a confined area while at the same time encourage sailor and sailboarders to enter new, unexplored areas).

By its very nature, managing for unexpected events would seem to be impossible. While many types of events (e.g., boat breakdowns and boating accidents) may be unexpected to the individual boater, they should be expected by the resource manager. Management plans and procedures for common events such as boat breakdowns should be developed and updated. An additional factor to be considered is that the manager understand the impacts of these events on the boaters' overall satisfaction. A better information system to make boaters aware of the conditions before they go out could allow them to better prepare for the situations of the day and thus improve their level of satisfaction. An example of this might be to develop a boating report somewhat similar to traffic reports on the local radio station.

Management implications for marine debris may seem to be quite straight forward. No one likes it - so restrict it. There are, however, other factors to consider. While negative impacts of debris on tourism are cited in the debris literature, there is evidence that the tourist is actually less sensitive to debris than other users. This could be due to cognitive dissonance, unfamiliarity with the waters, or the bays could be cleaner than other comparable bodies of water. Conversely, permanent residents tended to be the most sensitive to the existence of debris, perhaps due to their familiarity with the waterways, so perhaps they might be the better indicators of problems. Perhaps the creation of a "Residents' Advisory Group" to help monitor debris and water quality issues would be more appropriate than waiting for tourists to report impacts.

Additionally, resource managers must manage for a wide variety of boating activities. Each group examined (i.e., activity groups, resident groups) perceived impacts differently. Situations that may decrease satisfaction for one group may actually increase the satisfaction of other groups, thus requiring the manager to be aware of specific needs of all users. Implicit in this is the knowledge that there is more to boater satisfaction than just boater density, crowding and user conflict. This information can be helpful both in planning and operational management. For instance, if zone management were necessary, waterskiers should be zoned into more protected waters as they prefer calm, flat water conditions while sailors and sailboarders should be zoned into more open areas. In day to day operations, it would seem necessary to understand how certain conditions impact each group. Wind speed and direction could force all participants of a particular activity into tightly confined areas. In this case, though density may be low on a particular day, the level of crowding could be unacceptably high for a specific activity group leading to displacement and dissatisfaction.

Recommendations for Further Study

Very little research has been done on the impacts of marine debris on the behavior of outdoor recreationists. As coastal growth continues, debris will become a greater problem. Further study of marine debris and its impacts on satisfaction should be replicated in both estuarine and coastal environments. Though the Inland Bays were relatively clean and clear of debris, boaters still reported its impact on satisfaction. Additional study is warranted in areas where greater amounts of debris have been documented.

While satisfaction was impacted in part by weather conditions and unexpected events, these variables should be further studied. Additionally, the role of weather conditions in displacement and activity substitution should be investigated. Do boaters keep their location constant but change their activity preference based on weather conditions or do they keep their preferred activity and change location? More detailed analysis of these varied impacts on satisfaction should also be conducted taking into account variation by user or activity group

This study has highlighted some of the additional factors which impact a recreationist's satisfaction. Continued attempts to better understand and model factors affecting satisfaction are important both from a theoretical and resource management perspective. It is essential, not only to re-examine and validate variables shown to impact satisfaction, but to identify other potential impacts on the visitor experience.

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**INFLUENCES OF LEADERSHIP
DEVELOPMENT AMONG WILDERNESS
EDUCATION PARTICIPANTS**

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The purpose of this research was to identify factors on a wilderness course that contribute to leadership development in wilderness education. The theory of self-efficacy was selected to assess the relationship it has with leadership development. Self-efficacy has provided a conceptual framework for which to understand behavior and provide explanation to one's success and future involvement in an activity. 86 students from the National Outdoor Leadership School were given pre and posttest surveys to identify the impacts a wilderness leadership experience has on their self-efficacy. Results indicated that posttest self-efficacy scores were significantly higher from pretest scores after a student completed their wilderness course. Males were found to have significantly higher self-efficacy scores than females in the pretest survey but the posttest surveys revealed that overall self-efficacy scores between females and males were very similar. The wilderness leadership experience had a significant impact on a student's level of self-efficacy. These preliminary results help to begin the process to better understanding the components that lead to leadership development outcomes.

Introduction

Given the significant length of field time, there are a multitude of factors that influence an individual's outcomes on a wilderness course. These outcomes include interacting with the environment with comfort, the establishment of a philosophy for making choices and decisions, development of a consciousness for self-responsibility, respect for others and the environment, and attainment of leadership skills. Although there are a variety of leadership training settings from which to select, many wilderness education programs instrumentally use the natural environment to develop leadership skills. The length of time in the wilderness, the physical and emotional challenges (i.e., carrying heavy packs over rough terrain, stress due to the change in a student's everyday civilized and comfortable routine, etc.) and the interpersonal relationships encountered during a wilderness experience allow students to develop behaviors and skills that are representative of leadership qualities (i.e., physical fitness and skills, emotional maturity, patience, tolerance, concern for others, and self-confidence) (Ford & Blanchard, 1985).

Statement of the Problem

To date, research on leadership has been sparse and inconclusive. According to Phipps and Swiderski (1990), there has been little use of quasi-experimental designs in outdoor leadership research. There is little assessment of the degree to which graduates continue their involvement in wilderness education, either as a career or as a voluntary activity.

Wilderness education programs want people to continue their involvement in wilderness education. Often times this continued involvement reflects the development of leadership in wilderness skills and experiences. Uncertainty exists as to whether or not desired long range leadership development outcomes have been achieved. Furthermore, the literature identifies the need to investigate the "process" by which certain outcomes are achieved rather than focusing attention

on solely the outcomes of an extended wilderness experience (Klint, 1990). In other words, what specific elements of the adventure experience produces which results? Subsequently, how do these results influence future behaviors and outcomes separate from the adventure experience?

Purpose

The purpose of this research was to identify those factors on a wilderness course that contribute to leadership development in wilderness education. Leadership development was defined in terms of continued involvement in wilderness education activities. Furthermore, this research explored the relationships among feedback (amount and type), goal attainment and mentoring on a wilderness course. Since feedback and goal attainment are contributing factors to one's level of self-efficacy and integral components in the mentoring process, these factors may begin to specify the process that leads to leadership, such as continued involvement in outdoor education activities.

Literature Review

The literature suggests that there are a variety of elements in a wilderness/adventure experience that contribute to effective leadership (i.e., skill performance, motivation, physical fitness, healthy self-concept, personality traits, concern for others, ability to inspire others, and understand participants' needs) (Priest, 1991; Ford & Blanchard, 1985).

Although much of the literature discusses theories of leadership and characteristics of a leader (i.e., personality traits, situational factors, behavioral traits), there are many authors who believe that leadership is a continual process of experiences (March, 1987; Swiderski, 1981; Raiola, 1990; Green, 1990; Rosenbach & Taylor, 1984). In other words, leadership is developmental. The key factor that appears most critical in the development of quality outdoor leadership is judgment (Cain, 1985; Green, 1981; McAvoy, 1980; Petzoldt, 1984; Swiderski, 1981). They operationalize judgment as skills, knowledge and experience and agree that development of leadership comes from these three 3 components. These authors agree that the development of leadership comes from acquiring the skills, knowledge, and experience necessary for leading a safe and enjoyable outdoor trip (see Figure 1).

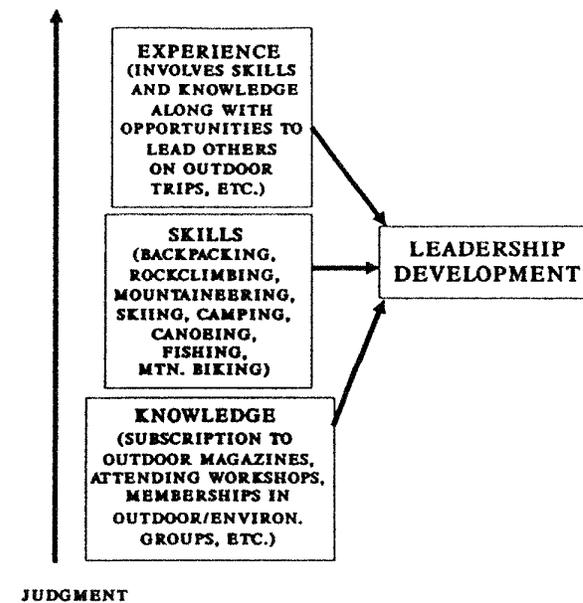


Figure 1. Key components of leadership development.

In essence, the literature supports the idea that leadership is not an end in itself. Specifically, there are no concrete measures or absolute certainties that an individual has achieved leadership (Miles, 1987). Rather, leadership development is considered an ongoing process that continually evolves through "involvement" in a variety of outdoor related experiences (e.g., classes, workshops, personal experiences, reading, leadership responsibilities, past outdoor related jobs, etc.).

Self-Efficacy

Self-efficacy refers to personal judgments of one's capability to function in specific situations (Bandura, 1977). In other words, how confident does a person perceive themselves to be

in performing a task/skill of varying difficulty? Since this assessment may provide the opportunity to determine future performance, self-efficacy is a highly recommended theory for assessing performance and human behavior in outdoor adventure pursuits (Ewert, 1989). Research (Bandura, 1977, 1986) indicates that factors such as feedback and goal attainment have an impact on a person's level of self-efficacy. In addition, mentoring, which involves the elements of feedback and goal attainment, is suggested as having a strong impact on one's self-efficacy.

Figure 2 provides an example of the self-efficacy scale used for this study.

- 19. INSTRUCTIONS:** Please indicate how certain you are in your present (TODAY) ability to perform the following tasks. If you have no certainty about the tasks place an "X" in the 0% box. Otherwise, place an "X" in the box that reflects the most appropriate percentage of certainty.

TASKS	VERY UNCERTAIN				SOMEWHAT CERTAIN				VERY CERTAIN			
	0 %	10 %	20 %	30 %	40 %	50 %	60 %	70 %	80 %	90 %	100 %	
a. CASTING A FISHING LINE												
b. RAPPELLING OFF OF A ROCK FACE												
c. STREAM CROSSING OVER FAST MOVING WATER												
d. USING AN ICE AXE TO PROTECT YOURSELF FROM FALLING ON SNOW/ICE												
e. CLIMBING A BEGINNER LEVEL CLIMB												
f. BACKPACK 3 MILES WITH 60lbs ON YOUR BACK												
g. CLIMBING AN INTERMEDIATE LEVEL CLIMB												
h. BACKPACK 6 MILES WITH 60lbs ON YOUR BACK												
i. CLIMB A PEAK THAT IS OVER 12,000 FT. IN ELEVATION												
j. CLIMB A PEAK THAT IS OVER 18,000 FT. IN ELEVATION												
k. IDENTIFYING FLORA AND FAUNA IN A WILDERNESS AREA												
l. OUTDOOR COOKING												
m. IDENTIFYING WEATHER PATTERNS												
n. ADMINISTERING BASIC FIRST AID												
o. PRACTICING MINIMUM IMPACT CAMPING AND RESOURCE/ ENVIRONMENTAL PROTECTION												
p. READING AND INTERPRETING A TOPOGRAPHICAL MAP												
q. JUDGE THE TIME AND DISTANCE IT MAY TAKE TO HIKE FROM POINT A TO POINT B IN A WILDERNESS SETTING												
r. ROUTE FINDING OFF TRAIL IN A WILDERNESS SETTING												
s. LEADING A SMALL (3-5) GROUP IN A WILDERNESS SETTING												
t. ORGANIZING AN EMERGENCY EVACUATION PROCEDURE												

Figure 2. Wilderness education self-efficacy scale.

Methods

A quasi-experimental, pretest-posttest with control group design was used for this study. 116 students from the National Outdoor Leadership School, located in Lander, Wyoming, participated in this study during the summer of 1992. 30 of those students represented the control group sample. The purpose of the control group was to control for any extraneous variables that are likely to impact the pre-measured scores. Research reports that just before the start of a course, students experience a high anxiety level which may create biases in the pretest measures (Koepke, 1973). To increase validity and account for this bias, the pretest instrument only will be administered to the control group by mail before the student arrives in Wyoming.

Students were given the pretest instrument the first day of their course and the posttest instrument the last day of their course. A 20-item self-efficacy scale was included in all three groups (i.e., control, pretest and posttest group) to assess levels of self-efficacy as well as investigate changes in self-efficacy resulting from participation in a wilderness course. The pretest questionnaires pertained to questions concerning socio-demographic information and the identification of goals they would like to accomplish on their course. The posttest questionnaires included questions about the amount and type of feedback students received on their courses, goal achievement and the extent and type of mentoring relationships on their courses.

Results

The pretest-posttest sample consisted of 41 females and 45 males (n=86). The control group sample consisted of 15 females and 15 males (n=30). Ages ranged from 15 to 51 and a total of 85 participants out of 116 had some previous outdoor experience before the start of their course. T-test results indicate that posttest self-efficacy scores were significantly higher from pretest scores across 19 out of 20 wilderness tasks. (See Figure 2 for example of the self-efficacy scale). Fishing was the only wilderness task that did not indicate a significantly higher self-efficacy score. Findings also indicate that self-efficacy mean scores in the control group were higher than in the pretest group, although not significantly higher. (See Table 1 and Figure 3). This result suggests that directly before going on a course, students may tend to have lower self-efficacy scores due to the anxiety experienced at that time.

Table 1. Self-efficacy scores for control, pretest and posttest groups.

Self-Efficacy					
Control Group (n=30)		Pretest Group (n=86)		Posttest Group (n=85)	
M	SD	M	SD	M	SD
55.48	16.10	46.78	19.86***	80.87	8.94

*** T-test for difference between pretest and posttest self-efficacy scores significant at .001 level.

Although female self-efficacy scores were significantly lower than male self-efficacy scores before the start of their course, there were no significant differences between overall female and male scores after their course. (See Table 2 and Figure 4).

Females had significantly higher posttest self-efficacy scores in outdoor cooking and minimum impact camping techniques at .05. Males had significantly higher posttest self-efficacy scores in fishing and reading a topographical map at .05. Results reveal that there is a positive correlation between age (.34) and experience level (.45) with self-efficacy. Both were found to have a significant relationship with self-efficacy

SELF-EFFICACY MEAN SCORES

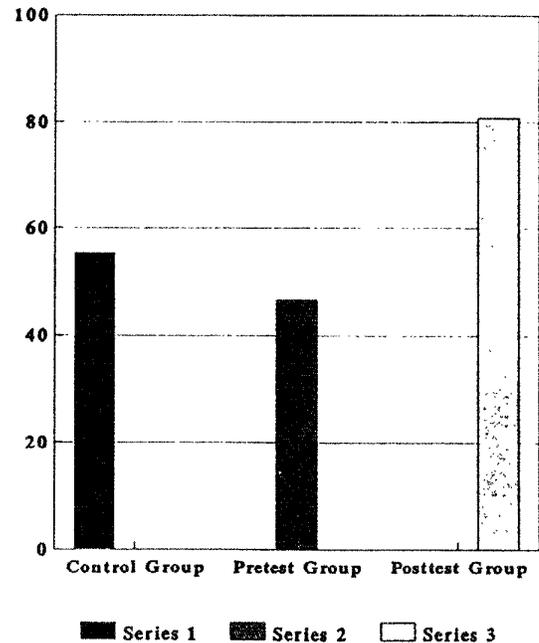


Figure 3. Self-efficacy mean scores.

Table 2. Self-efficacy scores between females and males in control, pretest and posttest groups.

Gender	Self-Efficacy					
	Control Group (n=30)		Pretest Group (n=86)		Posttest Group (n=85)	
	M	SD	M	SD	M	SD
Female	55.18	11.63	42.01	18.87	79.14	8.97
Male	55.80	20.37	*51.31	19.52	80.94	9.53

* T-test for difference between female and male pretest self-efficacy scores significant at .05 level.

(.001). There is evidence that having some experience (developmental level) opposed to little or no experience (introductory level) indicates a significant difference in one's self-efficacy level in the following wilderness tasks; minimum impact camping techniques, route finding, reading a topographical map and judging distances from point A to point B. Results also reveal that those students who have a great deal of experience (commitment level) opposed to some experience reflect significantly higher self-efficacy scores in the following wilderness tasks; backpacking 3 and 6 miles with 60lbs on your back, climbing 12,000 and 18,000 foot peaks, minimum impact camping techniques, reading a topographical map, judging distances from point A to point B, route finding, leading a small group, and evacuation procedures.

SELF-EFFICACY MEANS BY GENDER

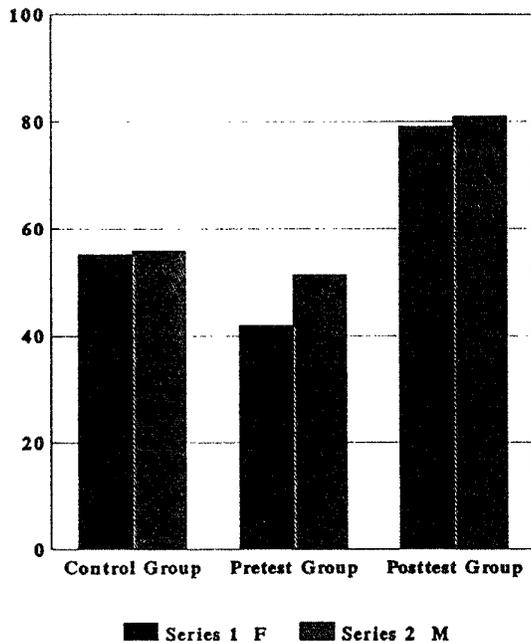


Figure 4. Mean scores by gender groups.

Although the literature indicates strong relationships between feedback, goal attainment, and mentoring with self-efficacy, the correlations in this study were weak. There is a positive yet weak relationship between goal achievement and self-efficacy (.13), feedback and self-efficacy (.05) and a positive relationship between feedback and mentoring (.21).

Discussion and Implications

Self-efficacy is a theory used widely across many disciplines to determine the effects it has on success and future development. The significant increases in self-efficacy after participation in a wilderness course provide some support that the initial "process" toward leadership development has been initiated. Thus, there is some potential for future involvement in wilderness education.

To determine the effects of self-efficacy on future involvement in wilderness education, a follow-up survey will be sent to students who participated in the pretest-posttest questionnaire. This survey will be sent to them approximately 1 year (summer of 1993) after the completion of their course. The intent of this survey is to assess the long term effects of self-efficacy and to investigate the amount and type of outdoor involvement the student's have participated in after their course. The degree of involvement will determine the strength of a student's development toward outdoor leadership. The objective of this process is to measure the relationship between self-efficacy and leadership development in wilderness education. Figure 5 outlines the key variables toward the leadership development process. The arrows point in the direction of influence. It is hypothesized that self-efficacy will have a positive correlation with leadership development in wilderness education.

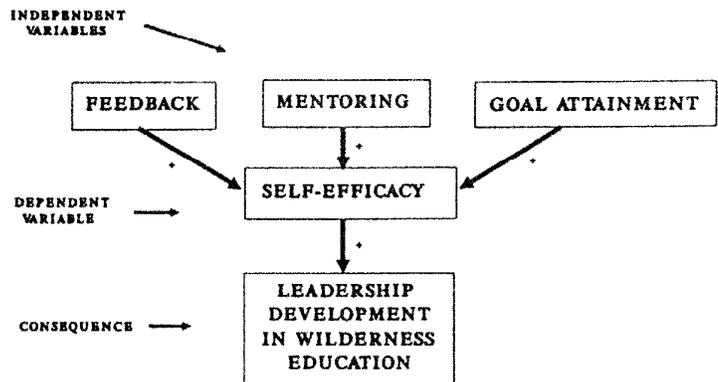


Figure 5. Hypothetical path model of the leadership development process.

The results of this completed study is intended to provide staff and instructors of wilderness/outdoor leadership programs insights into the factors that influence leadership development. Having some awareness between female and male differences in self-efficacy may help staff become more cognizant of and sensitive to the needs, strengths and weaknesses of both genders in wilderness activities. This sensitivity can provide a better experience for developing competent leaders. Traditionally and historically, outdoor adventure experiences have been male-dominated. The significant difference found between female and male pretest self-efficacy scores may indicate that women tend to underestimate their abilities in wilderness tasks and/or men tend to overestimate their abilities. Men may feel the role of rating themselves strongly in a male-dominated field whereas women may feel the role of underestimating their abilities.

Physical skills alone, knowledge alone or experience alone do not measure outdoor leadership competency. A balance of all three over time develop the judgment necessary toward the development of a successful leader. Although the variables of feedback, goal attainment and mentoring showed weak relationships with self-efficacy it cannot be concluded that they are insignificant. These preliminary results provide some support toward the role of self-efficacy in leadership development. The first year results revealed the need to change how certain variables will be measured and these changes along with increased sample size may yield a better assessment of hypothesized relationships.

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EXPLORING THE SIXTH DIGIT: AN ANALYSIS OF FLY FISHING PARTICIPATION IN THE UNITED STATES¹

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Introduction

With the release this year of Norman Maclean's *A River Runs Through It* more people than ever are interested in fly fishing. Even before the movie was released fly anglers were portrayed as having a Zen like quality that sets them apart from other fishermen (Time August 7, 1989). Although Robert Redford's movie of Maclean's book is true to the art of fly fishing and in particular fly fishing in Montana, it has helped to further perpetuate the myth of the fly fisherman. The myth almost became believable for us when we recently overheard one angler say: "My fly rod is the sixth digit, an extension of my hand."

Are fly fishermen really the fishing gurus that myth would suggest? To examine the myth we examined the participation patterns of fly fishermen throughout the United States. We wanted to find out if the participation of fly fishermen differed so much from other anglers that they might warrant different management considerations. Work by Bryan (1977) and Katz (1981) suggests that fly fishermen are different from other anglers and each other. Katz (1981) stated when the term 'trout fishermen' is used as a synonym for those who fly fish, the resulting image then is a somewhat misleading stereotype. The fishing literature has provided us with a better understanding of the trout angler, but what do we really know about fly fishermen? The purpose of this paper is to begin to explore the stereotype.

Literature Review

Bryan (1977, 1979) classified trout fishermen based on a continuum of behavior which would vary predictably with increasing levels of specialization. The continuum was defined by equipment, skill and preferences for resource. Each level was considered a further development in the specialization of an angler. As the angler progressed through the stages of trout fishing he moved from general techniques and tackle to techniques and tackle distinct to fly fishing. As he moved from one form of fishing to another his social groups, vacations and life begin to center around fly fishing. As fishing methods moved from the general to the specific, management preference of fishermen moved from the desire for easy access to the resource then to preservation of the natural settings. Those using fly tackle preferred catch- and-release policies that favored maintaining the quality of wild trout populations.

Katz (1981) defined trout activity involvement by an individual's score on a multi-variable scale or index based on participation patterns and preferences for conditions and

techniques. His profile of fly fishermen who were members of Trout Unlimited represents comprehensive data which focuses on fly fishermen, their frequency of participation and equipment usage.

Bryan's (1977) typology emphasized techniques, resource conditions, motivations, and social context of the trout experience. Occasional anglers most often participated with family and technique setting specialists (fly fishermen) most often participated with peers. Chipman and Helfrich (1988) set out to determine the relative dimensions and components to an overall fishing specialization framework. Their study found that when social context was used as one of the components of the centrality of life dimension it was not correlated with the other components. Other studies produced similar results. In general, the results suggest that fly anglers placed more emphasis on getting away from people, less emphasis on being with friends and family (Manfredo and Anderson 1982; Hick et al. 1988), and that family togetherness was more important to female anglers than male (Hick et al. 1988). These inconsistencies with Bryan's findings (that friendship networks are an important part of the fly fishing experience) may be due to several factors. First the studies of Bryan (1977), Manfredo and Anderson (1982), Hick et al. (1988), and Chipman and Helfrich (1988) are not directly comparable. Bryan used interview techniques and observation. The other studies used interview techniques which included questions about the social context of the angling experience yet each question was worded, organized and analyzed differently.

Secondly, in the Chipman and Helfrich (1988) study, small mouth bass was the dominant sportfish and only two percent of the study population were fly anglers. Other studies have focused on the social context in which trout was sought or the focus was on all anglers where fly fishermen had a greater representation. Different social groups may revolve around different species of fish and/or as Bryan suggest, around different techniques of fishing. Ditton, Loomis and Choi (1992) have recently discussed the existence of such angling social worlds at great lengths. In addition to the above, social setting may not have been correlated with the other dimensions because it may be an inappropriate component of the centrality of life dimension.

To date, our understanding of fly fishermen is centered on 1) Bryan's (1977) work on trout fishermen; 2) Katz's (1981) work on fly fishermen involved in Trout Unlimited; and 3) other trout studies (Manfredo and Anderson 1982; Hick et al. 1988). Angler specialization has been the focus of many of these studies. Although the literature provides information about fly fishermen seeking trout, we can not assume that this information is correct for all fly fishermen. Many areas of the country can not support wild trout populations, yet fly fishermen still persist throughout the United States. In addition, little is known about the basic demographics of fly fishermen, their spending patterns, their distribution across the United States, and their travel patterns. The objectives of our analysis was to 1) describe basic demographic, participation, and spending patterns of fly fishermen; 2) to compare them to national patterns of fishing behavior; and 3) to explore how the results fit into the present conceptual angling frame work.

Methods and Procedures

The source of data for this study was the 1985 National Survey of Fishing, Hunting and Wildlife-Associated Recreation (FHWAR), conducted by the U.S. Bureau of Census (USBC), for the U.S. Fish and Wildlife Service (USFWS). The end product of this survey was an extensive compilation of estimates of angler, hunter, and nonconsumptive wildlife resource user populations, their sociodemographic characteristics, participation, and expenditures. See the 1985 FHWAR report for further details concerning survey design.

^{1/} This work was supported through a cooperative agreement with the U.S. Forest Service, North Central Forest Experiment Station, Chicago IL.

The Data File

The 1985 Fish and Wildlife Survey is divided into several files that contain information about sociodemographics, hunting, fishing and nonconsumptive wildlife activities.

The FH3 portion of the survey is divided into sections of hunting and fishing. Fishing is further divided into categories of Great Lakes fishing, freshwater fishing and saltwater fishing. Respondents were asked if they participated in each of the fishing categories. Respondents answered questions under all three, two or one fishing categories. Fishermen could participate in any number of fishing activities, which include (but not exclusive to) freshwater fly fishing, saltwater fishing, saltwater fly fishing, Great Lakes fishing, and/or freshwater fishing with baits and lures. To insure an uncomplicated sample of fly fishermen only fishermen who indicated fly fishing in freshwater were included in the study.

Results

The National Survey of Fishing, Hunting and Wildlife Associated Recreation (FHWAR) reports 6,413,000 fly fishermen in the U.S. This study compares demographic, participation and expenditure data of freshwater fishermen²

²/ Excludes Great Lakes fishermen.

and freshwater fly fishermen from the 1985 FHWAR survey.

Data on freshwater fly fishermen were compared to data in Tables 22 and 16 of the FHWAR 1985 report (USD). To compare data the unique weighting scheme applied to the FHWAR data was used in the analysis of fly fishing data.

Demographic Comparisons

Table 1 presents comparisons of the select demographic characteristics of the freshwater fishing population from the FHWAR report and results of this study. Demographic characteristics of fly fishermen were more similar to freshwater fisherman than anticipated. Differences in age, income and race did not appear. The age distribution of fly fishermen is similar to that of the national distribution of freshwater fishermen, with 48% of the participants ranging from 25 to 44 years old. Income distributions indicate that fly fishermen and freshwater fishermen are not different in yearly earnings. The majority of fly fishermen reported an income ranging from \$10,000 to \$30,000. Fewer women participate in fly fishing than women who participate in freshwater fishing. Seventy-eight percent of all fly fishermen are male. Education differences were more significant. Fly fishermen appear to be slightly better educated than the national distribution of freshwater fishermen. Forty-six percent of fly fishermen attended college as compared to 37% of freshwater fishermen.

Table 1. Select characteristics of freshwater and fly fishermen.

	Freshwater Fishermen (%)	Fly Fishermen (%)
Age		
16-17	5	6
18-24	15	4
25-34	27	25
35-44	2	23
45-54	13	13
55-64	10	10
65+	8	8
Income		
under \$10,000	10	4
\$10,000-\$19,999	21	21
\$20,000-\$24,999	11	10
\$25,000-\$29,999	14	16
\$30,000-\$49,999	27	27
\$50,000-\$74,999		
\$75,000 or more	5	4
Education		
8 years or less	7	5
9-11 years	16	12
12 years	39	37
college	37	46
Gender		
Male	68	78
Female	32	22
Race		
White	93	93
Black	5	5
Other	2	2
Urban/Rural		
Urban	57	63
Rural	43	37
Census Regions		
North East	4	4
Middle Atlantic	8	7
East North Central	21	18
South Atlantic	16	10
East South Central	8	8
West North Central	12	11
West South Central	13	12
Mountain	7	17
Pacific	12	12
Average Number of Days Fished Per Day	20	27
Average Number of Hours Fished Per Day	7	8

Regional Comparisons

The 1985 FHWAR survey reports urban and rural participation in addition to the percent of participants in the U.S. census regions. Table 1 contains regional comparisons.

Sixty-seven percent of fly fishermen indicate urban residences as compared to the national sample of freshwater fishermen where 57% indicate an urban residence. Approximately forty percent of all fly fishermen reside west of the Mississippi. The Mountain, West South Central and Pacific regions comprise the bulk of western fly fishermen. The East North Central region contains 21% of all freshwater fishermen the most of any census region and likewise of all the regions contains the majority of fly fishermen. It is important to

consider the number of fly fishermen in each census region. The East North Central Region contains 17% of the U.S. population and 18% of all fly fishermen. Only 5 percent of the U.S. population 16 years old or older lives in the Mountain Region, but 17% of all fly fishermen reside in the Mountain Region. Of eastern fly fishermen, 18% residing east of the Mississippi reside in the East North Central states and 8% in the South Atlantic states. See Figure 1 for regional comparisons.

Participation Comparisons

Fly anglers appear to fish 3 hours more than the national freshwater fishing average. The number of days fly fishermen participated in fishing was greater than the number days that are reported in table 16 for national freshwater fishermen. Freshwater fishermen participated an average of 20 days in 1985, while the sample of fly fishermen participated an average of 34 days. Fly anglers took an average 30 fishing (all types) trips in 1985.

Table 2. Total dollars spent on trips and other items.

	Freshwater Total 1985 (%)	Fly Fishing Total (%)	Percent of Total (%)
		(thousands of dollars)	
Food and Lodging	3,878,514	983,765	25
Transportation	2,727,369	707,769	26
Other Trip Expenses	2,057,191	433,476	21
Total Trip Cost	17,795,427	2,125,622	12
Fishing Equipment	1,759,795	505,799	28
Auxiliary Equipment	310,838	227,203	73
Fishing Licenses	293,444	83,112	28

Table 3. Average dollars spent per fisherman.

	Mean Dollars/ Freshwater Fishermen (\$)	Mean Dollars/ Fly Fishermen (\$)
Food and Lodging	101	153
Transportation	71	110
Other Cost	54	67
Total Trip	463	331
Fishing Equipment	46	78
Auxiliary Equipment	8	35
Fishing Licenses	8	12

Expenditure Comparisons

Expenditures on fishing trips made by fly fishermen in 1985 amounted to \$2.1 billion. This accounted for 12 percent of the total trip cost of freshwater fishing spent in 1985. Fly fishermen spent approximately \$331 dollars on a fishing trip, \$132 dollars less than the national average for freshwater fishermen. Fly fishermen spent, on the average, \$20 on food, lodging and transportation for a fishing trip.

Fly fishermen spent more than the national average on fishing equipment, auxiliary equipment and fishing licenses. Average expenditure for auxiliary equipment by fly fishermen was \$35 as compared to the eight dollar national average for freshwater fishermen in 1985. Fly fishermen spent more than the national average on fishing equipment, auxiliary equipment and fishing licenses. Fly fishermen purchased an average of \$78 in fishing equipment. See Table 3 for expenses on 'other' items which included licenses, stamps and tags, as well as dues

and contributions and subscriptions or cost for magazines. Fly fishermen spent \$12 on licenses, tags and stamps, four dollars more than the national freshwater average.

Conclusion

Who is the fly fisherman? Our data suggest that the fly fisherman differ from bait and lure freshwater anglers somewhat based on demographics and significantly based on expenditures. They reside all over the United States with a large percentage of them living in the East North Central or the Mountain Census Region. Compared to the U.S. population, a larger proportion of fly fishermen reside in the mountain states. Fly fishermen have a high school education or above. Many fly anglers are college graduates. Their incomes are the same as their freshwater bait and lure peers but they appear to spend a greater amount of it on fishing equipment and fishing travel expenditures. They spend a significant amount more on auxiliary equipment.

Income, which usually increases as education increases, is not a variable where differences are found between the two groups. This is surprising due to the expense of fly fishing equipment. When comparisons are made concerning means dollars spent on food and lodging, transportation, other trip cost, fishing equipment, auxiliary equipment and fishing licenses it appears as if in fact a higher percentage of the fly anglers' income is devoted to the sport. Bryan's (1977) typology would suggest that as the angler becomes more and more involved in fishing the sport becomes a central life interest. If fly angling has become a central life interest for these anglers then a majority of their discretionary income may be devoted to the sport regardless of their total income. Futures studies need to include ways to determine fly fishing as a central life interest. Improved economic measures need to be added to fly fishing research. Future analysis of FHWR fly fishing data might include economic models that would allow an indication of how much of a respondent's income is spent on fly fishing activities and equipment during a year.

Participation differences are as dramatic as expenditures. Fishing days and hours reported suggest that fly anglers fish longer hours and more days. These data should be viewed cautiously because the 1985 FHWR data has several idiosyncratic features which may cloud results. Data reported here on days are for all types of fishing regardless of water type fished or equipment used. It is not possible to separate out bait and lure fishing days and fly fishing days for any angler in the FHWR study. Unknown then is actually how many hours, days and trips fly fishermen participated in the sport of fly fishing. In addition, it is suspected that the number of fishing days reported by anglers is the 1985 data may be inflated by respondents due to recall errors.

Our search for information on fly fishing led us to articles in the popular press which only offered advice to the angler or elaborated on the mystical joys of fly fishing. Limited information existed in journals. We have no idea whether state fish and wildlife managers, fly fishing equipment manufacturers and fly fishing outfitters are aware of their clientele's spending patterns, demographics, and travel behavior. As fly fishing participation continues to grow as a sport we encourage state fish and wildlife departments, manufacturers and outfitters and university professionals to increase or initiate communications, to compare information and share data.

We have only begun to explore the notion of the sixth digit: the uniqueness of fly fishermen. Our data is limited in its scope and it's population. Future studies focusing on fly fishing should be specific about the type of fishing, the number of days, hours and trips that are unique to fly fishing, and should include social and psychological factors.

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MOTIVATION/IMPORTANCE TYPOLOGY OF NATURAL RESOURCE HARVESTERS

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The purpose of this study was to develop a taxonomy of motivations related to three natural resource harvesting activities and to investigate the ability of the taxonomy to differentiate participation rates and specialization among harvester types. A factor analysis of attribute and motive scores collected from 392 residents from a rural county in Vermont revealed four separate factors/scales of harvesting motives for respondents engaged in hunting and fishing. Three motivational factors were discovered in the reduction of motivation and importance scores for berrying/mushrooming. Factor scores were used in a subsequent K-means cluster analysis for each of the three harvesting activities. Five clusters or types of motivational dimensions emerged for each activity. The motivational clusters (types) were found to be significantly different in participation rates across all three activities. Hunting clusters were significantly different in the numbers of specialized equipment used. Understanding the motivations of resource harvesters and the construction of a taxonomy of harvesters based on motivations could provide resource managers with a more efficient means for segmentation in future marketing decisions and for distinguishing among the constituency groups they must serve.

Harvesting natural resources provides rural Vermonters with both consumptive and non-consumptive benefits ranging from material goods like firewood and food to recreation participation. Participation in consumptive activities also often reinforces a variety of psychological, sociocultural, and heritage values that maintain individual stasis, interrelationships, and other components of social structure. Understanding the meanings and motivations for participation in resource harvesting will provide managers and policy makers useful information to enhance the quality of rural life.

Numerous studies of harvesting activities (i.e., fishing and hunting) have indicated that there are multiple motives for engaging in consumptive recreation activities and have focused on identifying and measuring the non-consumptive experience outcomes (Knopf et al., 1992). Most of these studies have attempted to find meaningful ways to distinguish recreational segments of such activities and to identify the diversity sought by participants, including such varied experiences as relaxation, experiencing nature, and companionship, as well as catching or bagging game (Knopf et al., 1973; Loomis and Ditton, 1987; Decker and Connelly 1989; Hammitt et al., 1990; Steele et al., 1990). Much of this research has had practical significance for partitioning hunters and anglers into groups or constituencies in order to provide more effective management (Knopf et al., 1992).

Other studies have focused on the consumptive benefits of harvesting activities, focusing on the contribution to household and individual well-being (Glass et al., 1990). Implicit in these studies have been assumptions that participants are motivated by food procurement (e.g., hunting and fishing), BTU output (e.g., personal firewood cutting), and monetary income (e.g., cutting Christmas trees to sell), as well as participation for "recreational values". Few of these "subsistence" studies, however, have actually identified the underlying motivations and importance dimensions for people engaged in such consumptive activities and even fewer have gone beyond exploring a single motivation variable. A comparison of motivations across harvesting activities is also needed to determine if motivational patterns exist among harvesting activities.

Exploring the multiple dimensions of motivation of those participating in traditional subsistence or consumptive resource harvesting activities, including food procurement, may help explain why individuals participate in these activities even when monetary income is available. Moreover, various motives could be used to develop a "motivational/meaning" typology of harvesters. Such a typological construct could subsequently be used to explore differences in specialization constructs (e.g., recreation activity specialization) or for examining the non-consumptive sociocultural aspects of the experience. By comparing partitioned motivations across harvesting activities common patterns may be discerned that could help managers of resources better understand and predict behavior, and harvester reaction to management policy.

The purpose of this research was to determine the underlying dimensions of motivation and activity importance statements in three traditional subsistence harvesting activities—hunting, fishing, and berrying/mushrooming, and to develop a typology of individuals based on those motivational/ importance dimensions.

Methods

This study used data collected from 392 respondents to a subsistence questionnaire mailed to a random sample of 1172 residents of a rural county in Vermont's Northeast Kingdom (the three most northeastern counties). Approximately 10.5 percent (i.e., 123) of the questionnaires were undeliverable (37% response rate using a modified Dillman [1978] method). Measurements of hunting motivations were based on twenty three Likert type scales on which respondents rated the relative importance of various hunting attributes and level of agreement with motives for participating. Twenty one scaled statements were used to assess fishing motives and seventeen were used for berrying/mushrooming. Respondents were queried about the types and variation of equipment used in harvesting and the extent to which they shared their harvest. A series of demographic questions and questions about days of participation in activities also were collected.

Exploratory factor analysis (Principle Axis Factor Analysis) was initially used to reduce the motivation attributes of each of the three harvesting activities to smaller, more manageable, underlying dimensions. Because the factor scores from such analysis cannot be saved, a principle components approach was then used. The factor scores from the reduced scales in the principal components analysis were subsequently used in nonhierarchical cluster analysis to classify and categorize the respondents into groups for each of the three harvesting activities. Clusters of individuals that emerged from the cluster analytic procedure can be characterized as holding common motivational profiles. This commonality (or homogeneity) can then be used for comparison with other "types".

Non-parametric statistical procedures then were used to differentiate clusters for each of the three harvesting activities on the basis of their mean participation rates in the harvesting

activities and the magnitude of their use of specialized equipment. A comparison of clusters of motivations among the harvesting activities also was attained as a descriptive component of the study.

Analysis and Results

The rural resident respondents participated in a variety of harvesting activities (see Table 1). They indicated extensive days of participation in lake and pond fishing (\bar{x} =25.3 days), as well as cutting firewood for personal use (\bar{x} =21.0 days). While such participation exceeds national and state averages, the extensive access to natural resources (both public and private) may explain some of the respondent's participation. What was surprising was the percent of respondents participating in harvesting activities, particularly berrying (68.6%) and fishing (47%). Respondents also distribute and receive harvested resources extensively. Table 2 indicates that a greater percentage of households reported receiving than giving each of the harvested resources, except for mushrooms/berries. Home garden products were reported as being given and received by the greatest percentage of households.

Table 1. Participation in non-marketed harvesting/gathering activities in a rural Northeast Kingdom county of Vermont, 1992.

Activity	Percent Participating (n = 347)	Average Number of Days Participating (Participants Only)
Lake or pond fishing	47.0	25.3
Stream fishing	49.9	17.5
Small game hunting	36.9	15.9
Large game hunting	39.8	15.2
Waterfowl hunting	3.7	9.1
Berry picking	68.6	10.3
Mushrooming	4.9	6.6
Wood cutting for personal use	38.0	21.0
Sugaring	12.6	19.6

Table 3. Motivation/Importance factors for hunting.

Motivation /Importance	Factor I Food Procurers (11.4%) ^a	Factor II Outdoor Life (13.5%)	Factor III Trophy Harvest (11.7%)	Factor IV Social Harvest (7.5%)
Hunt for food supply	.774			
Hunt for food*	-.710			
Hunting is over regulated	.578			
Shoot only the game I'll eat	.508			
Hunt to relax		.796		
Hunt to enjoy nature		.746		
Enjoy hunting w/o harvesting		.649		
Hunting important to my life		.616		
Hunt to obtain trophy animal			.792	
Bag trophy is biggest reward			.677	
Hunt to experience kill			.595	
Hunt only specific types game			.559	
Hunt because of challenge			.529	
Hunt to be with friends				.654
Rarely go hunting alone				.650
Hunt to be with family				.548

^a Proportion of post-rotation variance explained

* Reversed scale

Table 2. Sharing and distribution of fish, wildlife, and other harvested resources.

Resources harvested	Gave to other households (n = 331)	Received from other households (n = 392)
Fish	18.7	21.2
Small game	3.6	9.4
Large game	6.0	18.6
Waterfowl	1.0	NA
Mushrooms/berries	22.3	16.8
Fuel wood	8.1	20.9
Home garden products	32.5	45.1
Maple products	8.2	37.0
Other	NA	4.3

Exploratory factor analysis (principal axis factor analysis) was initially used to reduce the motivation/importance attributes to underlying dimensions. In this stage of the factor analysis an eight factors solution emerged for both hunting and fishing motivation scores; a six factor solution emerged for berrying motivations. After several specified iterations, the exploratory principal components analyses suggested a four factor solution for rotation for both hunting and fishing motivations and a three factor solution for berrying. The decision about the numbers of factors to be extracted for the final solutions were based on the convergence of eigenvalues (≥ 1.00); explained variance ($\geq 7.5\%$); and scree tests (Hawes 1988), and preservation of original dimensions found in the principal axis approach. The results of the four factor Varimax (orthogonal) rotation for hunting motivations/importance dimensions are shown in Table 3. Factor labeling was based on the criteria of a minimal significant loading ($\geq .450$) of variables on the factor. Factor 1 suggests motivations related to *food procurement*, epitomized by motivations related to hunting for food supply and the importance of hunting for food. This dimension is also characterized by the statements "I shoot only the wild game I'm going to eat" (.508) and "Hunting is over regulated" (.578). The second dimension

indicates an *outdoor life* orientation. Motivations attributed to this dimension appear to be hunting to relax (.796), hunting to enjoy nature (.746), enjoyment of hunting without bagging game (.649), and importance of hunting to their life (.616). The third factor reflects an orientation toward *trophy hunting*. Loadings on this factor reflect large numbers of respondents who hunt to obtain a trophy animal (.792), who see the greatest reward in hunting in bagging a trophy (.677), who hunt to experience the kill (.595), who specialize in only hunting specific types of game (.559), and who are motivated because of the challenge (.529). The fourth factor loaded on hunting to be with friends (.654) and family (.548), and respondents indicated they rarely hunted alone (.650), suggesting a factor related to the *social aspects of harvesting*. The four underlying dimensions, thus, appear to form differentiating structures of hunting motivation profiles.

A four factor solution was also suggested for fishing motivations. Similar decision criteria (i.e., eigenvalue convergence, explained variance, and scree test) were used in determining the number of factors to extract for a final solution. The first motivational factor was seen as *outdoor*

escape, characterized by moderate to high loadings on fishing to enjoy nature (.743), importance of fishing to be outdoors (.741), and fishing as an important part of the respondent's life (.621). This factor also had moderate loadings on fishing to relax, fishing for enjoyment, and keeping the catch. Similar to the first factor of the hunting motivational dimensions, the second factor of fishing motivations was related to *food procurement* loading heavily on the importance of fishing for food supply and the motivation of fishing for food. The third factor was unique because of the inverse loadings on fishing to catch a trophy (-.708), fishing for extra income (.574), and seeing trophy catch as a big reward (-.508). The motives for fishing are non-trophy oriented, and seem to indicate a dimension in which people just *dabble* in fishing, that is they fish just to fish. The fourth factor again is related to the social aspects of the harvesting activity. Here the motivation is to fish to be with family (.662), enjoy fishing without harvesting (.534), fish to be with friends (.532), rarely fish alone (.467), and an inverse loading on the statement that they wouldn't fish even if they wouldn't catch anything (-.460). The loadings on this latter factor indicate a *social experience* motivational dimension.

Table 4. Motivation/Importance factors for fishing.

Motivation /Importance	Factor I Outdoor Escape (16.0%) ^a	Factor II Food Procurer (9.1%)	Factor III Dabbler (8.5%)	Factor IV Soc. Experience (9.8%)
Go fishing to enjoy nature	.743			
Go fishing to be outdoors	.741			
Fishing is important to my life	.621			
I fish to relax	.584			
Fish for enjoyment*	-.555			
Only keep the fish I'll eat	.544			
Fish for food supply		.832		
Fish for food*		-.643		
Fish to catch a trophy			-.708	
Fish for extra income*			.574	
Trophy catch is biggest reward			-.508	
Fish to be with family				.662
Enjoy fishing w/o harvesting				.534
Fish to be with friends				.532
Rarely go fishing alone				.467
I wouldn't fish if I thought I wouldn't catch anything				-.460

a/ Proportion of post-rotation variance explained

* Reversed scale

Again employing the aforementioned criteria for determining the optimal number of dimensions, a three factor solution was suggested for motivations in berry harvesting (see Table 5). The first factor for berrying was characterized by loadings on berrying to be outdoors (.795), berrying to enjoy nature (.781), pick berries to have peace and solitude (.696), and to a lesser extent pick berries to be with family (.549) and friends (.514). This first factor was labeled *outdoor escapist*. The second factor, food *procurement*, was characterized by motivations for picking berries for food and picking specific types of berries. The third factor was again a *family gathering* factor. The motivations loading on this factor were "pick berries to be with family" (.618) and a high loading on "rarely go berrying alone" (.781).

A review of the factors across the three harvesting activities indicates a commonality of motivations related to food procurement, having an outdoor experience, and social contacts. Hunting is differentiated by a trophy motivational dimension, whereas fishing has a unique motivational dimension related to fishing for its own sake. Factor scores from the rotated factor solutions for each of the three harvesting activities were then used in subsequent cluster analyses to partition harvesters into types.

Table 5. Motivation/Importance factors for berrying.

Motivation /Importance	Factor I	Factor II	Factor III
	Outdoor Escapists (18.5%) ^a	Food Procurers (12.8%)	Family Gathers (9.7%)
Go berrying to be outdoors	.795		
Go berrying to enjoy nature	.781		
Pick berries for peace/ solitude	.696		
Enjoy berrying w/o harvesting	.618		
Pick berries to be with family	.549		.618
Go berrying to be with friends	.514		
Berrying for family food supply		.731	
Pick berries for food*		-.675	
Berrying important to my life		.608	
Pick only specific types		.497	
Rarely go berrying alone			.781

^a/ Proportion of post-rotation variance explained

* Reversed scale

Cluster analysis is essentially a mapping procedure. The output from the procedure allows one to identify and label the cluster, and understand how cases group together. Various cluster analytic procedures are available, but generally can be divided between hierarchical and nonhierarchical techniques. A nonhierarchical, or iterative, cluster procedure (K-means) was selected for use in this study because of the relatively large number of cases. The nonhierarchical technique uses multivariate profiles to sort the cases into k-clusters based on "seed" points (Goldsmith 1987). The initial seed points were automatically defined by the cluster program used and each case was assigned to an initial seed. Seed points were then redefined through subsequent iterations. In the first stage of the cluster analysis for this study, an iterative partitioning method was employed to determine respondents who were outliers. Through subsequent iterations and elimination of outliers (single case clusters) the original 141 respondents who responded to the hunting motivation questions were reduced to a set of 140; those who responded to the fishing motivations were reduced to 178 cases; and berry pickers were reduced to 231 respondents.

One of the difficulties in using nonhierarchical cluster analysis is the determination of the optimal number of homogeneous groups for the final solution. Aldenderfer & Blashfield (1984) suggest heuristic procedures for determination seem to be predominant. In this study, we subjected the hunting motivational factor dimension scores of the reduced set of respondents to eleven different cluster runs that ranged from 12 clusters to 2 clusters. A five cluster solution was selected as optimal based on the criteria of interpretability of the clusters and modified scree test (Aldenderfer & Blashfield 1984). An examination of Cluster I, which contained the largest number of cases (50), revealed that the factors related to Outdoor Life (Factor II) and the Trophy Harvesting (Factor III) factor could be identified as interpreting the cluster (both factor means were positive); this cluster was subsequently labeled as *Specialists* because of the emphasis on trophy harvesting (see Table 6). The second cluster of 22 cases had a moderately high mean associated with the first factorial dimension and was negatively related to the other three. Because this first factor was a Food Procurement oriented dimension, the cluster was characterized as *Food Procurers*. The third cluster contained only 3 cases. This cluster was characterized by negative means on all four factor dimensions. A further examination of the raw data on these respondents revealed very minimal participation in hunting activities and little agreement with any motivational statements for participating; this cluster was labeled as *Un-Hunters*. Cluster IV (44 cases) was characterized

by a moderate positive mean on the second factor—Outdoor Life, and a positive mean on the fourth factor—Social Harvest. This cluster was labeled *Outdoor Socializers*. The 21 cases comprising Cluster V, had a very high mean on the fourth and third factors (Social Harvest and Trophy Harvest respectively), and a moderate positive mean on the first factor (Food Procurers). Cluster V was labeled *Trophy Socializers*. This latter cluster may be epitomized in by those who attend deer camp for both the hunting and socializing aspects.

Table 6: Hunting clusters.

Clusters	Factor I (Food Procurers)	Factor II (Outdoor Life)	Factor III (Trophy Harvest)	Factor IV (Social Harvest)
I Specialists	-0.16	0.32	0.62	-0.71
II Food Procurers	0.62	-1.21	-0.67	-0.34
III Un-Hunters	-2.98	-2.68	-0.39	-0.27
IV Outdoor Socializers	-0.30	0.63	-0.76	0.45
V Trophy Socializers	0.66	-0.47	1.03	1.16

Eleven different cluster solutions also were run on the fishing motivation factor scores. A five cluster solution was selected based on interpretability of the clusters and scree/fusion test (see Table 7). The first cluster contained 86 harvesters and was defined by moderately low positive means on all four fishing motivational factors. This first cluster was labeled as *Generalists*. Cluster II had negative loadings on Factors I (Outdoor Escape), II (Food Procurement), and IV (Social Experience), and a positive loading on Factor III (Dabbler). The relatively inverse relation to outdoor escape and positive relationship with the third factor suggests labeling this cluster of 28 cases as *Dabblers*. Cluster III contained 46 harvesters and was distinguished by the single positive mean associated with the Outdoor Escape motivational factor (Factor I). This cluster was labeled as *Outdoor Enthusiasts*. Cluster IV was clearly related to the third factor—food procurement and was inverse to the social experience; the cluster of 10 harvesters was labeled as *Food Procurers*. The fifth cluster was positively related to Factor II (Food Procurement) and Factor IV (Social Experience). As a result of the higher positive mean on the social dimension, Cluster V (8 cases) was labeled as *Social Participants*.

Table 7: Fishing clusters.

Clusters	Factor I (Outdoor Escape)	Factor II (Food Procurement)	Factor III (Dabblers)	Factor IV (Social Experience)
I Generalists	0.47	0.59	0.20	0.37
II Dabblers	-1.11	-0.22	0.19	-0.32
III Outdoor Enthusiasts	0.37	-1.20	-0.22	-0.25
IV Food Procurers	-0.93	0.97	-0.05	-2.38
V Social Participants	-2.20	0.09	-0.79	1.35

A five cluster solution was also selected for the berry harvesters (see Table 8). Cluster I was characterized as *Generalist Gatherers* because of the positive relationship to all three motivational factors (Outdoor Escape, Food Procurement, and Social Gatherers) of berrying. Sixty eight berry pickers were classified into this type. The 51 berry harvesters of Cluster II had a moderately positive mean on Factor II (Food Procurement) and negative means on Factors I (Outdoor Escape) and III (Social Gatherers). This cluster was subsequently labeled as *Food Gatherers*. Cluster III, labeled as *Outdoor Enthusiasts*, had one positive mean on the first factor dimension (Outdoor Escape) and negative means on dimensions two and three. There were 55 harvesters classified into this type. Cluster IV partitioned 25 berry pickers into a cluster characterized by a positive mean associated with Factor III (Social Gatherers) and negative means on Factor I and Factor II. The cluster was labeled as *Family Pickers*. The final cluster type had moderately positive means on Factors I (Outdoor escape) and III (Social Gatherers); and a negative mean on the Food Procurement factor. This fifth cluster was labeled *Outdoor Kinship* and partitioned 32 berry harvesters into this type.

Table 8: Berrying clusters.

Clusters	Factor I (Outdoor Escape)	Factor II (Food Procurement)	Factor III (Social Gatherers)
I Generalist Gatherers	0.45	0.68	0.79
II Food Gatherers	-1.09	0.59	-0.39
III Outdoor Enthusiasts	0.66	-0.13	-1.12
IV Family Pickers	-1.24	-1.20	0.22
V Outdoor Kinship	0.58	-1.15	0.66

In summary, the cluster analysis indicated that five distinct motivational "types" of harvesters are prevalent for each of the three harvesting activities. Such constructed types help reduce the data's complexity and can be useful for comparing real events related to the attributes of the type (Lorr 1983). The value of constructed types lie in their use in comparing empirical data, so the taxonomic scheme should be tested to be useful.

The viability of the constructed typology was explored by testing whether clusters within each harvesting activity could also be distinguished on a specialization construct. Various research studies have used frequency of participation as a surrogate for specialization in activities; others have used the purchase and use of specialized equipment as an indicator of the specialization concept. It was hypothesized that the five clusters for each of the three harvesting activities could be distinguished by their participation rates in the respective harvesting activity. Because of the small numbers of cases in some of the clusters, a non-parametric version of Analysis of Variance, the Kruskal-Wallis Test, was used to examine whether differences existed among the five cluster "types" on

their participation rates. Significant differences in participation rates were found among cluster "types" for each of the three activities—hunting, fishing, and berrying (see Table 9). An examination of means days of participation in hunting indicated that Trophy Socializers (Cluster V) differed significantly from Un-Hunters (Cluster III) and Food Procurers (Cluster II). In fishing, Generalists (Cluster I) significantly differed in mean days of participation from Dabblers (Cluster II) and Food Procurers (Cluster IV). Generalists and Outdoor Enthusiasts showed significant differences from the clusters labeled Family Pickers and Outdoor Kinship in mean days of berry harvesting.

Kruskal-Wallis analysis was also employed to test whether clusters in each harvesting activity differed in the numbers of specialized equipment used in their respective natural resource harvesting activities. No significant differences were found among fishing or berrying clusters, but significant differences were found among the hunting clusters (see Table 10). An examination of mean numbers of specialized equipment used in hunting indicates that Specialists (Cluster I) and Trophy Socializers (Cluster IV) differed appreciably from Food Procurers (Cluster II) and Un-Hunters (Cluster III) by using a greater number of specialized equipment in their harvesting activities. The results of the Kruskal-Wallis analysis, thus, indicate limited support for the viability of the cluster constructs' ability to differentiate harvesters on other empirical variables.

Table 9. Hunting, fishing, and berrying clusters: Differences in participation.

Participation	(Kruskal-Wallis)	Test statistic Significance ^a
Hunting Clusters	H = 11.263	p ≤ .025
Fishing Clusters	H = 19.043	p ≤ .005
Berrying Clusters	H = 26.339	p ≤ .005

^a/ p ≤ .05, 4 df.

Table 10. Hunting, fishing, and berrying clusters: Differences in numbers of specialized equipment used in natural resource activities.

Participation	(Kruskal-Wallis)	Test statistic Significance ^a
Hunting Clusters	H = 9.663	p ≤ .05
Fishing Clusters	H = 8.095	N.S.
Berrying Clusters	H = 5.203	N.S.

^a/ p ≤ .05, 4 df.

Implications

Given the limitations of the natural resource base and the demands for a variety of consumptive and non-consumptive uses as well as non-user interests, natural resource management agencies are faced with exceedingly difficult allocative and managerial choices. Managers must define what is to be delivered at any given resource in the context of the system of resource areas (Knopf et al., 1992, p. 151). In some instances the goal may be to provide opportunities for experiences that fit with the intrinsic nature of the resource (Knopf et al., 1992, p. 151). For example, for one constituency partitioned in this study fisheries managers may want to enhance and protect a trophy fishing lake, or conversely improve habitat for a prolific warm water species and provide additional access for a

lake frequented by dabblers. In contrast, an alternative goal may be responsiveness to new constituencies as traditional users change their patterns of use or there is attrition of users. For example many of our public resource agencies are pressured to justify budgets by the number and types of users on the resource areas. As use declines for certain traditional activities (e.g., hunting) these agencies are expected to "market" to new constituencies. The extent of use and relatively low service and impact requirements of berry and mushroom pickers suggest a possible new market segment for those agencies wishing to expand their clientele.

Market segmentation may also help to accommodate a mix of users with similar motivations and to structure services to appeal to these distinct motivational types, i.e., designating and managing a resource area for trophy hunting or fishing. Alternatively, a particular resource area may be designated and managed for food procurement at the exclusion of other uses or users and may be marketed using strategies designed to appeal to those motivated by such concerns by emphasizing success of harvest for all three activities or the quality of fish, game or berries/mushroom. In both instances a typology of motivations can contribute to a more effective and efficient marketing strategy.

Partitioning harvesters by motivation is also useful for understanding the non-consumptive benefits accruing to those who engage in consumptive activities such as hunting, fishing and berrying. All three activities have distinct harvester types who are motivated to participate by social reasons, being outdoors and enjoying nature, and food procurement. These three types may have unique beliefs about how resource areas should be managed and unique ways they develop social support networks that cross harvesting activities. Such a taxonomy, as that provided in this study, is a more parsimonious method of exploring these differences. Further studies should explore whether these "types" differ in belief and interaction structure.

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