

Table of Contents

Keynote Address.....	1
Making research more relevant: Give it a try! <i>David W. Lime.....</i>	3
Crowding Issues in Resource Management.....	13
Balancing tradeoffs in the Denali Wilderness: An expanded approach to normative research using stated choice analysis. <i>Steven R. Lawson and Robert Manning.....</i>	15
Coping, crowding and satisfaction: A study of Adirondack wilderness hikers. <i>Andrew K. Johnson and Chad Dawson.....</i>	25
Perceived crowding at Boston Harbor Islands National Park Area. <i>Megha Budruk, Robert E. Manning, William A. Valliere, and Benjamin Wang.....</i>	32
Transportation planning and social carrying capacity in the National Parks. <i>William Valliere, Robert Manning, Megha Budruk, Steven Lawson, and Benjamin Wang.....</i>	36
The Role of Information in Travel Planning Decisions.....	41
Assessing information needs and communication behaviors of National Forest summer visitors. <i>James D. Absher, Brijesh Thapa, and Alan R. Graefe.....</i>	43
The commodification process of extreme sports: The diffusion of the X-Games by ESPN. <i>Chang Huh, Byoung Kwan Lee, and Euidong Yoo.....</i>	49
Marketing National Parks: Oxymoron or opportunity? <i>Alan K. Hogenauer.....</i>	53
Demographic Trends in Outdoor Recreation Participation & Travel.....	61
Wildlife-associated recreation in the North Central Region: Participation patterns and management implications. <i>Allan Marsinko and John Dwyer.....</i>	63
The New England travel market: Generational travel patterns, 1979 to 1996. <i>Rod Warnick.....</i>	69
Welcome center research: How valuable is secondary research? <i>Lousia Meyer, Tara Patterson, Lori Pennington-Gray, Andrew Holdnak, and Brijesh Thapa.....</i>	76
Methodology in Outdoor Recreation Research I: Interventions.....	79
Unique programming: An examination of the benefits of a free choice program. <i>Dorothy L. Schmalz, Deborah L. Kerstetter, and Harry C. Zinn.....</i>	81
Outdoor experiential-based training: Motivational and environmental influences affecting outcomes. <i>Teresa (Birdie) High and Alan R. Graefe.....</i>	85
Use of experience sampling method to understand the wilderness experience. <i>Lynn Anderson.....</i>	92
Encounters and the guided group trip: Going "on-the-scene" to examine the situational interpretation of encounters. <i>Erin K. Sharpe.....</i>	98

Leisure Motivations of Outdoor Recreationists.....	105
Differences in SCUBA diver motivations based on level of development. <i>Sharon L. Todd, Alan R. Graefe, and Walter Mann.....</i>	107
Skier motivations: Do they change over time? <i>Erin White and Lori Pennington-Gray.....</i>	115
Sociocultural perspectives of trapping revisited: A comparative analysis of activities and motives 1994 and 2000. <i>Rodney R. Zwick, Ron Glass, Kim Royar, and Tom Decker.....</i>	118
Resource Management & International Tourism Development.....	125
The impact of potential political security level on international tourism. <i>Young-Rae Kim, Chang Huh, and Seung Hyun Kim.....</i>	127
Future of the Korea National Parks: A preliminary Delphi study of key experts. <i>Byung-kyu Lee and Wilbur F. LaPage.....</i>	130
User Satisfaction in Outdoor Recreation.....	133
A preliminary analysis of Florida State Park satisfaction survey data. <i>Andrew Holdnak, Stephen Holland, and Erin Parks.....</i>	135
Recreationists in the Columbia River Gorge National Scenic Area: A survey of user characteristics, behaviors, and attitudes. <i>Robert C. Burns and Alan R. Graefe.....</i>	138
Visitor satisfactions: Backcountry and wilderness users in the White Mountain National Forest. <i>Chad P. Dawson, Rebecca Oreskes, Frederick Kacprzyński, and Tom More.....</i>	144
Participants' perceptions of the 1997-1998 Missouri State Parks Passport Program. <i>Yi-Jin Ye and Jaclyn Card.....</i>	153
Environmental Knowledge, Concern, Behavior & Education.....	161
An evaluation of Appalachian Trail hikers' knowledge of minimum impact skills and practices. <i>Peter Newman, Robert Manning, Jim Bacon, Alan Graefe, and Gerard Kyle.....</i>	163
Who cares and who acts? Different types of outdoor recreationists exhibit different levels of environmental concern and behavior. <i>Mario F. Teisl and Kelly O'Brien.....</i>	168
Visitor behavior and resource impacts at Cadillac Mountain, Acadia National Park. <i>Rex Turner and Wilbur LaPage.....</i>	175
Leisure Constraints of Outdoor Recreationists.....	181
The effects of perceived leisure constraints among Korean university students. <i>Sae-Sook Oh, Sei-Yi Oh, and Linda L. Caldwell.....</i>	183
Exploration of the influence of self-efficacy on recreation participation levels of individuals with visual impairments who use dog guides. <i>Laurlyn K. Harmon and Linda L. Caldwell.....</i>	188
Urban Recreation & Development Issues.....	193
An integrative concept for visitor monitoring in a heavily used conservation area in the vicinity of a large city: The Danube Floodplains National Park, Vienna. <i>Arne Arnberger, Christiane Brandenburg, and Andreas Muhar.....</i>	195

Linkages in the use of recreation environments across the urban to ex-urban spectrum by urban residents. <i>John F. Dwyer and Susan C. Barro</i>	202
The role, use and benefits of natural recreation areas within and near residential subdivisions. <i>Christine A. Vogt and Robert W. Marans</i>	208
Economic Impacts & Non-economic Benefits of Tourism	215
New York State's 1999 agritourism business study. <i>Diane Kuehn and Duncan Hilchey</i>	217
Rail-trails and special events: Community and economic benefits. <i>Charles Nelson, Christine Vogt, Joel Lynch, and Daniel Stynes</i>	220
Private business perceptions of transportation issues and the Island Explorer Bus system at Acadia National Park, Maine. <i>Rea Brennan, Marc Edwards, and John J. Daigle</i>	225
Management Decision-making & Planning for Outdoor Recreation	231
Integrating resource, social and managerial indicators of quality into carrying capacity decision making. <i>Peter Newman, Robert Manning, and Bill Valliere</i>	233
Redefining roles of science in planning and management: Ecology as a planning and management tool. <i>Greg Mason and Stephen Murphy</i>	239
Impacts of Wildlife Viewing	247
Elk viewing in Pennsylvania: An evolving eco-tourism system. <i>Bruce E. Lord, Charles H. Strauss, and Michael J. Powell</i>	249
Competing values: A case study of Pennsylvania's elk herd as a tourism attraction. <i>Jeffrey A. Walsh and Leonard K. Long</i>	253
Impacts of wildlife viewing at Dixville Notch Wildlife Viewing Area. <i>Judith K. Silverberg, Peter J. Pekins, and Robert A. Robertson</i>	260
Methodology in Outdoor Recreation Research II: Instruments & Methods	267
Effects of pretesting with the adventure recreation model instrument. <i>Anderson Young, Lynn Anderson, and Dale Anderson</i>	269
Modeling nonlinear preferences. <i>Donald F. Dennis</i>	275
Personal Relevance, Involvement & Loyalty in Outdoor Recreation	279
Psychological commitment as a mediator of the relationship between involvement and loyalty. <i>Joohyun Lee and Alan Graefe</i>	281
Gender Issues in Outdoor Recreation & Resource Management	289
Older Chinese women immigrants and their leisure experiences: Before and after emigration to the United States. <i>Ching-Hua Ho and Jaclyn A. Card</i>	291
Towards an understanding of gender differences with respect to whitewater rafting preferences. <i>Duarte B. Morais, Traci Zillifro, and Susanne Dubrouillet</i>	298

Trails over Land & Water: Issues of Multiple Use & Conflict	305
Use and user patterns among Michigan licensed Off-Highway Vehicles ownership types. <i>Joel A. Lynch and Charles M. Nelson</i>	307
Recreation conflict of riparian landowners with personal watercraft and motorboat use along the New York's Great Lakes. <i>Cheng-Ping Wang and Chad P. Dawson</i>	314
User preferences for social conditions on the St. Croix International Waterway. <i>Jamie Hannon, John J. Daigle, and Cynthia Stacey</i>	320
Security along the Appalachian Trail. <i>James J. Bacon, Robert E. Manning, Alan R. Graefe, Gerard Kyle, Robert D. Lee, Robert C. Burns, Rita Hennessy, and Robert Gray</i>	326
Trails research: Where do we go from here? <i>Michael A. Schuett and Patricia Seiser</i>	333
Attachments to Places & Activities in Outdoor Recreation	337
Visitor meanings of place: Using computer content analysis to examine visitor meanings at three National Capitol sites. <i>Wei-Li Jasmine Chen, Chad L. Pierskalla, Theresa L. Goldman, and David L. Larsen</i>	339
The importance of visitors' knowledge of the cultural and natural history of the Adirondacks in influencing sense of place in the High Peaks Region. <i>Laura Fredrickson</i>	346
Attachments to places and activities: The relationship of psychological constructs to customer satisfaction attributes. <i>Thomas D. Wickham and Alan R. Graefe</i>	356
An exploration of human territoriality in forest recreation. <i>Harry C. Zinn, Laurlyn K. Harmon, Brijesh Thapa, Deborah L. Kerstetter, and Alan R. Graefe</i>	365
Community attachment and resource harvesting in rural Denmark. <i>Rodney R. Zwick and David Solan</i>	369
Poster Session	375
The political economy of wilderness designation in Nova Scotia. <i>Glyn Bissix, Leah Levac, and Peter Horvath</i>	377
The Westfield River Watershed Interactive Atlas: Mapping recreation data on the Web. <i>Robert S. Bristow and Steven Riberdy</i>	383
Park resources as an essential to urban societies. <i>Kristin Dion, Doug Stefancik, Serena Hawkins, and Robert Bristow</i>	386
Parks and recreation employment status: Implications from a civil service perspective. <i>Joel Frater and Arthur Graham</i>	390
Natural resources interpretation: The role of researchers – A new-old approach. <i>Mark Gleason</i>	395
Mountain bike trail compaction relation to selected physical parameters. <i>Jeff Hale and Rodney R. Zwick</i>	399
Internet & branding: A perfect match or a fatal attraction? Analysis of fifty states of the U.S. official tourism websites. <i>Gyehee Lee, Liping A. Cai, Everette Mills, and Joseph T. O'Leary</i>	403

Job satisfaction among recreation practitioners. <i>Erin Parks and Andrew Holdnak</i>	411
Extensivity and intensity of grants usage in obtaining funding for recreation services and capital improvement projects among park and recreation agencies in the state of Michigan. <i>Jerry L. Ricciardo</i>	415
Resident camp directors, spirituality, and wilderness. <i>Michael Rule and Edward Udd</i>	418
Social groups preferences relation to motivations and ability levels of whitewater kayakers. <i>Seth Turner and Rod Zwick</i>	421
Management Presentation	427
Human preferences for ecological units: Patterns of dispersed campsites within landtype associations on the Chippewa National Forest. <i>Lisa Whitcomb, Dennis Parker, Bob Carr, Paul Gobster, and Herb Schroeder</i>	429
Roundtable Discussions	435
Creating recreation partnerships on private agricultural and forest land in the urban Northeast: A case study from the Great Meadows of the Connecticut River. <i>Robert L. Ryan and Juliet Hansel</i>	437
Applied research opportunities in developed campgrounds. <i>Carl P. Wiedemann</i>	443
Adapting the Recreation Opportunity Spectrum (ROS) for states lands planning. <i>Susan Bulmer, Linda Henzel, Ann Mates, Matt Moore, and Thomas A. More</i>	447
It's time to put the C.A.R.T. before the H.O.R.S.E. or Putting Critical, Analytical, and Reflective Thinking before "Handyman" Oriented Recreation Student Education. <i>David L. Jewell</i>	452
Index of Authors	457

Economic Impacts & Non-economic Benefits of Tourism

NEW YORK STATE'S 1999 AGRITOURISM BUSINESS STUDY

Diane Kuehn

Coastal Tourism Specialist, NY Sea Grant, Adjunct Assistant Professor, SUNY College of Environmental Science and Forestry, State University of New York at Oswego, Oswego, NY 13126

Duncan Hilchey

Agriculture Development Specialist, Farming Alternatives Program, 16 Warren Hall, Cornell University, Ithaca, NY 14853

Abstract: Agritourism businesses (i.e., farm-based businesses that are open to visitors for recreational purposes) are becoming an important component of New York's tourism industry today. In order to estimate the economic impacts of these businesses on New York State and identify cost-effective management and marketing strategies for business owners, New York Sea Grant and Cornell University conducted a study of New York State agritourism businesses and their customers. With the assistance of six agritourism business owners, 299 customer surveys were completed in 1999. In addition, a sample of 2000 business owners were surveyed by mail in 2000, with a return rate of 38.8% or 645 completed surveys from the qualified sample. An estimated 2,087 agritourism businesses existed in New York State in 1999, yielding a total estimated net profit of nearly \$25.8 million. A breakdown of the types of agritourism businesses existing in New York State was generated from the results. Business owner concerns were identified, as well as the management and marketing strategies found to be most effective for attracting and managing visitors. This presentation will focus on the results of this study as well as its management and marketing implications for agritourism businesses.

Introduction

Many farm businesses in New York State today are opening their doors to visitors. Farm stands, wineries, maple syrup and honey producers, greenhouses and plant nurseries, and Christmas tree farms are just a few of the many types of farm-based businesses that are open to, and attract, visitors for recreational purposes (Kuehn & Hilchey, 2001). In order to identify the viability of agritourism businesses in New York State, estimate the economic impact of agritourism on New York State, and identify cost-effective management and marketing strategies for agritourism businesses, NY Sea Grant and Cornell University's Farming Alternatives Program, in conjunction with the Cornell University Statewide Committee on Community and Economic Vitality Tourism Work Group, conducted a two-part study of agritourism business owners and their customers in New York State in 1999 and 2000. Funding for this research was provided by the United States Department of Agriculture through Cornell University's Research and Extension Integration Grants Program.

Methods

The 1999 New York State agritourism business study consisted of two components: a customer survey and a business owner survey. The customer survey was conducted in 1999 with the assistance of six agritourism business owners in New York State. Business owners were requested to ask their customers to complete a short survey. A total of 299 customer surveys were completed and analyzed (Kuehn & Hilchey, 2001).

In 2000, a survey of agritourism business owners was conducted using a modified total design method (Dilman, 1978). A mailing list of 2,416 agriculture-related businesses open to the public was generated with assistance from agriculture and tourism agencies and organizations across New York State. The size of this initial mailing list is likely conservative since businesses not included in agency mailing lists may have been excluded. A systematic random sample of 2,000 businesses was generated from this initial mailing list. Farm business owners in this sample were sent surveys by mail and asked to report on their business activities for the calendar year 1999. A reminder postcard and follow-up survey were mailed to non-respondents. After businesses with undeliverable addresses and businesses not classified as agritourism businesses by their owners were removed from this sample, a qualified sample of 1,661 businesses remained. From this qualified sample, 9.7% of the surveys were returned by owners who did not wish to participate in the study, 51.5% were not returned, and 38.8% (645 surveys) were completed and used in this study (Kuehn & Hilchey, 2001).

Results

Data from the customer and business owner surveys were analyzed for New York State as a whole, and according to type of agritourism business (i.e., farm stand, Christmas tree farm, etc.) and New York State Department of Economic Development tourism region (Figure 1). In addition, results were broken down into the following subject categories: business income and net profit, promotional strategies, customer markets, management and operations, business owner concerns, and future plans of business owners.

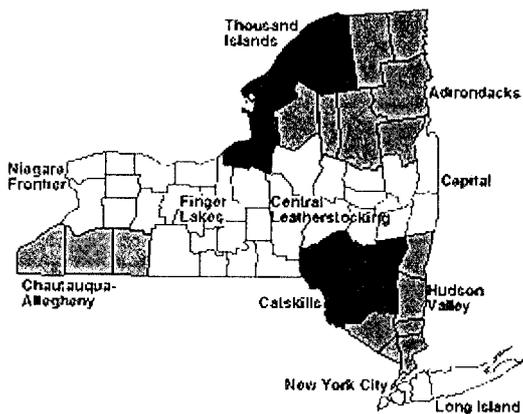


Figure 1. New York State Department of Economic Development Tourism Regions

Statewide Results

In New York State in 1999, farm stands made up the largest percentage of agritourism businesses (37.4%), followed by Christmas tree farms and u-pick operations. The largest percentages of agritourism businesses were located in the Finger Lakes region (27%) and Central Leatherstocking region (11.3%). Tables 1 and 2, respectively, list the percentages of respondents by agritourism business type and New York State tourism region in which businesses are located.

Table 1. The Percentages of Respondents by Agritourism Business Type in New York (n = 645)

Business types	Percent of respondents
Farm stands	37.4%
Christmas tree farms	11.9
U-pick operations	9.6
Maple producers	9.3
Greenhouses and nurseries	9.2
Other*	9.1
Wineries	6.2
Livestock breeders	4.5
Farm-based B&Bs	2.8
TOTAL	100.0%

*"Other" includes miscellaneous business types such as herb and perennial farms, petting zoos, community supported agriculture farms, farm-related museums, farm tour operators, and horse riding stables.

Table 2. The Percentages of Respondents by New York State Department of Economic Development Tourism Region (n = 645)

Tourism region	Percent of respondents
Finger Lakes	27.0%
Central Leatherstocking	11.3
Capital	9.9
Niagara Frontier	9.8
Hudson Valley	9.6
Adirondacks	7.9
Catskills	7.3
Chautauqua-Allegheny	6.5
Thousand Islands	5.6
Long Island	5.0
New York City	0.1
TOTAL	100.0%

Business Income and Net Profit

Statewide estimates reveal that an estimated 2,087 agritourism businesses within New York State received a total estimated gross income of \$210.87 million in 1999 from their agritourism business components (e.g., products and services such as educational programs, tours, hayrides, exhibits, crafts, and food tastings; n = 399). Due to high

costs associated with operating agritourism businesses, the total net profit of these businesses was estimated to be \$25.77 million, with the average agritourism business receiving an estimated net profit of \$12,347.

While the average agritourism business did make a profit in 1999, 25% of agritourism businesses either had expenses that equaled their income (i.e., they broke even) or had expenses that exceeded their income (i.e., they lost money). The most profitable types of agritourism businesses were greenhouses and plant nurseries, farm stands, and u-pick operations. The least profitable type was livestock breeding farms. Christmas tree farms, maple producers, farm-based bed and breakfasts, and wineries were all moderately profitable.

Promotional Strategies

Responding business owners used a diversity of promotional strategies to attract visitors to their businesses. Direct mailings, business signs, and brochures were the most cost-effective strategies used because, according to business owners, of their high effectiveness at attracting customers and their moderate cost. The use of newsletters was also found to be highly effective but had a higher cost associated with it. Television advertisements, newspaper advertisements, and radio advertisements were found to be moderately effective at attracting visitors but at a high cost.

Customer Markets

Knowing where customers of agritourism businesses are coming from and what their interests are is essential for implementing effective marketing strategies. According to responding business owners, most customers (57.6%) come from the same county in which the business is located; 30.6% come from other counties in New York State, 9.0% come from other states outside of New York, 1.7% come from Canada, and 1.1% come from other countries (n = 569). International visitors primarily came from England, Germany, Japan, and Ireland.

Customers are looking for businesses with friendly staff (71% of customers indicated that this is important to them), activities at the business (58%), businesses with farm animals (33%), and businesses with barns and historic buildings (32%; n = 267). Customers indicated that they would be most interested in sampling local foods and produce (47.2% of customers indicated this activity), sampling wines (44.2%), and picking fruits and vegetables (43.4%) at agritourism businesses in the future (n = 267). The top five activities that responding business owners indicated that their customers participate in are visiting parks, attending festivals, camping, visiting historic sites, and fishing.

Management and Operations

Responding business owners utilized many different management strategies for their businesses. Diversification of products and services was commonly used, with businesses offering farm tours and educational programs,

selling homemade foods and crafts, hayrides and sleigh rides, u-pick vegetables and fruits, and other business components as well. While only 4% of business owners indicated that they charge a general admission fee, many owners do charge a fee for specific activities on their farm such as educational programs and hayrides. The majority of agritourism businesses were open during specific seasons only in 1999, with 78% open during the fall, 76% during the summer, 60% in the spring, and 43% in the winter. Only 30% of all responding businesses were open year-round in 1999. Most agritourism businesses are family-operated, with an average of three family members as employees. In addition, the average business has six employees who are not family members.

Business Owner Concerns

The top five concerns of agritourism business owners were liability and liability insurance; marketing, promotion, and advertising; labor costs and issues; government regulations, and taxes. Eighty-four percent of respondents indicated that liability is a concern and 90% have purchased liability insurance to protect themselves from it (n=614). In addition, 71% of business owners regularly make any needed repairs to their business and 41% have added safety precautions (Kuehn & Hilchey, 2001). Conducting a risk analysis of their business, incorporating, having visitors signs a disclaimer, managing potentially dangerous visitor behaviors, and not charging admission (to reduce the status of the visitor from invitee to licensee) are used as well by some respondents.

Future Plans of Business Owners

When asked what their future plans for their business are, 64% of respondents indicated that they plan on expanding their business within the next five years (n = 581). In addition, 34% of respondents plan on investing more funding in their business, 21% on hiring more employees, and 8% in incorporating their business. These plans indicate that agritourism business in New York State will be expanding in general over the next five years. Seven percent of businesses plan on going out of business in the next five years, either due to the lack of business profitability or retirement of the business owners.

Conclusion

Agritourism appears to be an expanding component of New York State's tourism industry with many businesses

planning on expanding and hiring more employees during the next five years. In addition, 75% of businesses did make a profit in 1999 from the agritourism components of their farm business. This indicates that agritourism components are viable components of New York's farm-based businesses. However, while the average agritourism business in New York did make a profit in 1999, 25% of businesses did not, an indication that some agritourism businesses may need to utilize careful business planning procedures to increase their success.

The economic impact data compiled from this study indicate that agritourism contributes an estimated \$210.87 million in gross income to farm businesses across New York. Much of this revenue is in turn used by business owners to pay for farm operation and management costs such as employee wages and production costs, thus benefiting New York's economy as a whole.

This study was also useful for identifying cost-effective management and marketing strategies for agritourism business owners. Strategies such as reducing costs by buying insurance from agritourism associations at group rates and developing partnerships with other local businesses and attractions for promotional purposes could make businesses more profitable. Business owners also need to identify what makes their business unique and expand on this uniqueness to attract more customers.

In conclusion, agritourism offer tremendous potential to increase the profitability of farm-based businesses in New York State. Agritourism also benefits New York's tourism industry by diversifying the recreational opportunities offered to visitors and increasing the state's economy. However, because agritourism is a fairly new sector of tourism in New York, business owners may need management and marketing assistance from government agencies and organizations to achieve their potential in the future.

Literature Cited

- Dilman, D. (1978). Mail and telephone survey: The total design method. New York: John Wiley.
- Kuehn, D., & Hilchey, D. (2001). Agritourism in New York: Management and operations. Oswego: NY Sea Grant.

RAIL-TRAILS AND SPECIAL EVENTS: COMMUNITY AND ECONOMIC BENEFITS

Charles Nelson

Associate Professor of Park, Recreation and Tourism Resources, Michigan State University, 131 Natural Resources Bldg., East Lansing, MI 48824-1222, 517-353-5190, nelsonc@msu.edu

Christine Vogt

Assistant Professor of Park, Recreation and Tourism Resources, Michigan State University, 131 Natural Resources Bldg., East Lansing, MI 48824-1222, 517-353-5190, vogtc@msu.edu

Joel Lynch

Research Specialist in Park, Recreation and Tourism Resources, Michigan State University, 131 Natural Resources Bldg., East Lansing, MI 48824-1222, 517-353-5190, lynchjoe@msu.edu

Daniel Stynes

Professor of Park, Recreation and Tourism Resources, Michigan State University, 131 Natural Resources Bldg., East Lansing, MI 48824-1222, 517-353-5190, stynes@msu.edu

Abstract: This paper discusses community and economic benefits associated with two recreational bicycle special events held on the Pere Marquette Rail-Trail (PMRT) in Midland County Michigan during the summer of 1999. One event was an annual ride to fundraise for the Rails to Trails Conservancy of Michigan. Approximately 1,800 participants rode in the event which included two days of riding on the Pere Marquette Rail-Trail. Overall the event produced \$207,000 of direct spending by travel parties in Michigan. The second event was the Midwest Tandem Bike Rally, an annual event staged in a different location each year over a weekend. In 1999, Midland was selected as the site and attracted 550 tandem bicycle teams. Overall the event produced \$260,000 of direct spending by travel parties in Michigan. The two events brought visitation to Midland that otherwise would not have occurred and for 25% of both events' participants, the Pere Marquette Rail-Trail was the primary draw to ride participation. The communities along the trail benefited from the exposure as over three-quarters of the participants were riding the trail for the first time. Further, the majority from both events indicated they were likely to return to the Pere Marquette Rail-Trail and county on a future trip. Discussion and implications of this research includes: (1) ways of maximizing economic impact through fee structure and overnight accommodation arrangements, (2) the importance of Rail-trail facilities to draw visitors to an area, and (3) how residential trail use displacement can be minimized during recreational bicycle events.

Introduction

Typically, research on trails developed from abandoned rail road right of ways, herein referred to as rail-trails, has focused on the use and benefits by local residents (Moore, Scott & Graefe, 1998; Mowen, Graefe & Williams, 1998). However, such facilities also attract visitors from beyond the local area, thereby contributing to local economies. For instance, Schutt (1998) showed that the use of the Bruce Trail in Ontario Canada was primarily by tourists (67%) and that many stayed overnight near the trail during the course of their trail use. Special trail-related events are also instrumental in attracting tourists. These events may be held using existing trail facilities and the tourism infrastructure (i.e., restaurants, hotels, bike-related retail, other retail).

The purpose of this paper is to report on and discuss community and economic impacts of two recreational bicycling events to a local economy in Michigan. These impacts will be reviewed according to community and economic variables and explained across both short-term and longer-term effects.

Description of Research Study, Rail-Trail and Two Special Events

A group of faculty from the Department of Park, Recreation and Tourism Resources at Michigan State University is conducting a two-year study of a single rail-trail in Michigan. The goal is to document some of the economic, social and community benefits such facilities provide. The Michigan Department of Transportation and Michigan Agricultural Experiment Station are the primary financial supporters of the research project. The project includes a group of advisory partners with representatives from the National Park Service's River and Trails Assistance Program, Michigan office of the Rail-to-Trails Conservancy, Michigan Department of Natural Resources, Michigan Department of Transportation, and the Midland and Isabella County Park and Recreation departments. These partners contribute in-kind and financial assistance and meet on a quarterly basis to suggest research direction and discuss applications of results. The focus of this research is the segment of the Pere Marquette Rail-Trail (PMRT) located in Midland County, Michigan. Midland County's population is approximately 80,000 people and is world headquarters to Dow Chemical Corporation. Initially developed in 1993, the 22 paved miles of the PMRT in Midland County connect three communities, including several public park and recreation facilities. A six-mile extension into the adjacent county is under construction, and due to open in the summer of 2001.

In general, the park and recreation departments of Midland County and the city of Midland allow limited use of the PMRT for special events. They view the trail as a public facility that should be open to all. Hence, events such as a bike race, that might otherwise displace normal use of the trail or endanger users, are generally not permitted. Two bicycling events that fit the special event use criteria were studied. The first is an annual event called the Michigander, organized by the Michigan Office of the Rails-to-Trails

Conservancy to promote recreational cycling and to raise money. The second is the Midwest Tandem Bike Rally, which is staged at a different Midwest location each year and promotes tandem cycling and raises funds. Both events used the PMRT during the summer of 1999.

Methods

A mail survey was used to collect data regarding the two special events. The Michigander was held in July 1999 and attracted 1,800 participants. Half of the participants rode the two-day event which primarily took place in Midland County, one-third rode six days and the remainder rode the full seven days, the longer time segments traversed the central part of Michigan. From the registration list (excluding individuals under the age of 18 years old), 600 participants were randomly selected. After a Dillman modified survey procedure including a reminder postcard and a second mailing, a 71 percent response rate (n=424) was achieved. The Midwest Tandem Rally was held over the Labor Day holiday in 1999 and attracted 1,100 participants or 550 tandem teams. Six hundred individuals from the registration list were randomly selected to receive the survey. Using the same mailing procedure as described above, a 75 percent response rate (n=452) was achieved.

The mail questionnaire consisted of four pages and included 27 questions. Questions focused on measuring experience levels with the event and the PMRT; whether the event was the primary reason for the trip; the nature of the travel party (i.e., friends) and spending party (i.e., family); spending before, during and after the event; intention to return to the Pere Marquette Rail-Trail and area; and demographics. Economic benefits are illustrated by calculating event spending, measuring the amount of tourism or out-of-county visitation the event yielded, and the potential for future visitation by the participants. Community benefits are illustrated by measuring the proportion of participants who

were introduced to the bicycling event or rail-trail through these two special events.

Results

A demographic profile of the respondents to the two day event is found in Table 1. While a minority (26%) of Tandem Rally participants were from Michigan, a strong majority (95%) of Michigander participants were (Table 1). In both groups, about half of the participants earned \$80,000 or more in 1998 annual household income and the majority were employed on a full-time basis. A minority of Michigander and Tandem participants had children in their household.

Michigander participants were less likely than Midwest Tandem Rally participants to be members of a bicycling organization (Table 2). Of those who were members of an organization, Michigander participants were most likely to be members of the Rail-to-Trails Conservancy while Tandem Rally participants were most likely to belong to a local bicycling organization, followed by the League of American Bicyclists and the Rail-to-Trails Conservancy. The financial commitment of participants in both events to cycling is significant, with Michigander participants averaging almost \$750 and Tandem participants averaging almost \$2,500 per year in cycling related expenditures during 1998. The largest proportion of expenses for both groups was equipment, followed by events/membership fees and repair costs.

When asked about the purpose of their trip that included event participation, almost all participants in both events cited the event as the main purpose for the trip (Table 3). This suggests that the visit to the Midland area would not have occurred if there was no event. Furthermore, 27% of Michigander participants and 23% of the Tandem participants indicated that the Pere Marquette Rail-Trail "highly or moderately influenced" their participation in the event.

Table 1. Demographic Profile of 1999 Michigander and Midwest Tandem Rally Participants

	Michigander (n=424)	Midwest Tandem Rally (n=452)
Residency		
Michigan resident	95%	26%
Nearby states/providences (IN, OH, IL, WI, Ontario)	3%	48%
Other states/providences	2%	26%
1998 Household income levels		
Under \$40,000	10%	9%
\$40,000 to \$80,000	44%	40%
Over \$80,000	46%	51%
Household composition		
With children	40%	26%
Without children	60%	74%
Employment status		
Full-time/self employed	76%	72%
Retired	9%	17%
Other	15%	11%

Table 2. Bicycling Profile of 1999 Michigander and Midwest Tandem Rally Participants

	Michigander (n=424)	Midwest Tandem Rally (n=452)
Membership in bicycling organizations:		
Local group	10%	66%
League of American Bicyclists	5%	30%
Rails-to-Trails Conservancy	29%	25%
League of Michigan Bicyclists	5%	12%
Average annual spending on bicycling		
Equipment purchases	\$478	\$1,860
Repairs	\$80	\$230
Events/membership fees	\$190	\$356
Average total spending on bicycling	\$748	\$2,446

Table 3. Purpose of Trip for 1999 Michigander and Midwest Tandem Rally Participants

	Michigander (n=424)	Midwest Tandem Rally (n=452)
Primarily purpose of trip related to event	99%	99%
Pere Marquette venue influence		
Not much	52%	61%
Some	21%	16%
Moderate	14%	14%
High	13%	9%

On a per person and overall basis, Tandem Rally participants spent more than Michigander participants (Table 4). Excluding the registration fee, Michigander participants and their travel parties spent \$207,000 in conjunction with the event or \$233 per travel party. This amounts to \$100 per person over the course of the event. Of the \$207,000 total spending, half was spent before or after the event and half during the event. Six-day participants were responsible for 50% of the overall spending. The \$81,700 in Michigander registration fees paid to the Michigan Office of the Rails-to-Trails Conservancy provided some funds for the organization's fund raising efforts and for services and supplies to support the ride. Michigander sponsors also arranged camping at locations such as schools, fairgrounds, etc., so many participants did not stay overnight in paid

accommodations. In total, Michigander participants booked an estimated 510 hotel room nights, including 150 room nights during the event.

As for the Midwest Tandem Rally participants, they paid fees for each aspect of their experience (i.e., fee per day of riding, banquet, box lunches, etc.). Since the researchers were not provided the registration fee data paid per participant by the sponsors, we asked this of respondents. Overnight accommodations were arranged separately. Over three-quarters (82%) of the Tandem Rally participants stayed overnight in a hotel, with a small segment camping or staying with friends or family. In total, 1,100 hotel room nights were estimated. Including the registration fee, participants and their travel parties spent \$260,000 in conjunction with the

Table 4. Spending Profile of 1999 Michigander and Midwest Tandem Rally Participants

	Michigander (n=424)	Midwest Tandem Rally (n=452)
Total spending	\$207,000	\$260,000
Proportion of spending		
Before and after trip	50%	15%
During trip	50%	85%
Average spending per party	\$233	\$566
Average party size	2.3	2.5
Total hotel room nights	510	1,100

event or \$566 per travel party (average 2.5 persons). Of this \$218,000 was spent during the event (mostly likely in the Midland area) and \$42,000 was spent in Michigan getting to and from the event. With multiplier effects, the total impact on the state economy is \$390,000 in sales, \$140,000 in personal income, \$222,000 in value added, supporting about eight jobs, mostly in Midland County. These figures assume all of the spending would not otherwise occur in Michigan, as 74% of the participants were out-of-state residents.

The economic impact of these events may extend into the future as 79 percent of the Michigander participants and 54 percent of the Midwest Tandem Rally participants said they are extremely or quite likely to ride the rail-trail again (Table 5). Ninety-four percent of the Michigander participants rated the Pere Marquette Rail-Trail "very good" or "good." The event experience was rated "very good" by 54 percent of the participants and "good" by 36 percent. An even greater proportion of Tandem Rally participants were positive about the rail-trail. Ninety percent rated it "very good" and eight percent rated it "good." The Tandem Rally event was also rated higher than the Michigander, with 71 percent rating it "very good" and 27 percent rating it "good."

Community benefits were measured by the proportion of participants who were introduced to these annual bicycling events or the PMRT through these two 1999 events. The assumption is being made that encouraging participation in outdoor recreation activities like bicycling enhances quality of life. Furthermore, the higher the first-time event participation and Pere Marquette Rail-Trail users show growth in the activity and trail use. Of the participants in the Michigander event, 42 percent were first-time event riders compared to 27 percent of the Tandem Rally participants. Eighty-three percent of the Michigander participants were riding the PMRT for the first time and 91 percent of the Tandem Rally participants were first-time PMRT users.

Conclusions and Implications

This research illustrates a rail-trail offering a compatible, sustainable tourism resource for events that produce positive economic impact to a local economy, while simultaneously serving the needs of local residents. Combined these two recreational bicycling events generated close to \$500,000 of direct spending in the areas where participants rode and stayed overnight. Moreover, our findings suggest many of the participants indicated they would return to visit the area and/or ride the rail-trail, bringing future economic benefits. The results also demonstrate events introduce new people to activities, facilities and communities. Higher levels of trail and community awareness can lead to increased future usage and economic impact.

The results of this study also demonstrate how different events can lead to different levels of economic impact. The Michigander was primarily marketed to and attended by Michigan residents. Therefore, the economic impact was more a redistribution of money rather than new money to the state. The Michigander also generated fewer overnight rooms and local bed taxes than the Tandem Rally as most participants camped in the group camps set up by Michigander organizers. Also, most of the meals were provided by the Michigander sponsor or donated by local groups, so spending on food and restaurants was limited. The Midwest Tandem Rally was shorter in length but more highly concentrated in the City of Midland and Midland County. More hotel room nights, bed taxes and restaurant purchases were generated, as the Rally did not have prearranged group camping and meal options. The Tandem Rally attracted many more out-of-state participants to Michigan, which represents "new" money. Another factor in calculating economic impact is to consider how the registration fee is being spent. While the Michigander had a higher registration cost it appears that a greater percentage of the budget was spent out of the Midland County area on bulk event supplies and assisting the Conservancy in their programs.

Table 5. Likelihood of Returning to Area and Satisfaction with Event and PMRT for 1999 Michigander and Midwest Tandem Rally Participants

	Michigander (n=424)		Midwest Tandem Rally (n=452)	
	PMRT	Midland County	PMRT	Midland County
Likelihood of return visit				
Quite likely	50%	54%	15%	12%
Extremely likely	29%	23%	39%	39%
Quite unlikely	17%	19%	36%	37%
Extremely unlikely	4%	4%	10%	12%
Satisfaction level				
	<u>Trail condition</u>	<u>Experience</u>	<u>Trail condition</u>	<u>Experience</u>
Very good	82%	54%	90%	71%
Good	12%	36%	8%	27%
OK	4%	8%	1%	2%
Poor	1%	2%	0.5%	0%
Very Poor	1%	0%	0.5%	0%

Local entities incurred some costs to host these events. Local bicycle groups and the local convention and visitors bureau had expenditures in planning and marketing the events. It is not known if this resulted in additional memberships for the bicycle organizations. The convention and visitors bureau fulfilled their mandate to increase hotel occupancy using bed tax money for event marketing. The City of Midland and Midland County Parks and Recreation Departments coordinated (and paid for) police and park maintenance to service both events. Again, the image of Midland as a quality destination to visit or place to live is an intangible value that may more than compensate for these expenditures.

A final note is that these events often require a park administration to draft and pass rules that suggest how events can use the facilities. These rules should be focused on maintaining the facility and allowing continued public use during the event. This can promote positive interaction among visitors and locals and safeguard the resource for future local use and major events. We learned of no problems

or conflicts that would suggest these two events caused harm to the community. On the contrary, this study provided quantitative evidence that special events held on rail-trails produce positive economic and community benefits.

References

Moore, R., Scott, D., & Graefe, A. (1998). The effects of activity differences on recreation experiences along a suburban greenway trail. Journal of Park and Recreation Administration, *16*(2), 35-53.

Mowen, A., Graefe A., & Williams, D. (1998). An assessment of activity and trail types as indicators of trail user diversity. Journal of Park and Recreation Administration, *16*(1), 80-96.

Schutt, A. (1998). Trails for economic development: A case study. Journal of Applied Recreation Research, *23*(2), 127-145.

PRIVATE BUSINESS PERCEPTIONS OF TRANSPORTATION ISSUES AND THE ISLAND EXPLORER BUS SYSTEM AT ACADIA NATIONAL PARK, MAINE

Rea Brennan

Graduate Student, Parks, Recreation, and Tourism,
University of Maine, 5769 South Annex B, Orono, ME,
04469

Marc Edwards

Graduate Student, Parks, Recreation, and Tourism,
University of Maine, 5769 South Annex B, Orono, ME,
04469

John J. Daigle

Assistant Professor, Parks, Recreation, and Tourism,
University of Maine, 215 Nutting Hall, Orono, ME, 04469

Abstract: National Parks and communities that surround them often must work together to create the best possible experience for the visitors to the area. In the case of Acadia National Park in Maine, the surrounding communities and the park have worked together to face the issue of congestion in the area caused by too many automobiles. The Island Explorer Bus alternative transportation system was integrated in 1999 to begin dealing with this problem. This exploratory study was designed to assess the perceptions of private businesses on transportation issues in and around Acadia National Park and the Island Explorer Bus alternative transportation system. In-person interviews were conducted with managers or owners. The businesses included hotels, motels, campgrounds, bed and breakfasts, and in town stores. The results from the interviews will be used to assist in the planning of Intelligent Transportation System information to be integrated with the Island Explorer Bus alternative transportation system in late Summer, 2001. Also, the results will help with the design process of an in-depth mail survey of businesses on Mount Desert Island, to evaluate transportation and the Intelligent Transportation Systems technologies associated with the Island Explorer Bus system in late Summer, 2002.

Introduction

In 1999, over 280 million people visited the United States National Parks from all over the world to experience their historic and natural beauty, and the numbers are ever increasing (National Park Service, 2001). Yet, there is more to the experience than simply visiting these parks. While traveling to and from these gems of America, visitors encounter the numerous communities that surround the National Parks. As Lucas (1992) discusses, the National Park Service (NPS) must work cooperatively with these surrounding communities to create a positive overall experience for their many visitors. To ensure success of many park programs, the NPS must work closely with the

surrounding communities during the planning stages. The communities and their available amenities hold the power to attract visitors and promote the parks, as they have a great deal of contact with the visitors to the National Parks.

Part of the experience of visiting Acadia National Park, Maine, is the experience of visiting the numerous small coastal villages that are next to the park. Acadia National Park shares its main 32,000 acres with these multiple small villages on Mount Desert Island (National Park Service, 1992). The layout of Acadia is such that some of these surrounding small coastal villages share property lines and roads with the park. Because of this closeness, the National Park Service and their associated management actions must be mindful of these communities. Members of the surrounding communities and Acadia National Park Service representatives work together to satisfy the needs of each other and their many visitors. To further illustrate this, in 1998, the National Park Service conducted a general survey of Acadia National Park visitors (Littlejohn, 1999). One of the top reasons visitors reported for visiting Acadia was to also visit the surrounding villages, mainly for shopping and dining purposes (Littlejohn, 1999).

Each year almost 3 million visitors arrive at Acadia National Park (Daigle & Lee, 2000), and almost 4 million people visit the small surrounding community of Bar Harbor, Maine (McMahon & Propst, 1998). The small area of the park and the many visitors it receives each year makes Acadia among the most densely populated National Parks. In the Acadia National Park General Management Plan (1992), congestion of people and automobiles are discussed as areas that need to be addressed if the experience of the area is to be maintained. The management plan also notes that with the numerous cars parked on the sides of the roads, a safety issue is also of concern (National Park Service, 1992). Alternative methods of entering the park and working with the surrounding communities to begin solving the congestion problem were also stressed (National Park Service, 1992). Further supporting idea of congestion within Acadia National Park, in 1998 a general survey of Acadia visitors reported responses to open-ended questions regarding what visitors liked most and liked least about their trip to the park. The top four things that the visitors liked most about their trip to Acadia National Park were Beauty and Scenery, Scenic Views, Hiking Trails, and the Carriage Roads. The top four things that visitors liked least were Crowds, Traffic, Nothing, and congested parking. (Littlejohn, 1999). Again, the traffic, congestion, and crowding issues are still of concern to the park planners as they try to maintain the positive overall experience for their visitors.

In 1999, Acadia National Park, with the help of several other state and federal government agencies, the Friends of Acadia, and the surrounding communities on Mount Desert Island, introduced the Island Explorer Bus alternative transportation system into the park and onto the island as a means to address the congestion caused by too many automobiles on the roads (Daigle & Lee, 2000). The bus system began service with 9 buses along 6 routes, and

attracted 142,260 passengers (Daigle & Lee, 2000). In Summer 2000, the Island Explorer Bus ran 17 buses along 7 routes, and carried 193,057 passengers throughout Acadia National Park and the island (Crikelair, 2000). The bus runs each day during the summer months, from the last week in June until Labor Day in September. The idea behind Island Explorer Bus system is to change the travel behavior of visitors to Mount Desert Island, from a private vehicle based behavior to an alternative transportation behavior, such as using private or public buses, which are both available options on the island. The Island Explorer is primarily designed to allow visitors to leave their personal vehicles at their lodging facility, yet still have the ability to move freely about the island. While working alongside the many private transportation providers, the Island Explorer Bus system can keep Acadia National Park and Mount Desert Island accessible.

The Island Explorer is a voluntary use, free shuttle supported by donations from the local communities and organizations, local private businesses, and the federal government and Acadia National Park. Once again, the relationship between the National Park and the surrounding community must be strong to support this program. According to the responses on the 1998 general visitor survey, 74% of the respondents that spent their nights on Mount Desert Island stayed in the local villages, at hotels, motels, bed and breakfasts and campgrounds (Littlejohn, 1999). These visitors may not have contact with a park employee each day of their stay, but they will have contact with these lodging facilities. The continued success of the Island Explorer Bus system relies on the satisfaction of these local businesses, lodging facilities and villages, as they have the power to promote using the bus system and make donations to keep it cost free to its users.

The Island Explorer Bus system found increasing success over its first two years of service; yet, the planners recognized a need to make the system more attractive and effortless for the visitors. The integration of Intelligent Transportation Systems was determined to be the best way to do both. Intelligent Transportation Systems are technological innovations that will allow the distribution of Island Explorer information to the visitors, such as bus location and driver communication, to be more efficient (Batelle, 2000). The most important of these new technologies, for the visitors, are the Traveler Information Services. Traveler Information Services will allow area visitors and Island Explorer users to access information regarding the bus schedule, arrival times of each individual bus, and parking availability status in certain areas within the National Park. The components of the Traveler Information Services include electronic display boards for the bus arrival times and the parking availability information, interactive video display screens that will monitor certain Acadia National Park parking lots and track the Island Explorer buses, a web link from the Acadia National Park homepage, and a telephone accessible menu of all of these information options (Batelle, 2000).

To ensure the Island Explorer Bus alternative transportation system is continuing to meet the needs of Acadia National

Park, the surrounding communities, and the visitors, several studies are being conducted regarding the Island Explorer service. This exploratory study was designed to assess the perceptions of private businesses, which surround Acadia National Park, regarding transportation issues and the Island Explorer Bus system. In-person interviews were conducted in Fall, 2000, and the results will assist the planning for the new Traveler Information Services, to be incorporated late Summer, 2001, and to develop a more extensive survey of the businesses on Mount Desert Island in late Summer, 2002, and future assessments of the Island Explorer Bus service.

Methods

The purpose of this study was to determine the overall perceptions of the local businesses regarding the benefits of alternative transportation to the business environment, the benefits to their customers, and the traveler information needs of their customers on Mount Desert Island. In order to identify the issues and concerns of these businesses, in-person interviews were chosen as the method of data collection.

The interview schedule was developed at the University of Maine, Parks Recreation, and Tourism program, and was then reviewed and revised by Batelle, an independent research firm, and an advisory planning committee, which included local town planners, park staff, and a local consultant. There were four topic areas included in the interview schedule. The first topic area included the background information of the businesses, such as how long the person had been in the business and whether the business operated on seasonally vs. year-round, the size and location of the establishment, and characteristics of the customers, such as the types of customer groups. The next topics addressed were the awareness and use of the Island Explorer, such as how the customers or business found out about the Island Explorer or if they actually used the bus. The third topic area included benefits to the businesses and their associated customers. The final topic area included what traveler information the participants thought would be important to the businesses or their customers. The questions for these topic areas were asked in an open-ended format. This allowed the respondents to discuss their feelings and perceptions of the problems and issues addressed in the interview. "Yes" or "No" answers could not always be avoided in response to the questions, and probing questions were used to help guide the conversations. The goal here was to collect information that would eventually be used to inform the visitors of the area and change the transportation behavior of customers to fewer automobile drivers and more bus riders.

Purposeful sampling was used to select the businesses using the AltaVista™ Internet search engine "yellow pages" directory. Businesses were first selected based on type of establishment, campground, hotel, motel, bed and breakfasts, or in-town shop. The second criterion for selecting a business was its location on Mount Desert Island, attempting to get a range across the island. Twenty-five businesses were initially selected and contacted by

phone. Of those, thirteen answered and were invited to participate in the study. Of the thirteen businesses contacted, one declined due to a busy schedule. The interviewees included the owner or manager of the establishments, which, in some cases was the same person.

Most businesses, especially lodging establishments, are at their full capacity until after Labor Day. Therefore the in-person interviews took place in late September and early October, after the busy summer season but before most businesses close for the winter months. The times of the interviews were scheduled around the businesses to make the interviews as convenient as possible; they lasted between 25 and 30 minutes.

Permission to record was granted by the interviewees at the beginning of each interview, then a tape recorder was used to record the interview. Tape recording the interviews along with brief note taking was used, rather than only note taking, to allow all of the interviews to be captured at a steady pace. Each business was given a code to protect their identities and ensure their confidentiality. The interviews were then transcribed using a transcribing machine, by the interviewer. The transcription process provided the opportunity to do an initial analysis of the interviews before they were analyzed for specific themes, which found additional themes than initially sought by the interviewer. The interviews were then examined for the specific recurring themes in the responses to the sets of questions, such as the idea that there is a transportation problem on Mount Desert Island and in Acadia National Park, and if there is a difference in the types of customer depending on the month of the tourist season.

Results and Discussion

Characteristics of the Business and Their Customers

The general characteristics of the businesses varied between type of establishment, size of establishment, and location. Type and sizes of businesses were one, 200+ room hotel; three, 50+ room motels; three, 6-8 room bed and breakfasts; three, 100+ site campgrounds; a small locally owned gift shop and a larger chain store. The majority of the businesses were located on the eastern side of Mount Desert Island, and several were located on the northern and southern parts of the island as well. Two of the businesses operated year-round and the seasonal businesses lasted from around mid-May until the mid to end of October. Almost all of the businesses reported full capacity in July and August and about 75% capacity in June, September, and October.

The participants reported a difference in the customer base depending on the time of the season. They determined in May and June, their customers were primarily local residents or in the area to attend a conference or wedding. During the busiest part of the season, from mid-June until Labor Day in September, their customers were mostly families. And, after Labor Day, the customer base consisted of local residents along with touring customers that were primarily older and possibly retired. When asked

what they thought about the different types of customers, one participant responded:

Yeah, it's usually July and August, but June is turning [busy], with weddings and seminars, and this year September is looking real good as well, I think that when repeat people come to the island, 'cause they know July and August is such a zoo here, [they] start coming in September. So, we're finding that from Labor Day to Columbus Day, and fall foliage, we're pretty much set at capacity.

Another responded:

Sure, they [September and October Customers] are touring customers, you know, retired, sightseeing, as opposed to July and August, which are family, June is definitely conference.

One implication of this changing customer base is that there may need to be different types of alternative transportation available for the diverse customers. Currently, the Island Explorer Bus system is the only public transportation system, and as one participant noted, "...you have to take your own car. Or, if not, you have to use your legs, or feet, or use a bike; there really isn't much as far as public transportation." The Island Explorer Bus also only runs during the busy season of families, in July and August. The other customers of June, September, and October, must find alternative transportation from private providers, such as commercial tours of the park, or they have to use their personal automobile, which is what the Island Explorer Bus system is trying to discourage. A possible extension of the season with different types of service was mentioned by several businesses and may be needed to promote use among all of the visitors to the Acadia National Park area.

Customer Awareness and Use of the Island Explorer Bus System

This topic area began with a brief discussion of the Island Explorer Bus system, which all of the businesses knew of and some had actually used the bus. During this discussion, the participants were asked if they thought there were any transportation issues, such as problems caused by too many automobiles, on Mount Desert Island. Only one motel participant did not think there was a transportation problem on Mount Desert Island, however, the participant indicated it was his first summer on the island. One bed and breakfast was aware of a traffic congestion and parking availability problem in the adjacent village, but did not think there was a transportation problem within Acadia National Park, as she had never heard of one. However, the rest of the businesses felt that there was a definite problem of too many automobiles on Mount Desert Island, including within Acadia National Park. The majority of responses were as follows:

I think the traffic is going to be here no matter what.

Oh, I think it's a big problem. I think that the roads weren't made for this traffic, I mean, certainly, there are no lights, you don't see one for crossing! I mean, someone must get run over...

...if someone was to stay here, and left their car, there is still another car to take its place. It's like water, always going into a space.

There was an agreement by all of the businesses that if the customers hadn't used the Island Explorer Bus the previous year or were new visitors, they were probably unaware of the bus prior to contacting the establishment. All of the participants reported their businesses advocated using the Island Explorer Bus by handing out schedules or helping their customers plan visits to Acadia National Park using the bus. There was some concern however, that the businesses were doing most of the advertising for the bus system and the Island Explorer planning committee needs to do, "A little more publicizing."

...for the first people just coming in, we always gave them the information when they were registering. Most of them, nine out of ten didn't know anything about the service, it was new.

I doubt they know before they get here.

They come in and ask us where they should go to hike. We tell them about great one-way hikes to do using the bus. It's good for bikes too.

Every business reported that not many of their customers used the Island Explorer Bus. A couple stated that it was hard to convince their customers to use it because they had already planned on using their private vehicles.

...maybe a couple, as far as I know. Not too many of them left their cars here.

I'd say 1 or 2% use the Island Explorer, a lot of them have rented cars...and their out for a few days, so they've already had their vehicle, and the traffic is the traffic that they thought.

Certainly I notice a difference in the number of cars left in the yard...in the fall, the yard is empty during the day. In the summer, when the bus is running, maybe a third, a half, or more are here. They leave the cars and ride the bus.

Although not many visitors seemed to be aware of the Island Explorer Bus system prior to their arrival on Mount Desert Island or at the business, the small percentage of people using the buses can make a difference. As the years progress, and more businesses speak to their customers about the Island Explorer Bus and more repeat customers return to use the bus, the numbers of Island Explorer Bus users will inevitably increase. The few businesses that were unaware of transportation congestion problems on certain parts of Mount Desert Island and in Acadia National

Park may be indicative of many more. Outreach efforts by Acadia National Park representatives may help to inform the local businesses of these transportation issues, which can then be passed along to the customers and promote using the Island Explorer Bus to avoid these transportation congestion problems. Along with additional outreach to the local businesses, the Island Explorer planning committee may indulge in increased marketing to the visitors to the area to increase the public awareness of the Island Explorer Bus system and the need to use it.

Benefits to Businesses, Customers, and the Environment

Multiple benefits of the Island Explorer Bus system were identified by the businesses. Several of these benefits were synonymous with benefits identified in the Daigle and Lee (1999) survey of Island Explorer Bus users. Participants in the interviews identified a benefit to the customers, such as not having to drive their own vehicles and find parking. The 1999 Island Explorer user survey respondents identified "Less worry about driving and parking" as the number one desired and attained benefit of the Island Explorer Bus and "Rest from driving own vehicle" as the fourth (Daigle & Lee, 2000).

But even people who have cars like to ride the shuttle. Its just so, its an easy way to see the area.

...that they don't have to move their motor home. It's very convenient, very simple, they can use it to put their bicycles on, go around the park...

As far as transportation for our customers, downtown is always a problem with parking.

Other benefits identified in these in-person interviews were benefits to the customers of not drinking and driving if they have a cocktail or wine while in town or at dinner, as one motel phrased it,

We feel that, people if they want to go downtown to have a couple of beers or a glass of wine or something, they don't have to drive.

Benefits to the environment, such as taking some cars off the road and the cleaner fuel burned in the buses were also identified by the businesses as a very important benefit. Some of the participants had very strong feelings about the numbers of cars on Mount Desert Island and in Acadia National Park. Some of the resounding responses were:

You know, less traffic, less pollution, I just think that they shouldn't let so many cars into the park.

Just what it does for the environment, by reducing the amount of cars and traffic. Also just making the island more accessible.

Over the years, I've seen the pollution increase. I've seen the cloud gray over the island. It just gets worse and worse every year. And if this is

someway, anyway to control it, I would like to see the integrity of the air here better.

Few if any benefits that directly impacted the businesses could be identified. The businesses that had an Island Explorer Bus stop on their premises felt that the bus was an additional attraction to their customers, such as this campground owner,

I can tell the public in my web page, or on my flyer, we are a shuttle stop, we are a bus stop. It really helps... It hasn't effected how much business I get, because I am still, we are still full, even though business was up this year, I was still quite full. It just made it easier for people here to get around the island.

Finally, a benefit identified for all three, the customers, environment, and the businesses, was the possibility of attracting more carless visitors to Mount Desert Island.

Yeah, people that come over on the ferry. Motorcycle people, but mostly people that would be hikers, people that come across on the ferry, that are here for a few days, and looking for transportation.

A lot of people that arrive just in their motor homes, those are usually the ones that really appreciate the shuttle service.

The Island Explorer Bus system provides many overall positive benefits to the business customers. Although the bus system may not increase the numbers of customers that the businesses attract, it has the potential to diversify the customer base, such as attracting more carless visitors. The idea that there would be fewer cars on the road due to the increased use of the Island Explorer Bus is a benefit to Mount Desert Island residents and Acadia National Park users, such as less traffic congestion and increased parking availability if a personal vehicle is required. The benefit to the environment, like less air pollution, benefits the business environment and the customers by allowing for a better quality of life; if the quality of life is ruined by air pollution, businesses may choose to locate elsewhere.

Ideas about Traveler Information Services

The topic area dealing with important traveler information was especially important because it will help to plan for the new Traveler Information Services that will be initiated in late Summer, 2001. Most of the businesses had never really given much thought to the possibility of using technologies, such as video or electronic display signs, or a telephone information system, to relate information to the visitors during their stay. The businesses agreed that important information to include in the Traveler Information Services would be parking availability at certain busy areas in Acadia National Park and Island Explorer Bus arrival times.

You know, I never thought about that. It's kind of a good idea really.

Any bit of information we can get them is better.

Some of the businesses were skeptical that the Traveler Information Services would be used by their customers, and would probably not help to change the transportation behaviors of their customers. Many of the businesses felt that their customers were going to go where they wanted to go, on Mount Desert Island and in Acadia National Park, regardless of traffic congestion and parking availability.

They got there anyway.

They may, but as I say, my clients have a plan.

Providing this information to the patrons of these establishments did not seem to be a high priority for the respondents, they did not think that it would have much of an impact on their businesses. However, some businesses agreed there was a possibility that additional information on alternative travel routes using the bus could convince the visitors to leave their personal vehicles at their lodging facility. A few of the businesses felt that providing information on the arrival times of the buses could make the service more efficient and attract their customers to use the Island Explorer Bus system. Still, the businesses seemed to think that information on Acadia National Park was the most important.

Conclusion

As the interviews progressed, there seemed to be differences in the perceptions of the interviewees based on the type and size of business, how long the interviewee had been involved with the business, and the location of the business. The smaller businesses, the longer established businesses, and the businesses located on the northern and southern parts of Mount Desert Island seemed to think there was a bigger overall congestion problem, of people and automobiles. They tended to send their visitors to the less populated and congested areas in Acadia National Park. The larger businesses and the ones on the eastern side of Mount Desert Island, seemed to have more customers using the Island Explorer Bus and sent their customers to more populated areas in Acadia. Overall, the businesses thought that the Island Explorer was a positive addition to Mount Desert Island and Acadia National Park. They felt that there were definite benefits to their customers and the environment, and even a few to their businesses. Each participant had their own idea about what the new Traveler Information Services would be like. Traveler Information Services could complement the parking availability information with alternative travel plans into Acadia National Park using the Island Explorer Bus. They all felt that it would be an interesting addition to the Island Explorer Bus alternative transportation system, and were eager to see it in action the coming summer season.

Literature Cited

Battelle. (2000). Acadia National Park ITS field operational test: Evaluation plan. Report prepared for U.S. Dept. of Transportation, ITS Joint Program Office, Washington, DC.

Crikelair, T. (2000). Onboard passenger survey of the Island Explorer Bus. Report prepared for Acadia National Park. Bar Harbor, ME: Tom Crikelair Associates.

Daigle, J., & Lee, B. (2000). Passenger characteristics and experiences with the Island Explorer Bus: Summer 1999 (Tech. Rep. 00-15). Boston, MA: Department of Interior, National Park Service, New England System Support Office.

Littlejohn, M. (1999). Acadia National Park visitor study: Summer 1998 (Rep. 108 Visitor Services Project). Cooperative Park Studies Unit, University of Idaho.

Lucas, P. (1992). The state of world parks. National Parks, 66(1/2), 22-24.

McMahon, E., & Propst, L. (1998). Park gateways. National Parks, 72(5/6), 39-41.

National Park Service. (2000). Acadia fast facts. Acadia National Park Official Website. <http://www.nps.gov/acad/fastfacts.htm> (16 Nov. 2000).

National Park Service. (2001, March). Frequently Asked Questions About The National Park Service. ParkNet. http://www.nps.gov/pub_aff/e-mail/faqs.htm (20 May 2001).

National Park Service. General management plan, Acadia National Park. Bar Harbor, ME.

Management Decision-making & Planning for Outdoor Recreation

INTEGRATING RESOURCE, SOCIAL AND MANAGERIAL INDICATORS OF QUALITY INTO CARRYING CAPACITY DECISION MAKING

Peter Newman

Robert Manning

Bill Valliere

School of Natural Resources, University of Vermont, 361 Aiken Center, Burlington, VT 05405, USA

Abstract: As use in national parks and related areas continues to rise and visitors and types of activities continue to diversify, we are challenged to balance use and preservation in parks, wilderness and related areas. Faced with these challenges, integrative approaches to defining, monitoring and managing ecological, social and managerial setting attributes is crucial. This research outlined in this paper has two objectives. The first objective is to inventory and map selected ecological, social and managerial setting attributes that define wilderness quality in Yosemite National Park. Using GIS technology, overlay maps of these setting attributes will assist in determining the types and distribution of wilderness experiences, associated ecological impacts and concomitant opportunity zones for the wilderness portion of the park. The second objective is to evaluate relative tradeoffs among wilderness setting attributes. Evaluations of these tradeoffs will be analyzed and will allow management to decide how to best mitigate recreational impacts while not hindering, to an unacceptable degree, the freedoms and other qualities often associated with wilderness experiences.

Problem Statement

As use in national parks and related areas continues to rise and visitors and types of activities continue to diversify, we are challenged to balance use and preservation in parks, wilderness and related areas. This challenge forces managers and researchers to address both ecological and social issues when making management decisions. In park and wilderness management, integrating social and resource indicators is essential to meet park mandates that require the protection of both experiential and resource conditions. This paper will address the challenges we face in integrating social and resource data and outline a study in progress in Yosemite National Park. This study will develop and apply a management model that integrates resource, social and managerial indicators of quality into carrying capacity decision-making.

Historical Background

Yosemite National Park is in the Sierra Nevada mountain range of California. The Park is approximately 1200 square miles and is known for the sheer cliffs of Yosemite Valley, its rugged snowy mountain peaks and its high mountain meadows. Inspired by the writing of John Muir, the painting of Albert Bierstadt and the photographs of

Ansel Adams, visitation to the park has been on the rise since its inception. In Yosemite National Park wilderness use peaked in the early 1970s at approximately 200,000 visitor nights per year. Use quotas established in the mid-1970s helped to reduce that number to approximately 120,000 visitor nights through the 1980s and into the 1990s (van Wagendonk, 1979; Boyers, 1999). However, use is currently on the rise again (Cole, 1996; Boyers, 1999). Along with increasing use trends come associated ecological and social impacts. Management decisions must now be made about the number of visitors and associated impacts that can ultimately be accommodated within Yosemite National Park wilderness.

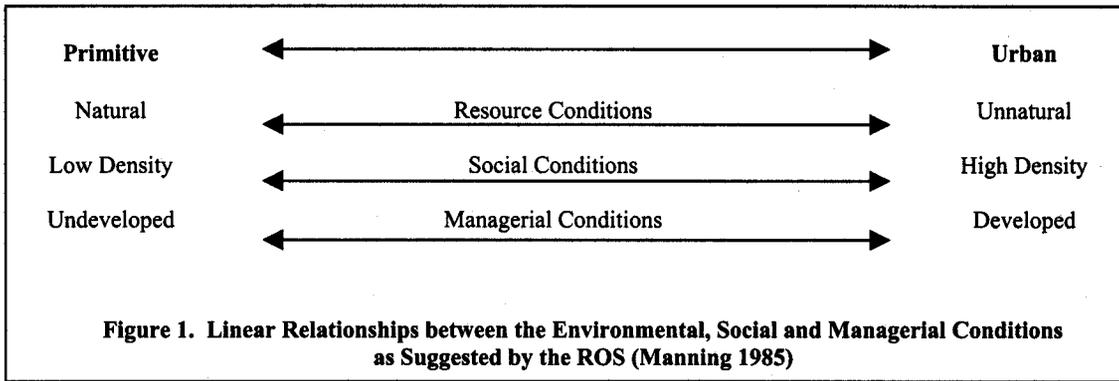
Conceptual Background

When facing these management challenges we look to frameworks to help organize our thoughts and set management objectives. Two prominent management frameworks in the recreation management literature are the Recreation Opportunity Spectrum (ROS) and carrying capacity.

ROS is a land classification framework developed during the late 1970s (Clark & Stankey, 1979; Brown, Driver, & McConnell, 1978; Brown, Driver, Burns, & McConnell, 1979). ROS is comprised of land classification categories that describe an array of recreation opportunities ranging from primitive to developed (Clark & Stankey, 1979). Within the ROS framework, recreation opportunities are defined by three characteristics: the resource setting, the social setting, and the managerial setting.

ROS can be a powerful allocation and planning tool that facilitates the inventory of diverse recreation opportunities. It assumes that linear relationships exist between each of its three setting attributes: resource, social and managerial. Alternative combinations of these setting attributes define recreation opportunities that range from primitive to urban. For example, primitive recreation opportunities are defined by natural resource conditions low density social conditions, and undeveloped managerial conditions (Figure 1). ROS has been adopted by federal land management agencies and is used in the planning and management of wilderness and related outdoor recreation (Buist & Hoots, 1982).

Traditional concern over the impacts of increasing recreation use has given rise to the concept of carrying capacity. In its most generic form, carrying capacity refers to the amount and type of recreation use that can be sustained in a park, wilderness or related area (Stankey & Manning, 1986; Shelby & Heberlein, 1986; Graefe et al., 1984; Manning, 1997). The literature on carrying capacity – like ROS – suggests that recreation experiences be considered within a three-fold framework of concerns: resource, social, and managerial. For example, the number of visitors that an area can accommodate is dependent on the resistance and resilience of the resource, the type of recreation activity taking place and the intensity with which an area is managed.



Research and management experience suggests that carrying capacity can be determined only when management objectives are defined, and that management objectives should be formulated and expressed in terms of indicators and standards of quality (Frissell & Stankey, 1972; Manning et al., 1996; Manning, 1998; Manning, 1999). Indicators of quality are measurable, manageable variables that define the quality of resource conditions and the visitor experience (Manning, 1999, Merigliano, 1990). Standards of quality define the minimum acceptable condition of indicator variables, or what is often termed the "limits of acceptable change."

The above frameworks provide a conceptual foundation for research to support an integrative approach to wilderness planning and management in Yosemite National Park. They suggest that planning and management of wilderness recreation must consider resource, social and managerial attributes, and that indicators and standards of quality should be developed for these attributes.

Analytical Integrative Models

Several models have emerged from the resource management literature that might help to make wilderness management and research more integrative in nature. For example, environmental impact statements (EIS) are used to assess the potential impact a management action may. An EIS mandated through the National Environmental Policy Act (NEPA 1968) combines social and ecological analyses, and findings are displayed within one report. Although this approach is integrative in nature, it is more multi-disciplinary than inter-disciplinary. An EIS model lacks the analytical power needed to fully address the relationships between social and ecological conditions.

Spatial analysis conducted using geographic information systems (GIS) gives us a tool in which we can begin to consider relationships between biophysical characteristics of a resource and a variety of social information. Traditionally, only resource data have been geo-referenced within GIS systems. However, GIS has the capability to incorporate social data as well, thereby facilitating a more integrative analysis.

Tradeoff analysis is another approach to integration. It is likely that most visitors want as unimpeded access to the

wilderness as possible, but also want such areas protected from excessive resource impacts, want to avoid undesirable levels of crowding and congestion, and want minimal management restrictions. However, these conditions often conflict, and tradeoffs must be made among these conditions. Such tradeoffs can be explored through a number of empirical approaches, such as stated choice models. Stated choice models allows us to understand the relative importance of resource, social and managerial condition/ attributes from the standpoint of the visitor. Stated choice models have been developed in marketing research to measure consumer preferences and tradeoffs among such preferences (Louviere, 1988; Green et al., 1988), and have recently been extended to applications in non-market and environmental policy contexts (Opaluch et al., 1993; Dennis, 1998). A trade-off analysis is an integrative approach that focuses on the cognitive relationships among resource, social, and management conditions.

GIS and stated choice analysis will be used as integrative frameworks in this study. Stated choice analysis will be used to determine preferred tradeoffs among resource, social and managerial attributes of the wilderness experience and these and other study data will be analyzed and reported using a GIS framework.

Study Objectives

The purpose of this research is to develop and apply a management model that integrates resource, social and managerial indicators of quality. More specifically, the study has two objectives. First selected ecological, social, and managerial setting attributes that define the quality of wilderness experiences in Yosemite National Park will be inventoried and mapped. Using GIS technology, overlay maps of these setting attributes will assist in determining the types and distribution of wilderness experiences and concomitant opportunity zones for the wilderness portion of the park. Second, relative tradeoffs among wilderness setting attributes will be evaluated. Optimum levels of ecological, social, and managerial setting attributes may not be able to be achieved simultaneously. In such cases, tradeoffs must be made among these attributes. Visitor-based evaluations of these tradeoffs will be analyzed and will inform wilderness planning and management decisions.

Study Methods

This study will be conducted in the wilderness portion of Yosemite National Park. A principal research method will be a survey of wilderness users. Sampling for the visitor survey portion of this study will be conducted in and around the wilderness permit stations in Yosemite Valley, Tuolumne, Wawona and Hodgdon Meadows. The sampling universe will include all persons receiving a wilderness permit during the summer use season of 2001. A stratified random sample will be selected from the sampling universe. The sampling season will begin on June 26, 2001, and end on Labor Day weekend 2001.

The research will be conducted in two phases corresponding to the two study objectives described above. The first phase of research will inventory and map selected setting attributes of wilderness experiences in Yosemite National Park using GIS. Setting attributes will be defined

in terms of indicators and standards of quality, and will address ecological, social, and managerial components of wilderness experiences. Examples of indicators and standards of quality to be included in the study are shown in Table 1.

The indicators were chosen using a modified delphi design (Sackman, 1975). Workshops were held in Yosemite National Park during the fall 2000 with researchers and over a dozen park managers and rangers. Over 30 potential indicators were discussed covering resource, social and managerial dimensions and managers were asked to vote for the indicators they believed were the most pertinent and feasible. Based on a literature review and continued discussion with management in Yosemite National Park, six indicators were chosen to represent the social, resource and managerial conditions of Yosemite wilderness (Table 1).

Table 1. Indicators to Be Utilized in the Study

Component of Wilderness Experience	Indicator of Quality
Ecological	1. Signs of human use at campsite (e.g., size of barren core, root exposure). 2. Signs of stock or stock use (e.g., trail impacts, tree scars, manure).
Social	3. Trail encounters. 4. Camp encounters.
Managerial	5. Availability of permits. 6. Camping regulation (e.g., designated campsites to freedom to camp anywhere).

Data on these indicators will be obtained through a visitor survey. This survey will be conducted as a "diary" where respondents will be asked to trace their daily route of travel and report and evaluate aspects of their wilderness trip as it is experienced on site. In this way, resulting data will be spatially referenced. Respondents will be asked to judge the existing quality or standards of selected indicator variables and to report the desired standard of quality as well. Resulting data will be coded into a GIS database that will allow development of coverages displaying the current and desired condition of all indicator variables.

The second phase of research will address visitor evaluations of tradeoffs among competing setting attributes or indicators and standards of quality. These tradeoffs will be explored through a visitor survey and application of stated choice models. The questionnaire will contain batteries of questions designed to enable the application of the statistical procedure of stated choice analysis. A standard research design involves assigning a range of performance levels to selected product or service attributes, then developing alternative scenarios that represent permutations of such attribute levels. Respondents then rate their preferences among scenarios and resulting data

indicate which attributes are most important. In the context of wilderness recreation, indicators and standards of quality can be substituted for performance levels of product or service attributes as shown in Table 2. In this example, a range of three standards of quality have been specified for each of six indicators of quality representing the resource, social, and managerial components of wilderness recreation experiences. Respondents will be asked to rate the desirability of a subset of scenarios representing the full universe of possible permutations, and resulting data, through application of stated choice analysis, will be used to estimate the relative importance of each indicator and standard of quality. Study findings can inform management decisions concerning appropriate tradeoffs among the setting attributes of wilderness experiences.

Integrating Study Findings

Several conceptual and analytical frameworks will be used to integrate the resource and social data collected in this study. Importance-performance analysis is a framework that can be used to help formulate indicators and standards of quality (Martilla & James, 1977; Hollenhorst & Gardner, 1994). The framework is illustrated in Figure 2.

Table 2. Yosemite Wilderness Setting Attributes and Levels

<p><u>Resource conditions</u></p> <p>Signs of human use at camping sites: Photograph 1 (low impact) Photograph 3 (medium impact) Photograph 5 (high impact)</p> <p>Encountering stock or signs of stock use: Never encounter stock groups or signs of stock use. Encounter stock groups or signs of a minority of days. Encounter stock group or signs of stock a majority of days.</p>
<p><u>Social conditions</u></p> <p>Number of other groups encountered per day while hiking: Encounter fewer than 5 other groups a day while hiking. Encounter 5 –15 other groups a day while hiking. Encounter more than 15 other groups a day while hiking.</p> <p>Opportunity to camp out of sight and sound of other groups: Able to camp out of sight and sound of other groups all nights Able to camp out of sight and sound of other groups most nights Able to camp out of sight and sound of other groups a minority of nights</p>
<p><u>Management conditions</u></p> <p>Regulation of camping: Allowed to camp anywhere. Allowed to camp anywhere in a specified zone. Required to camp in an assigned site in a specified zone.</p> <p>Chance of receiving an overnight back-country permit: Most visitors are able to get a permit for their preferred trip. Most visitors are able to get a permit for at least there second choice trip. Only a minority of visitors are able to get a back-country permit.</p>

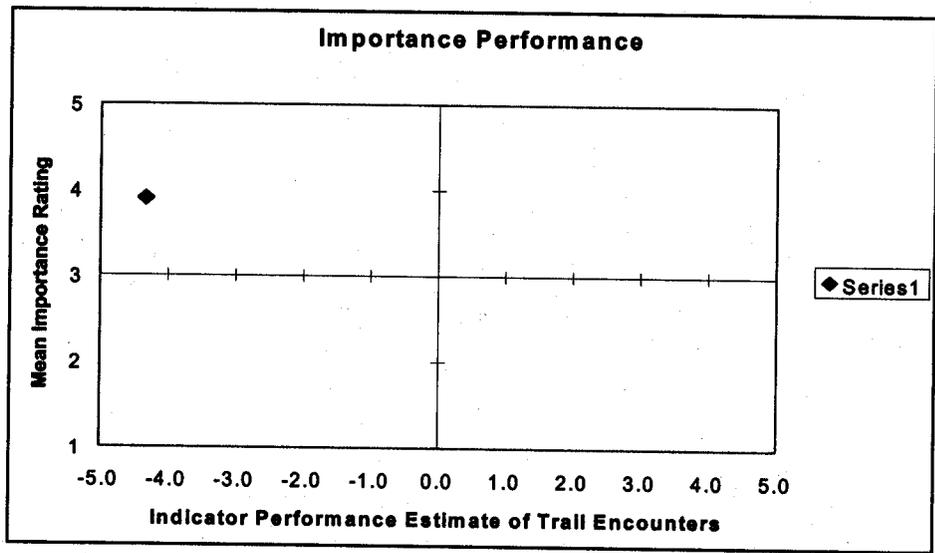


Figure 2. Example of Importance-Performance Framework

The vertical axis plots the importance that visitors place on resource, social and managerial indicators of quality and the horizontal axis plots the perceived or preferred condition of each indicator relative to its current condition. The resulting data provide a graphic representation of the relationships between importance and performance of indicator variables, and where management action is needed. Study data derived from the stated choice model

will be used as the measure of the importance of indicator variables and study data derived from the visitor diary will provide data on the preferred condition or standard of quality for the indicator variables. The algorithm shown in Figure 3 will then be used to integrate importance-performance measures for all resource, social and managerial indicators of quality.

$$\sum I_{1 \text{ IPE}}(W) + I_{2 \text{ IPE}}(W) + I_{3 \text{ IPE}}(W) + I_{n \text{ IPE}}(W)$$

W= importance weight from stated choice model.
 Indicator Performance Estimate (IPE) = Actual – Preferred/ Standard Deviation of Preferred

Figure 3. Algorithm Used to Estimate the Overall Condition on an Area Using Social and Resource Indicators

This algorithm will generate an overall condition score for any geographic area within the wilderness portion of the park, and these data can be analyzed and reported within a GIS framework. Study data and the GIS framework will 1) allow for the creation of a map of priority areas in need of resource and/or social mitigation, 2) provide an informed basis for formulation of indicators and standards of quality for all wilderness zones, 3) inform selection of wilderness management prescriptions of highest utility to wilderness visitors, and 4) provide a tool for monitoring resource, social and managerial indicators of quality.

Literature Cited

- Boyers, L., Fincher, M., & van Wagendonk, J. (1999). Twenty-eight years of wilderness campsite monitoring in Yosemite National Park. In D. N. Cole & S. F. McCool (Eds.), Proceedings of the Wilderness Science in a Time of Change Conference (RMRS-P-000). Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.
- Brown, P., Driver, B., & McConnell, C. (1978). The opportunity spectrum concept in outdoor recreation supply inventories: Background and application. In Proceedings of Integrated Renewable Resource Inventories Workshop (Gen. Tech. Rep. RM-55, pp. 73-84). USDA, Forest Service.
- Brown, P., Driver, B., Burns, D., & McConnell, C. (1979). The outdoor recreation opportunity spectrum in wildland recreation planning: Development and application. In First Annual National Conference on Recreation Planning and Development: Proceedings of the Specialty Conference (Vol. 2, pp. 1-12). Washington DC: Society of Civil Engineers.
- Buist, L., & Hoots, T. (1982). Recreation opportunity spectrum approach to resource planning. Journal of Forestry, 80, 84-86.
- Cole, D. N. (1996) Wilderness use trends 1965 through 1994 (INT-RP-488). USDA, Forest Service, Intermountain Research Station.
- Clark, R., & Stankey, G. (1979). The Recreation Opportunity Spectrum: A framework for planning, management, and research (Research Paper PNW-98). USDA, Forest Service.
- Dennis, D. (1997). National Forest planning: Assessing public preferences for recreation strategies. In W. F. Kuentzel (Comp., Ed.), Proceedings of 1996 Northeastern Recreation Research Symposium (Gen. Tech. Rep. NE-232, pp. 105-108). Radnor, PA: USDA, Forest Service, Northeastern Forest Experiment Station.
- Driver, B., & Brown, P. (1978). The opportunity spectrum concept in outdoor recreation supply inventories: A rationale. In Proceedings of the Integrated Renewable Resource Inventories Workshop (Gen. Tech. Rep. RM-55, pp. 24-31). USDA, Forest Service.
- Frissell, S., & Stankey, G. (1972). Wilderness environmental quality: Search for social and ecological harmony. In Proceedings of the Society of American Foresters Annual Conference (pp. 170-183). Hot Springs, AR: Society of American Foresters.
- Graefe, A., Vaske, J., & Kuss, F. (1984). Social carrying capacity: An integration and synthesis of twenty years of research. Leisure Sciences, 6, 395-431.
- Graefe, A., Kuss, F., & Vaske, J. (1990). Visitor Impact Management: The planning framework. Washington DC: National Parks and Conservation Association.
- Green, P., Tull, C., & Albaum, G. (1988). Research for marketing decisions (5th ed.). Englewood Cliffs, NJ: Prentice Hall.
- Hollenhorst, S., & Gardner, L. (1994). The indicator performance estimate approach to determining acceptable wilderness conditions. Environmental Management, 18, 901-906.
- Louviere, J. (1988). Conjoint analysis modeling of stated preferences: A review of theory, methods, recent developments and external validity. Journal of Transport Economics and Policy, 10, 93-119.
- Manning, R., Lime, D., & Hof, M. (1996). Social carrying capacity of natural areas: Theory and application in the U.S. National Parks. Natural Areas Journal, 16, 118-127.
- Manning, R. (1998). "To provide for the enjoyment": Recreation management in the National Parks. The George Wright Forum, 15, 6-20.

Manning, R. (1999). Studies in outdoor recreation: Search and research for satisfaction. Corvallis: Oregon State University Press.

Merigliano, L. (1990). Indicators to monitor the wilderness recreation experience. St Paul: University of Minnesota.

Opaluch, J., Swallow, S., Weaver, T., Wesselles, C., & Wichelns, D. (1993). Evaluating impacts from noxious facilities: Including public preferences in current siting mechanisms. Journal of Environmental Economics and Management, 24, 41-59.

Shelby, B., & Heberlein, T. (1986). Carrying capacity in recreation settings. Corvallis: Oregon State University Press.

Stankey, G., & Manning, R. (1986). Carrying capacity of recreation settings. In A Literature Review: The President's Commission on Americans Outdoors (M-47-M-57). Washington DC: US Government Printing Office.

van Wagtendonk, J. W. (1979, November). Visitation trends in the Yosemite backcountry. Paper presented at The Second Conference of Scientific Research in the National Parks.

REDEFINING ROLES OF SCIENCE IN PLANNING AND MANAGEMENT: ECOLOGY AS A PLANNING AND MANAGEMENT TOOL

Greg Mason

M.E.S. Candidate in Environment and Resource Studies,
University of Waterloo, Box 29 Nobel, Ontario, CAN, P0G
1G0

Stephen Murphy

Associate Professor in Environment and Resource Studies,
University of Waterloo, Waterloo, Ontario, CAN, N2L 3G1

Abstract: Science as a way of knowing has great value to decision-making but there is need to consider all its attributes and assess how science ought to be informing decision-making. Consideration of the critiques of science can make science stronger and more useful to decision-making in an environmental and ecological context. Scientists, planners, and managers need to consider the critiques of science and ecology, and examine how science can adapt and incorporate these critiques into the application of science and decision-making. This paper outlines many of the challenges facing the use of science (specifically ecology) in decision-making and shows possible areas for overcoming these challenges.

Critiques have questioned the following assumptions of science: 1) whether it is value-free, 2) concepts of order and predictability and 3) modern science's claim to being the key way of 'knowing'. Challenges have also been issued to the application of science such as: 1) the simplistic causal mechanisms used and 2) the lack of consideration for complex interactions and multi-scale issues. Science can be seen as a process of understanding rather than as a collection of facts. As a process, knowledge is changeable and adaptive, precautionary approaches become vital.

Ecology is a science that is beginning to recognize the need for value identification, the need for a multi-scale and multi-perspective approach. Ecology itself requires a multi-disciplinary systems approach. Solutions provided by ecology should stress relative merits instead of absolute answers. Rather than being viewed as a 'weak' science may be the most useful science and tool for dealing with environmental problems that are complex, multi-scale, and cannot necessarily be solved by reductionist measures alone. Ecology and the philosophy of science can be shown to advocate an adaptive precautionary approach given the complexity of social and bio-physical interactions.

Introduction

Questions abound regarding the roles of science in planning and management decision-making. These roles are debated at many levels and generate diverse responses. Two examples of these responses have stemmed partially from

post-normal science and post-modernist critiques. Post-normal analysis evaluates assumptions of linear causality in a quest for unerring predictability and control of nature; the implications of these assumptions are also examined. Post-modernists indicate that science is relative and, as such, the predominant use of science as a key mode of "knowing" may be fundamentally misguided when it is applied to decision-making. These insights, among others, are helping to redefine a role for science that appears to coincide with a new era of planning that includes a civics model, precautionary principles, and an ecosystem approach.

Despite emergent models of the use and definition of science, current management and planning may not be able to easily incorporate redefined concepts, nor experience the ideals represented by those models. In short the adaptability of institutions to these concepts remains questionable (Holling, 1995; Kay et al., 1999). The conceptual jumps required may be too great for current practices to deal with, as often, theoretical ideas lack the means for pragmatic implementation. Finding a middle ground for the role of science that can allow adaptation of these new concepts may be required. Despite numerous arguments from scientists, planners, managers, and academics that planning and management should be more science-based, these new models advocate a defined role for science set within a well established construction of social values and objectives to guide both the planning and management process.

Ecology, a key science in environmental decision making, provides an opportunity for scientists, planners, managers, politicians, and all of society to reshape interactions with the natural world. Many use ecology as a scientific tool to support desired decisions and as a means of understanding human impacts on the environment. Ecology is also used in attempts to transform ecological concepts into ethical, prescriptive stances (Callicott, 1986). While I agree with many of these attempts, and understand the need to adopt an ecological perspective, there is an equal need to consider what ecology, and specifically what ecology as a science, actually has to offer society. This process starts with an understanding of what is meant by science, followed by descriptions of what shapes ecology.

Critiques of science suggest that science, as a way of knowing, may be seriously misguided when it is applied to decision-making in an environmental and ecological context (Funtowicz & Ravetz, 1994; Schneider & Kay, 1994a). Scientists, planners and managers need to appreciate the critiques of science and ecology, and examine if, and how, science can adapt to incorporate such critiques into the application of science in decision-making. These critiques may be particularly salient for recreation research as many of the models for recreation planning and management are based in assumptions of scientific method.

Poor use of science includes simplification of diverse social contexts for planning and management as reflected in such models as Limits of Acceptable Change, Recreation Opportunity Spectrum and others. Secondly, biophysical impact assessments, monitoring, and carry capacity

considerations make simplistic assumptions (linear, mechanistic causality) about the bio-physical world (Schneider & Kay, 1994a). These models often do not, and possibly cannot, grasp the complexity of social and ecological systems in order to provide for effective, beneficial, and long-term decisions. A brief look at some of the characteristics of environmental and ecological problems helps explain the difficulty of planning and managing in social and ecological domains.

The Nature of Ecological Problems

Ecology, in its most general form, is the study of changing interrelationships between organisms and their biotic and abiotic environments (Loeb et al., 1998; Schneider & Kay, 1994a). Studies of ecology occur at multiple levels of interaction but no matter what the level, it is important to remember that each level is influenced by, and in its own turn influences, interactions and processes at other levels (Loeb et al., 1998). The diversity of interactions in ecology has created such concepts as emergent complexity (Schneider & Kay, 1994b), multiple scales and non-linear dynamics (Holling, 1992) that require approaches beyond the mechanistic, reductionist methods often used in a Newtonian-portrayed, modern science (Slocombe, 1998; Schneider & Kay, 1994a). Because of inherent uncertainty and movement away from traditional approaches, ecology is often seen as being a weak science, as intractable, messy, and unpredictable (Slobodkin, 1988; Peters, 1991).

Much of the reason for the "messiness" and conflict with ecology has emerged because of the following: the types of problems that it has been asked to solve (Slobodkin, 1988); the types of questions that ecology, in turn, is forced to ask (Grumbine, 1992; Schneider & Kay, 1994a); and the nature of the social settings in which these problems are being asked (Walters & Holling, 1990; Holling, 1995). On the environmental movement front, concern over ecological problems were motivated by analogies between the dynamics and complexities of ecological systems and human societies and a concern to plan and manage human societies within their ecological context and constraints (Slocombe, 1998).

Similarly, ecology was being asked to address problems in various resource industries (forestry, fisheries, etc.) where the scientific concepts traditionally used were not providing accurate predictions and resulting ecological disturbances were causing considerable economic problems (Gunderson, Holling, & Light, 1995). Global population growth and resource crises shaped ecological problems primarily as problems of scale. Decisions made at one particular scale created problems at multiple scales and often hidden at the scale of the initial implemented decision. Reactions to the new problems often focus, again, at only one scale (Norton, 1995) rather than attempting to view a complete scaled system.

Additionally, an ecological problem could depend largely on popular perception (Slobodkin, 1988). People will care for what they see and not necessarily think about what they definitely know. The popularity of cute, furry species or

majestic landscapes as symbols for environmental groups illustrates this dynamic and these symbols often become the focus of concern rather than root ecological problems and knowledge. Recognizing this, Slobodkin (1988) is quick to point out that solutions to environmental problems depend as much on the power of poetry and arts, as on economics, while the techniques of carrying out the resolution hinge on ecology. That is to say that environmental problems and perceptions of environmental problems have at least two aspects to them: value statements of what is desired and ecological understanding, explanation, and definition of what might be possible.

Ecological problems manifest themselves as multi-scale problems, require multiple types of perspectives (nutrients, populations, landscapes, etc.) and do not appear to be adequately solved using traditional linear, mechanistic approaches to scientific understanding. As well, a complex social dynamic merges with this bio-physical reality such that ecological planning and management of environmental and ecological issues requires acknowledgement of social values. Defining socially desired goals for an ecosystem is quickly becoming an important aspect of planning and management. In this form, ecology is a science that challenges much of the core modernist approaches to science.

What is Science?

Science is first and foremost a philosophy of understanding and learning. As a philosophy it shapes the process by which we go about learning and understanding the world around us. Its strength lies in its search to acquire knowledge that has the greatest likelihood of being true (Goldsmith, 1993). Science, as a philosophy and in practice is also subject to critique from diverse arenas of society. One notable critique portrays science as manifesting perceptions of today's world as normal, simplistic and unchanging (Goldsmith, 1993). Others suggest that science's claim to neutrality (or being value-free) is impossible and that the introduction of values to science invalidates scientist's work. A brief explanation of the philosophy of science helps to explain how some of these critiques are not necessarily critiques of the philosophy of science but rather of the practice of modernist science.

Biggins (1978) suggests that science is about our views on the possibilities for using nature, the constraints on our using nature, and our relationship to nature or, in short, it is about understanding the human-environment interaction. Science is a form of logical investigation about the how things work. Popper (1994a) would argue that science is about rational criticism; through discussion of ideas, knowledge and understanding can be furthered. This is an important distinction as society, decision-makers, and indeed many scientists and researchers, have established science as a static and concrete collection of facts and predictive tools rather than as a process of learning.

For Popper (1994a) and other scientific philosophers (Peters, 1991; Callicott, 1986), science is defined by the

following: investigating the world by creating conjectures or hypotheses (problem creation); testing the hypotheses and developing evidence (hypothesis testing); and presenting the train of thought (or theory) to critical examination by both the proprietor of the theory and by others who wish to examine and test the theory (critique).

Problem creation is arguably the least understood component of the scientific process but remains a crucial component of the scientific endeavour. In theory, researchers examine the literature about other theories and weigh out the relative merits of different methodologies, theories, and ideas, in an attempt to establish some new theory or direction for research. In practice however, it has been shown that researchers often turn a blind eye to the diversity of theories, instead focusing a smaller set, in attempts to provide evidence to strengthen their own theories or "pet" ideas (McIntosh, 1980). At a basic level, problems are tensions between knowledge and ignorance; they are imperative for the progress of knowledge (Popper, 1994a). The hypothesis creation phase develops the questions or discovers the problem to be researched and then creates ideas (conjectures) about the possible reasons for the existence of the problem. Problems may arise when we look at the world and perceive differences between observation and perception. That is to say, that the art of creating hypotheses may be a largely internalized process in which we mix our ideas of how things work with previously discovered phenomenon, other research, and our observations (Peters, 1991). As such, a hypothesis is formed which makes formalized statements about how the world might work, in preparation for a formalized testing of these statements.

From problem creation, the next phase is to test hypotheses. Hypothesis testing is perhaps what scientists do best. There are well established procedures and protocols for the multitude of tests that need to be done. They range from statistical sampling protocols to established tools and measurement techniques, most developed in attempts to reduce researcher bias. Testing is done by comparing deduction to observation (Peters, 1991). The original theory is tested by whatever means of observation are available and relevant. A positive test of a hypothesis proves only that in the context of the test, the theory is correct. It does not prove that the theory will be correct in all cases. Indeed, Popper (1994b) suggests that even the most rigorously tested theories will always be conjectures and hypotheses. This means that a new hypothesis can and should be created which can be further assessed against others. Popper (1994b) argues that we regard one hypothesis as better than another if, when testing is complete, it fulfils three requirements:

- 1) the new hypothesis must explain all the things that the old hypothesis successfully explained;
- 2) it must avoid at least some of the errors of the old hypothesis;
- 3) it should, where possible, explain things that could not be explained or predicted by the old hypothesis.

This amounts to the basis of the scientific critique and is how scientific understanding constantly evolves (Funtowicz & Ravetz, 1993).

Critical examination of theories follows this process and provides further problems for examination. Popper's form of critical discussion is in actual fact the explaining of a new theory, in light of, and better than an old theory. We have already seen this in his explanation of the three parameters by which an old hypothesis is rejected for a new one. But what is necessary is to know if a new theory would be considered acceptable. For Lee (1993), "an experiment is a systematic way of answering a question. Whether the results constitute a valid answer is a test of the competence of the experimenter."

In order for results to constitute a valid answer, internal and external validity must be made (Lee, 1993). Internal validity might be described as correct inferences: those considerations and decisions made in the course of developing and testing a hypothesis. According to Lee (1993), internal effects to experimental validity occur due to: the following factors: historical events, events that would have occurred anyway, flukes, effects caused by the experimenter, results that occurred because of measurement tools, and decisions of sampling. These factors consist of all things that would effect and bias the answers due to the experiment itself.

External validity constitutes whether the results can and are correctly applied to other situations (Lee, 1993). Threats to external validity generally take the form of changes to the subject matter, because of measurement, such that replication is not possible. Some examples include: multiple interventions causing non-linear changes, and complex interventions which are not repeatable due to failures or impossibilities in including those components actually responsible for the effects (Lee, 1993). Lee realizes that the approach offered may prove too idealistic but suggests that insisting on an idealistic approach to science does not entail refusing to do science unless it is invulnerable to criticism. Rather, it entails approaching a problem scientifically. For Lee (1993), evaluating internal and external validity provide an orderly framework in which to make assessments about the objectivity of an experiment and hence of a theory.

Schrader-Frechette and McCoy (1993) make an argument for what constitutes the objectivity of ecology that applies equally well to science in general. Ecology can be objective, not because it is empirically confirmable, but rather if it is not obviously biased or subjective. They define the objective result as being obtained through survival of intelligent debate and criticism, and if it appears to have more explanatory power and internal and external validity than alternative theories. They argue that objectivity is not tied to value-free confirmability but tied (as Lee [1993] also suggests) to the practices and procedures of intelligent criticism of the scientific community as well as to the practices and procedures of the methods used. Popper (1994a) would concur with these statements adding that, "to attain objectivity we cannot rely

on the empty mind." Objectivity rests on criticism, on critical discussion, and on the critical examination of experiments. A right and wrong method of critical discussion emerges. A wrong one would start with the question: How can we establish or justify our theory? This leads, Popper argues, to dogmatism. By contrast, the right method of critical discussion starts with: What are the consequences of our thesis or our theory? Are they all acceptable to us?

Because science is a process of learning, knowledge should be seen as changeable. Current theories and predictions may change dramatically with new knowledge and may not be appropriate to address future problems. The philosophy of science may necessitate an adaptive approach with a cautionary use of knowledge. This becomes even more important when we consider uncertainty, complexity, surprise, and social conflict in ecological problems.

Post-Modernism and Post-Normal and How Ecology and Science Can Respond

Many ecologists and decision-makers demand a more rigorous science, with greater predictability and understanding (Peters, 1991; Szaro et al., 1998). Such simplistic demands are seen, by Kay and Schneider (1994a), as the classical Newtonian cause and effect, modern scientific approach. The post-modernist critique challenges the fact-value dichotomy portrayed by modern science, the concept of order and predictability from a reductionist perspective, and the notion that science is the only way of knowing.

The knowledge and understanding that science is not value-free is not new; objectivity in science is perhaps questionable. Post-modernists insist that science like other intellectual disciplines is influenced by the social and political context within which they are embedded (Tauber, 1999; Howarth, 1995). Benson and Licht (1997) suggest that the experimental method of science often portrays results as supporting or refuting a hypothesis instead of focussing on the possibility that the methods used might be mistaken or lead to errors. This is a valid concern and scientists should be prepared to analyse and critique the methods used, assumptions made, and thus the relevance and objectivity of the outcome.

Despite these efforts by scientists, it is still argued that the very methods, models, and theories used, presuppose a set of values (Howarth, 1995). These values are often depicted as the modernist values of mechanistic control and domination of nature. Questioning this, Masters (1993) questions the importance of the critique that science might be value-laden. Tauber (1999) suggests that considerations of neutrality versus objectivity help to break this argument down. Objectivity can be maintained through the philosophy of science and its methods (as described earlier), whereas the scientist or the science may not be neutral. Tauber suggests that neutrality of science "depends on regarding nature as holding no value". Neutral science would not take a stand, while objective

science has claims to reliability. As such, objectivity is an ideal to be attained through a process.

If, however, the argument still rests on whether science can indeed be objective, it may be useful to think of objectivity and subjectivity on a continuum with the two at opposite ends. Knowledge shifts along this continuum. Perceptions of environmental problems consist of varying degrees of factual concepts, desired ends and varying degrees of objective information. Lee (1993) suggests that perceptions of individuals and collective human populations can be disconnected from reality under certain circumstances. These may be seen as "optical illusions" or situations in which the ideas and inferences people create are systematically mistaken. Often, these perceptions could be so strong as to have problems wished into reality; a more subjective rendition of knowing. Norton (1995) points also to individual perception as geared toward short-term changes rather than long-term perspectives demanded for parts of ecological understanding. Perceptions have considerable importance for decision-making. They influence allocation of funding and political and societal focus, possibly moving focus away from what is really at stake in the broader ecosystem. The role that ecology has in these situations is to create more objective ideas of what is needed for greater sustainability. Modern science should not posit that it is value free and completely objective. Rather, science has the capacity to be neutral, and more objective than not.

A second post-modern critique is that ecology in the modern scientific paradigm portrays nature to be ordered and structured and this leads to decisions that in longer timelines elicit greater surprise and uncertainty. Benson and Licht (1997) argue that under a post-modernist world-view, order and predictability are no longer possible, nor are they desirable. Schneider and Kay (1994) similarly argue that the Newtonian perspective of order and predictability cannot be used when studying ecosystems because of inherent complexity created through the number, and specificity of interactions. Despite these thoughts, this perspective does not preclude a modernist scientific approach to understanding the solution. Modernists are not necessarily stuck within the "universe is ordered and predictable" paradigm and the world-view of ecology is shifting away from such simplistic assumptions (Norton, 1995; Holling, 1986, 1995; Schneider & Kay, 1994a).

A further line of thought is that reductionist science cannot possibly explain ecosystems, however, modernist science is inherently reductionist, even in its attempts at holistic understanding (Trepl, 1994; Goldsmith, 1993). Goldsmith, (1993) rejects the ecologist who would attempt to reduce things in models of understanding, arguing instead that nature can only be understood holistically. While I agree that making models to encompass all of the complexity of natural systems may not be possible, holistic research methods and ways of knowing are not abundant and can be cumbersome and time-consuming to implement. As 'parts', a reductionist approach will always be incomplete, but necessary. Taken in stride with the philosophy of

science which forces contextual understanding, the proprietor of the model should no doubt understand the implications and short-comings of the model and seek a more holistic understanding of the context of their work; both holistic and reductionist methods are needed. Arguably, many scientists do not seek to merge the two.

The final post-modernist critique to be addressed here is regarding science's claim as the only way of knowing and further that knowing is impossible because knowledge is dependant upon the individual, their culture, their environment, etc. Certainly there has been a tendency for policy and decision makers to seek out scientific information and to diminish other types of information. This is understandable in a world which searches for and demands confident answers to problems. Jasanoff (1993) relates one post-modern position, that suggests that in a world where policy outcomes are largely determined by social relations, scientific knowledge serves only to underpin particular group or class interests, lending them the appearance of objectivity. This coincides well with a view that most citizens claim science has become an obstacle to the expression of concerns (Irwin, 1995).

Science as knowledge, is often used in conflicts to gain power. Science is portrayed as the only valid way of knowing and as such, alternatives lose credibility and standing in decision making. Popper (1994a) refutes this, arguing that ideas should be put forward as much as possible and should be able to operate freely against the narrowness of a 'scientists' perspective. Popper argues directly that science is only one way of knowing and operates within a certain finite realm. But, be prepared to defend other ways of knowing against critical discussion. The solution to 'science as power' is more difficult but lies in social uses of science and also in the critical discussion of the merits of each groups' particular scientific "facts". The application of post-normal science is perhaps one method for broaching the issue of multiple valid ways of knowing.

On the surface, there may be little that separates a post-normal critique from a post-modern critique. In fact it might be argued that post-normal critiques are a subset of post-modernist perspectives. Perhaps the two largest differences are that post-normal is mainly a critique of 'normal' science, and that post-normalists would not disallow a dominant use of science but rather frame the use of science more appropriately. More basically, I would argue that post-normal critics create a more explicit understanding of what science ought to be about and how science ought to influence decision-making. To that extent, post-normal science critiques are as follows: Funtowicz and Ravetz (1993) suggest that this emerging science attempts to manage uncertainty rather than eliminate it; make values more explicit; and creates scientific argument through interactive dialogues rather than formalized deduction. Further, they suggest that temporal and spatial characteristics are very important for discussing explanations and that historical perspectives and reflection of humanities past and future are relevant and necessary.

Normal science is claimed to be a science that in the modernist perspective has oversimplified the understanding of nature. What is often forgotten is that theories and scientific models are merely representations of reality and as such are inherently flawed. In this perspective any action taken will have errors and any actions that were based on previously accepted simple models, will have more errors and if adopted, create greater surprise (Holling, 1986). Ecology as depicted by Kay et al. (1999) requires understanding of complex systems, emergent properties, self-organization, spatial and scalar interactions, and self-organization (to name a few concepts) demanding a different paradigm than that of Newtonian objective and detached science (Norton, 1995).

Funtowicz and Ravetz, (1994) suggest that an appreciation of the diversity of knowledge systems can lead to a new practice of science in emergent complex systems. They suggest that as uncertainty increases and/or as decision stakes become higher, science, as it is traditionally practiced, loses some of its applicability and validity. There is no set boundary to indicate when science is appropriate or not, but rather the boundaries shift given different types of problems available knowledge, and conflicting interests among interest groups. In this form, post-normal science does not preclude the use of traditional science but rather places boundaries on it. Post-normal science does not appear to really be questioning how science is done (as does post-modernism) but rather questions the role that science plays in diminishing uncertainty, and gaining control over a given problem. Post-normal critiques address how science is used in the decision making process; a warning that scientific information can easily be taken out of its context and applied in ways that it was either not intended for, or applied where the information does not grasp the full complexity of a situation.

Post-normal science also speaks to the use of caution in high stake/uncertain situations. This is similar to the cautionary stance portrayed by the philosophy in science that knowledge is temporary, and will be replaced with new and hopefully better knowledge, from which actions may change. Decisions regarding ecological problems should be seen as relative merits or tradeoffs rather than based on solutions determining right and wrong. Thus, the role of ecology, according to Schneider and Kay (1994) should be about demonstrating the relative merits of different possible actions; ecology should provide explanations about tradeoffs.

The goals of ecology are frequently questioned. Many critics argue that the goal is to seek control over nature. Others claim that the goal of ecology is to gather information in an objective a manner as possible. Funtowicz and Ravetz (1993) suggest that science should have a more explicit goal in aiding decision-making and that definition of this goal should be discussed openly. The difficulty with complex systems and with deciding between tradeoffs is that it requires definition of values and thus the goal for the system. Schrader-Frechette and McCoy (1993) suggest that ecology has no clear norms for when a

community is normal or healthy and, as a consequence positing a goal for ecological practice is quite difficult. There is considerable debate about whether an objectively defined state can be determined by science that can be used as the goal for ecological systems. This debate perhaps provides the greatest distinction between the modernist scientist and the post-normal scientist. Modernists would claim that such an objective goal could be determined from science whereas the post-normal scientist would suggest that describing a state where an ecosystem 'ought' to be is a value based question, one which requires discussion among groups interested in that particular ecosystem.

Summary

Schrader-Frechette and McCoy (1994) suggest that, if it can be established that protection from serious harm is more basic than providing or enhancing welfare, then the goal of ecology is one of precaution. Various historians and ecologists perceive that some parts of the ecological viewpoint are at odds with the modern scientific conceptualization of nature, so that ecology might well provide a framework which could override and require fundamental revision of some existing patterns of scientific thought. Thus their writings suggest that the emergence of ecology might herald the emergence of a "new science" (Biggins, 1978). If modern science is defined purely as Newtonian science (simplistic linear prediction) then ecology as a science moves us away from modern science. If modern science is defined as providing purely objective and unerring predictive capacities (in the empirical sense), then ecology creates an understanding that this view of modern science is not possible.

However, given the philosophy of modern science outlined briefly in this paper, ecology attempts to be and mostly is, a type of modern science. That is, ecology in many respects, represents the ideals of modern science philosophy, and yet challenges those ideals. Mirroring the philosophy of science, ecology has the capability to develop ideas (theories) about how the world functions. In ecology, that world often includes humans and multiple spatial and temporal scales of understanding. These theories need to include a conceptualization of the complexity of the natural world and provide predictive statements (narratives) about likely outcomes and limits or constraints of application of the theory under question (Kay & Schneider, 1994; Norton, 1995; Holling, 1986). These theories are held up for critical debate. Indeed, there is considerable debate regarding ecological theory and its application (Peters, 1993; Schneider & Kay, 1994, 1993; Bocking, 1978; Holling, 1986; Gunderson, Holling, & Light, 1995).

In addition to critiques, any number of environmental problems could be viewed as testing grounds for ecological theory (diversity-stability debate, genetically modified organisms, sustainability, global climate change, etc.). A science that recognizes that knowledge is changeable is a science of caution. Any actions that result from use of science should recognize that new and complex situations will likewise require cautious application of science. Concepts underlying adaptive management frameworks

seek to institutionalize this debate allowing for action as opposed to the paralysis that is often felt in a purely political debate of uncertainty. And, it allows for alteration of theory when theories prove not to provide accurate explanations of ecological understanding. Last, ecology may be viewed as moving beyond the traditional modernist perspective as it evolves to include explicit definitions of values in order to help the science develop various narratives of policy outcomes.

When critiques of modern science are offered, there is a need to understand all that is being critiqued. Too often, a theory is used to critique practice, rather than another theory. The practice of science by scientists and its use by decision makers may have faults. Reasons for this are not merely a result of the science, but also representative of a societal evolution. Science has considerable sway in a society that looks to science for answers. This is both a phenomenon of science and of society. The theory of science may also be faulty but in its limitations it provides a more objective means of understanding the natural world than many other approaches to gathering information. It is not the only knowledge set that should be consulted but its predominant use in decision-making and policy creation suggests the need to improve the science that is influencing these domains.

Ecology is a science that recognizes the need for value identification, the need for a multi-scale and multi-perspective approach, and requires a multi-disciplinary systems approach. Solutions provided by ecology could stress relative merits instead of absolute answers. Rather than being viewed as a 'weak' science, ecology may be the most useful for dealing with environmental problems that are complex, multi-scale, and cannot necessarily be solved by reductionist measures alone. Ecology and the philosophy of science necessitates an adaptive precautionary approach given the complexity of social and bio-physical interactions. To continually improve our use of tools such as science, we need to consider its critiques, explore their validity, and incorporate them into application. Ecology as a key science and perspective in decision-making is well placed for this endeavour.

References

- Benson, G., & Licht, R. H. (1998). A post modern perspective for scientific managers of protected areas. In N. W. P. Munro & J. H. M. Willison (Eds.), Linking Protected Areas With Working Landscapes: Conserving Biodiversity. Proceedings of the Third International Conference on Science and Management (pp. 821-832). Wolfville, Nova Scotia: Science and Management of Protected Areas Association.
- Biggins, D. R. (1978). The social context of ecology. The Ecologist Quarterly, Autumn, 218-227.
- Callicott, J. B. (1986). The metaphysical implications of ecology. Environmental Ethics, 8, 301-316.

- Funtowicz, S. O., & Ravetz, J. R. (1993). Science for the post-normal age. Futures, 25, 1-17.
- Funtowicz, S. O., & Ravetz, J. R. (1994). Emergent complex systems. Futures, 26(6), 568-582.
- Goldsmith, E. (1993). The way: An ecological world-view. Boston: Shambhala Publications.
- Grumbine, E. R. (1992). Ghost bears: Exploring the biodiversity crisis. Washington DC: Island Press.
- Gunderson, L. H., Holling, C. S., & Light, S. S. (Eds.). (1995). Barriers and bridge to the renewal of ecosystems and institutions. New York: Columbia University Press.
- Holling, C. S. (1986). The resilience of terrestrial ecosystems: Local surprise and global change. In W. C. Clark & R. E. Mann (Eds.), Sustainable development of the biosphere (pp. 292-320). Oxford University Press.
- Holling, C. S. (1992). Cross-scale morphology, deometry, and dynamics of ecosystems. Ecological Monographs, 62(4), 447-502.
- Holling, C. S. (1995). What barriers? What bridges? In L. H. Gunderson, C. S. Holling, & S. S. Light (Eds.), Barriers and bridges to the renewal of ecosystems and institutions (pp. 3-34). New York: Columbia University Press.
- Howarth, J. M. (1995). Ecology: Modern hero or post-modern villain? From scientific trees to phenomenological wood. Biodiversity and Conservation, 4, 786-797.
- Irwin, A. (1995). Citizen science: A study of people, expertise and sustainable development. New York: Routledge.
- Jasanoff, S. (1993). Compelling knowledge in public decisions. In L. A. Brooks & S. D. VanDeveer (Eds.), Saving the seas: Values, scientists, and international governance, (pp. 229-252). Maryland Sea Grant.
- Kay, J. J., Regier, H. A., Boyle, M., & Francis, G. (1999). Futures. Futures, 31, 721-742.
- Lee, K. N. (1993). Compass and gyroscope. Washington DC: Island Press.
- Loeb, S., Lennartz, M. R., & Szaro, R. C. (1998). The role of fish, wildlife and plant research in ecosystem management. Landscape and Urban Planning, 40, 131-139.
- Masters, R. (1993). Beyond relativism. Hanover, NH: University Press of New England.
- McIntosh, R. P. (1980). The relationship between succession and the recovery process in ecosystems. In J. Cairns (Ed.), The recovery process in damaged ecosystems (pp. 11-62). Ann Arbor Science.
- Norton, B. (1995). Ecological integrity and social values: At what scale? Ecosystem Health, 1(4), 228-241.
- Peters, R. H. (1991). A critique for ecology. Cambridge: Cambridge University Press.
- Popper, K. R. (1994a). In search of a better world: Lectures and essays from thirty years. New York: Routledge.
- Popper, K. R. (1994b). The myth of the framework: In defense of science and rationality. New York: Routledge.
- Schneider, E. D., & Kay, J. J. (1994a). Complexity and thermodynamics: Towards a new ecology. Futures, 24(6), 626-647.
- Schneider, E. D., & Kay, J. J. (1994b). Life as a manifestation of the second law of thermodynamics. Math Computer Modelling, 19(6-8), 25-48.
- Schrader-Frechette, K. S., & McCoy, E. D. (1993). Method in ecology. MA: Cambridge University Press.
- Slobodkin, L. B. (1988). Intellectual problems of applied ecology. Bioscience, 38(5), 337-342.
- Slocombe, D. S. (1998). Environmental planning, ecosystem science, and ecosystem approaches for integrating environment and development. Environmental Management, 17(3), 289-303.
- Szaro, R. C., Berc, J., Cameron, S., Cordle, S., Crosby, M., Martin, L., Norton, D., O'Malley, R., & Ruark, G. (1998). The ecosystem approach: Science and information management issues, gaps and needs. Landscape and Urban Planning, 40, 89-101.
- Tauber, A. I. (1999). Is biology a political science? Bioscience, 49(6), 479-486.
- Trepl, L. (1994). Holism and reductionism in ecology: Technical, political and ideological implications. Culture, Nature, Socialism: A Journal of Socialist Ecology, 5(4), 13-31.
- Walters, C. J., & Holling, C. S. (1990). Large-scale management experiments and learning by doing. Ecology, 71(6), 2037-2068.

Impacts of Wildlife Viewing

ELK VIEWING IN PENNSYLVANIA: AN EVOLVING ECO-TOURISM SYSTEM

Bruce E. Lord

Senior Research Assistant in Forest Resources, The Pennsylvania State University, 206 Ferguson Building, University Park, PA

Charles H. Strauss

Professor of Forest Economics, The Pennsylvania State University, 104 Ferguson Building, University Park, PA

Michael J. Powell

Senior Research Technologist, The Pennsylvania State University, 206 Ferguson Building, University Park, PA

Abstract: In 1997, the Pennsylvania Game Commission established an Elk Viewing Area within Pennsylvania's elk range. The viewing area has become the focus for a developing eco-tourism system. During the four years of operation, a research team from Penn State has measured the number of visitors, their expenditure patterns, and other parameters of their visit. The trends observed during this period provide a useful insight into an evolving eco-tourism system.

Introduction

Elk, *Cervus elaphus canadensis*, were indigenous to Pennsylvania before the late 1800s. However, the original herds were extirpated by 1877 (Shoemaker, 1939), largely because of unregulated hunting pressures and the wide-scale harvest of the state's forests.

The resurgence of second growth hardwoods throughout much of the state during the early 1900's gave cause for the re-introduction of elk to the new forest system. From 1913 to 1926, 177 Rocky Mountain elk (*C. e. nelsoni*) were introduced to northcentral Pennsylvania (Bryant & Maser, 1982; Gerstell, 1936; Latham, 1954). A hunting season was established in 1923 and continued until 1932, when declining elk numbers caused it to be suspended. The remaining herd settled into Elk and Cameron Counties of northwestern Pennsylvania. Through a concerted management effort, led by the Pennsylvania Game Commission, the herd increased to nearly 300 animals by 1996. In its 2001 survey, the Commission identifies over 600 elk (Cogan et al., 2001).

The current success of these unique animals has not gone unnoticed by the public. In 1997, an elk viewing area was established on Winslow Hill, near the town of Benezette. Elk are a source of continued interest and pride among residents and visitors to their range (Strauss et al., 1999; Lord et al., 2000a). However with the expanded herd size, has come a call for reestablishing an elk hunting season. The Pennsylvania Game Commissions released its Elk Hunt Advisory Committee's report in April of 2000. That report supports the establishment of an elk hunting season (Cogan, 2000).

Prior to the announcement of the hunting season, Lord et al. (2000b) examined the opinions of visitors about an elk hunt. They found opinions split, with certain subgroups of the audience strongly for or against the concept.

Procedures

A series of random on-site interviews were obtained over the four-year study along the main road and observation site. Over 1,400 interviews were obtained during 155 survey days, providing information on visitor origins, travel plans, party sizes, expenditures, allied recreational interests and expectations.

Total attendance was developed from an allied system of vehicle counts taken along the main viewing road and observation areas. Vehicle counts were expanded to visitor days using passenger load and travel data obtained from the interviews. Two attendance models were developed, one which depicted daily use patterns and a second that analyzed seasonal trends, with the latter organized as triangular distributions (Strauss et al., 1999). These efforts provided annual estimates of total attendance on a weekly and monthly basis.

Expenditures were identified on a visitor day basis (one person's visit during some portion a day), classified by resident and non resident visitors, and further stratified as to the types, amounts, and locations of purchase. Total expenditures were developed from attendance estimates and were entered to an input-output model for the two-county region. The IMPLAN model provided the economic structure of the two-county region (MIG Inc., 1996). Non resident visitor expenditures were traced by the model in terms of their direct and secondary (indirect and induced) impacts within the region and were measured by total sales, value added, salaries and wages, and employment.

Results

Visitation

Daily visitation patterns show a pronounced seasonal variation in elk viewing. The prime viewing opportunities occur in the fall (September - November), during the elk rut, as the bulls are assembling their harems (Figure 1). The first two falls after the viewing area was established had peak usage of over 3000 people on some weekend days. At this level, both the viewing area and the associated road system were overwhelmed. By the third fall, these extremes were no longer observed, as visitation spread to the late summer (Table 1).

Table 1. Seasonal Attendances at the Elk Viewing Area

	Year 1	Year 2	Year 3	Year 4
Fall	35,781	49,461	38,094	42,820
Winter	3,225	5,506	3,715	3,331
Spring	6,993	5,621	4,672	
Summer	5,926	12,162	12,221	
Total	51,925	72,749	58,702	63,624

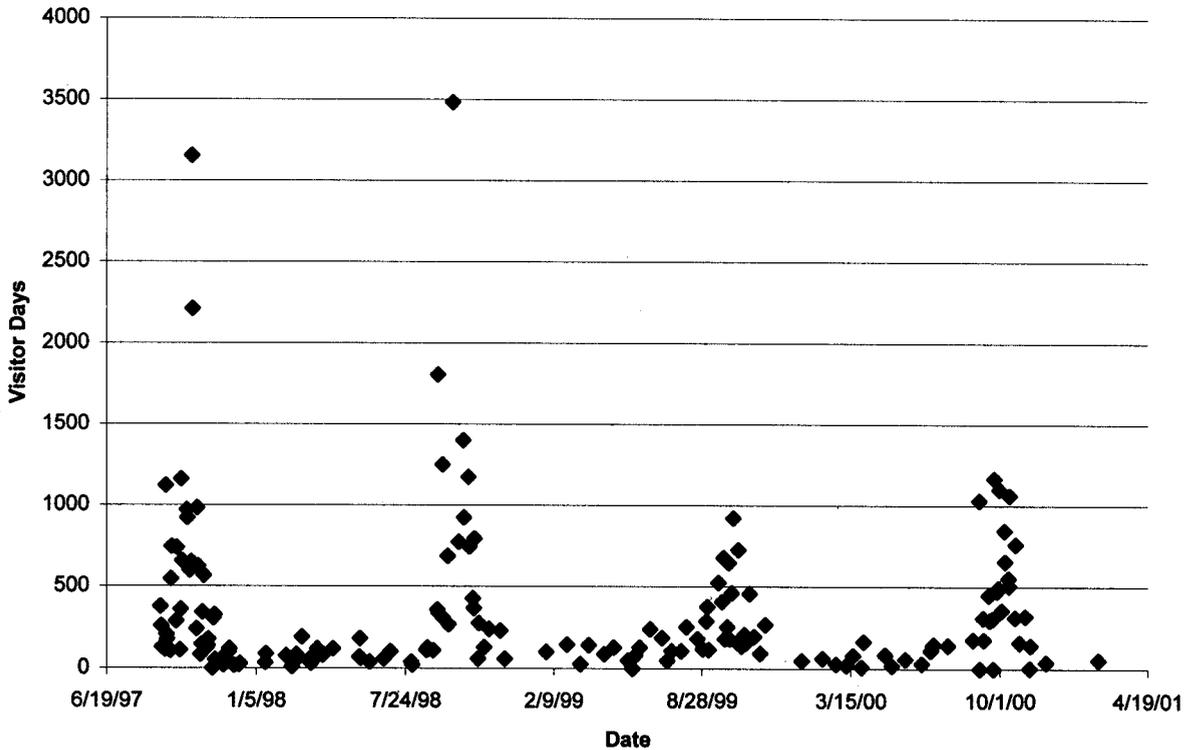


Figure 1. Daily Visitation Observed at the Elk Viewing Area

Overall attendance for the first year was just under 52 thousand visitor days. The second year saw significant increases in both the fall and the following summer seasons, for an annual total of over 72 thousand visitor days. In the third year, the fall attendance dropped back to the level observed in the first fall. Winter, spring and summer remained at about the same levels, with the third summer still significantly higher than the first summer. The fourth fall showed an increase from the third fall, though not as high as had been observed in the second fall. Total visitation for year four was estimated at 64 thousand visitor days. The spring and summer estimates were based upon patterns observed in previous years, rather than actual observations.

Resident visitation showed a definite peak in the second year with over 9 thousand local visitor days (Table 2). This was over triple any other year's resident visitation. Non resident visitation also peaked that year. Since the second year, resident visitation dropped steadily, while non resident visitation declined in the third year, but increased in the fourth.

Table 2. Trends in Resident and Non resident Visitation

	Year 1	Year 2	Year 3	Year 4
Resident	3,042	9,294	3,040	2,390
Non resident	48,883	63,455	55,662	61,235

Prior Experience

Starting with the second year, respondents were asked about the number of years that they had been viewing elk in the area. Overall, the average was 4.4 years, with a third of the visitors being first time elk watchers (Table 3). One year later, the average had increased by exactly one year (5.4 years), with one third still identified as first time visitors. The fourth year was differed significantly from the first two, with the average dropping to 3.8 years and over half of the people listed as first time visitors to the elk viewing area.

Non resident Expenditures and Economic Impact

During the first year that the viewing area was open, non resident visitors spent almost \$20 per visitor day (Table 4). Food (\$7.94/visitor day), transportation (\$5.27/visitor day), and lodging (\$4.03/visitor day) were the largest expenditure

Table 3. Prior Experience in Viewing Pennsylvania's Elk Herd

Study Year	Previous Visits (yrs.)	First Time Visitor
1998-1999	4.4	34%
1999-2000	5.4	32%
2000-2001	3.8	52%

categories. The next year, average expenditures dropped precipitously to \$8.66 per visitor day. Food (\$2.96/visitor day), transportation (\$2.89/visitor day) and lodging (\$1.96/visitor day) still lead expenditure categories, albeit at much lower levels. Expenditures increase in the third year (\$14.33/visitor day) and fourth (\$26.45/visitor day). Notable increases in year three were food (\$5.53/visitor day) and lodging (\$5.03/visitor day). In year four, food (\$9.20/visitor day) and lodging (\$8.90/visitor day) rose to new highs. Meanwhile, transportation expenditures (\$5.23/visitor day) also increased to the levels seen in year one.

The economic impacts follow directly from the expenditure levels and the number of non resident visitors. Total expenditures in year one were \$0.9 million (Table 5). In year two, even with increased attendance, only \$0.6 million was spent in the region. By year three, total expenditures increased to \$0.8 million, and in year four, it doubled to \$1.7 million. Total sales impacts followed the same pattern, \$1.2 million in year one, \$0.9 million in year two, \$1.1 million in year three and \$2.3 million in year four. Employment impacts in the two-county region showed similar trends over the four years (30 jobs, 21 jobs, 27 jobs, and then 54 jobs).

Hunting Opinion

When visitors were asked their opinions about a "limited hunt outside of the major viewing areas", a majority expressed approval. In the first three years, just over half approved (56%, 53% and 55% respectively) (Table 6). In the spring of the third year the Game Commission announced the details of a proposed elk hunting season. Hunting approval in the following fall rose to 67%.

Table 4. Non resident Expenditures for Elk Viewing

Season	Trans.	Food	Lodg.	Photo	Other	Tour	Total
'97-'98	\$5.27	\$7.94	\$4.03	\$0.20	\$1.58	\$0.40	\$19.43
'98-'99	2.89	2.96	1.96	0.32	0.49	0.03	8.66
'99-'00	2.79	5.53	5.03	0.06	0.89	0.04	14.33
'00-'01	5.23	9.20	8.90	0.36	2.76	0.00	26.45

Table 5. Economic Impact of Elk Viewing by Non residents

Category	Year 1	Year 2	Year 3	Year 4
Non resident visitor-days	48,883	63,455	55,662	61,235
Expenditures per visitor-day	\$20.23	\$9.38	\$15.00	\$27.17
Total expenditures	\$909 K	\$595 K	\$835 K	\$1,663 K
Total Impacts	\$1,235 K	\$873 K	\$1,134 K	\$2,259 K
Job Impacts	29.8	20.9	27.3	54.4

Analysis of Trends

Visitation

The establishment of a formal elk viewing area attracted large number of visitors to the region. Much of this usage was centered around the fall elk rut. Extreme crowding was observed on several weekends during the peak of the first two seasons. As the third year approached, a significant increase in summer visitation was evident, along with some reduction in the attendance on peak viewing days. Severe cases of congestion were no longer apparent. In year four, total visitations increased, though without extreme crowding. Prior to the fourth season, improvements had been made to the road system, including increased parking at key locations around the viewing area. It seems that after the second fall season, the visitors had learned of earlier congestion and spread their usage to both the early rut season and to weekday periods. Combined with improvements in the road system, overall visitation had increased without detracting from the visitor experience.

Expenditures and Economic Impacts

There are few opportunities to spend money in this rural area. Both food and lodging are limited in the immediate region of the elk viewing area. This was further aggravated in the second year when the town's only gas station temporarily shut down its pumps. As a result, regional gasoline expenditures declined and did not recover until one year after their return to service.

New businesses have appeared, including an "Elk Country Store," a wood carving shop, and a helicopter tour operator. The increase in miscellaneous spending reported in year four may be related to the increased opportunities. However, note that none of the viewers interviewed reported that they had taken a helicopter tour. Apparently, this latter service is either infrequently used or their clients don't mix with the more plebeian crowd on the ground.

Non resident expenditures dropped during year two followed by a steady increase in the next two years. In terms of economic impact, the low expenditures in year two were somewhat offset by the large number of non resident visitors. Increase impacts were observed in the subsequent years as attendance ebbed and then bounced back and average expenditures increased.

Table 6. Portion of Visitors Approving of a Limited Elk Hunt

Season	Percent Approving.
1997-1998	55.5%
1998-1999	53.4%
1999-2000	55.1%
2000-2001	67.3%

Hunting

During the first three years, opinions about and elk hunt were split, with just over half of the visitors approving of the concept. During the spring and summer prior to the fourth year, the details of a proposed elk hunt were announced by the Pennsylvania Game Commission. Following this, approval increased significantly with two out of three visitors approving. Earlier analysis found that perceptions of a small herd size and animals habituated to humans were the main reasons for disapproving of a hunt. The details of a formal elk hunting proposal seems to have alleviated some of these concerns.

Experience

Prior experience was tested to see if it was a significant predictor of expenditure levels and of opinions about an elk hunting season. A negative correlation was found when non resident expenditures were regressed against the number of years of elk viewing experience (Table 7). Visitors were found to spend \$0.33 less per visitor day for each year they had visited the region. Note that many of the people with a history of prior experience had hunting cabins in the area and consequently may have had fewer needs to make purchases during their trip. Visitors with more experience were more likely to disapprove of a hunt (Table 8).

Table 7. Relationship between Prior Experience and Expenditure Levels

Effect	Coefficient	Std Error	T	P (2 Tail)
Constant	20.452	1.747	11.706	0.000
Previous	-0.328	0.175	-1.873	0.062

Table 8. Relationship between Prior Experience and Opinions about an Elk Hunting Season

Parameter	Estimate	S.E.	T-ratio	P-value
Constant	0.582	0.106	5.497	0.000
Previous	-0.017	0.010	-1.674	0.094

Conclusions

The eco-tourism system tie to the region's elk viewing area is evolving as visitors become familiar with the opportunities offered. There also appears to be an adjustment in the usage patterns. Visitors are learning about the best viewing opportunities and how to avoid crowding. Simultaneously, local services are providing additional opportunities for these visitors. No doubt there will be successes and failures along the way, but the region appears to be developing a stronger tourism infrastructure. There are problems, including a continued lack of lodging places and visitor encroachments on private land. Perhaps

the biggest limitation is the concentration of visitors in the relatively short eight-week season centered around the elk rut.

The increase in new visitors suggests that local planners will have to attend to this growth. Furthermore, new visitors may have different desires and expectations than the more traditional elk viewer. They bring in new money and offer new opportunities. They also may have different opinions about the resource. Continued monitoring of the visitors and their needs is recommended as the system continues to evolve.

References

- Bryant, L. D., & Maser, C. (1982). Classification and distribution. In J. W. Thomas & D. E. Towell (Eds.), Elk of North America ecology and management (pp. 1 - 60). Harrisburg, PA: Stackpole Books.
- Cogan, R. D. (2000). Recommendations to PGC Executive Director Vern Ross for: Pennsylvania's first modern-day elk hunt. Harrisburg, PA: Pennsylvania Game Commission.
- Cogan, R. D. (2001). 2001 elk survey. Pennsylvania Game News, 72(4), 16-17.
- Gerstell, R. (1936). The elk in Pennsylvania. Pennsylvania Game News, 7, 6-7.
- Latham, R. M. (1954). Elk live here. Pennsylvania Game News, 12, 15-19.
- Lord, B. E., Strauss, C. H., & Tzilkowski, W. M. (2000a). Economic impact of elk viewing in rural Pennsylvania. In G. Kyle (Comp., Ed.), Proceedings of the 1999 Northeastern Recreation Research Symposium (Gen. Tech. Rep. NE-269, pp. 251-256). Newtown Square, PA: US Department of Agriculture, Forest Service, Northeastern Research Station.
- Lord, B. E., Strauss, C. H., & Tzilkowski, W. M. (2000b, June). Opinions of elk viewers on a proposed Pennsylvania elk hunt. Paper presented at The 5th Eastern States Elk Management Workshop, Saint Marys, PA.
- Shoemaker, H. W. (1939). Vanished Game. In A. Ely, H. E. Anthony, & R. M. Carpenter (Eds.), North American big game (pp. 15-34). New York: Charles Scribner's Sons.
- MIG, Inc. (1996, May). IMPLAN News (No. 17). Stillwater, MN: MIG, Inc.
- Strauss, C. H., Tzilkowski W. M., & Lord, B. E. (1999). Second Year Report - Economic impact of Pennsylvania's elk herd: Analysis of the demographics, pursuits and expenditures of a recreational audience. Research report to the Rocky Mountain Elk Foundation. University Park, PA: Penn State School of Forest Resources.

COMPETING VALUES: A CASE STUDY OF PENNSYLVANIA'S ELK HERD AS A TOURISM ATTRACTION

Jeffrey A. Walsh

Assistant Professor in Recreation Management, Zimmerli 108, Lock Haven University, Lock Haven, PA 17745

Leonard K. Long

Assistant Professor in Recreation Management, Honors/Recreation House #21, Lock Haven University, Lock Haven, PA 17745

Abstract: This paper qualitatively investigates the Pennsylvania Game Commission's (PGC) "Elk Trap and Transfer Project" as a tourism development initiative. Beginning in 1998, a three-year trap and transfer project was initiated by the PGC to relocate 33 elk from Elk County to Clinton County. The ecological goals of this project included re-establishing an elk population that could once again support limited hunting opportunities and to address plausible negative repercussions of the significant annual growth the herd experienced in the 1990s in Elk County. The project has also led to an increase in the numbers of visitors to Western Clinton County interested in "elk viewing" experiences, and is reported to have stimulated local economies. The general consensus from recent research examining the economic impacts attributable to "elk viewing" in Elk and Cameron counties in Pennsylvania suggests that an escalated interest in Pennsylvania's elk herd has directly led to increased non-resident tourism in these two counties. These findings have supported the view that rural tourism development in northcentral Pennsylvania should be encouraged and expanded.

Amid an extensive body of literature related to rural tourism development, Middleton and Hawkins (1998) have advised that the management of local tourism destinations needs to be "proactive", focused towards identifying and addressing issues that could potentially become areas of conflict between different individuals and/or groups impacted by tourism development. One manner of being proactive and minimizing such conflict is to actively participate in "positioning" a given tourism development initiative in stakeholders' minds (cf. Crompton, 1999). A preliminary assessment of the current situation in northcentral Pennsylvania seems to suggest that the PGC's project to relocate and reintroduce elk into other parts of the state may have sparked some local discord or conflicts of interest. This paper attempts to investigate this dissonance from a case study methodology, paying particular attention to the relevance of the "positioning" concept to this dissonance.

Introduction

The management of the elk herd in Pennsylvania throughout the 20th century and into the 21st century has, at

times, been negatively impacted by competing values of local landowners and the Pennsylvania Game Commission (PGC). Documentation of this ongoing struggle can be found as far back as 1914, when the *Millheim Journal* (a local newspaper in central Pennsylvania) ran an article informing the public about a proposition to relocate elk for the purposes of reducing and minimizing the crop damage they caused and to improve tourism. It has been said that history repeats itself; perhaps this is why one can read about the same elk management proposition in a local paper some 80 years later. In September of 1996, the PGC announced that it had developed an Elk Trap and Transfer Project to address those very same issues mentioned in the 1914 newspaper article. For the last couple of years, local farmers and residents in northcentral Pennsylvania have been driving off or shooting elk, various groups have been supporting or condemning these locals, and the PGC has found itself in the midst of it all. The PGC's most recent three-year Elk Trap and Transfer Project appears to have ignited some local adversarial fires that, in turn, have spawned a significant amount of negative publicity for the PGC. The purpose of this paper is to summarize an investigation of this negative publicity from a rural tourism development case study perspective. More specially, the researchers have attempted to examine the importance of Crompton's (1999) *positioning* concept within the context of rural tourism development based on Pennsylvania's elk herd.

History of Elk Herd Management in Pennsylvania

Over 30 years ago, local farmers and residents in central Pennsylvania began demanding that the Pennsylvania Game Commission (PGC) do something with the "rogue", free-roaming elk herd in their part of state. In 1970, local citizens who were experiencing crop and/or property damage attributed to elk demanded that the situation be remedied. In support of the farmers and landowners, the Pennsylvania Federation of Sportsmen's Clubs and the Elk County Federation of Sportsmen's Clubs proposed that the PGC consider planting food plots in nearby fallow and deserted croplands to attract elk away from active farms in production. Almost simultaneously, the Cameron County Soil and Water Conservation District and the North Central Pennsylvania Economic Development Corporation suggested the establishment of a 10,000-acre elk management area in Elk and Cameron Counties primarily for tourism development initiatives and economic growth. In addition, the Northcentral Division Supervisor of the PGC at that time suggested that if the elk herd continued to grow an elk hunt might be in order. A direct outgrowth of these conditions was the "modern era of elk management" for the state of Pennsylvania.

It appears that little has changed with regard to the elk herd management over the last 30 years in northcentral Pennsylvania. It is once again "center stage" in newspapers, as citizens debate the *best practices* for managing the herd. The current situation precipitated directly from the PGC's three-year Elk Trap and Transfer Project, an important component of its current elk management plan to re-establish an elk herd that could once again sustain limited

hunting opportunities and provide "wildlife viewing" experiences. More specially, the goal of the PGC's 1996 Management Plan for Elk in Pennsylvania is,

...to recognize elk as a valuable wildlife resources, to perpetuate free-roaming elk, within suitable habitat for viewing and unique hunting opportunities, and to maintain elk population numbers that affected landowners will accept. (http://sites.state.pa.us/PA_Exec.PGC/elkhunt/02_hunt/eh20_01.htm, March 15, 2001, p.1)

To this end, 33 elk were released in western Clinton County (located in northcentral Pennsylvania) in February of 1998 in an effort to re-establish an elk population that could once again support limited hunting opportunities and to mitigate negative repercussions associated with a significant annual growth in the elk herd in Elk County during the 1990s. Prior to this date, the herd had already begun to migrate or drift out of its traditional range in Elk and Cameron counties in a southern direction and the PGC's plan simply hastened or augmented this migration to an area comprised a vast tracts of public lands (Clinton County). Thus, the PGC proposed that the "established" elk range in central Pennsylvania be expanded from an area where about one-third of the land is publicly owned and two-thirds privately owned to an area where just the opposite occurs—two thirds public and one-third privately owned land. In 1998, in conjunction with the Rocky Mountain Elk Foundation (RMEF), the PGC began its three-year Elk Trap and Transfer Project designed to trap elk in Elk and Cameron counties and transfer them to Sproul State Forest in Clinton County.

Although this project might have begun solely as a PGC resource management practice, it was highly touted as an opportunity to further develop and promote tourism experiences that could (should) eventually have positive impacts on the economies of several rural communities in northcentral Pennsylvania. In fact, recent research, conducted to examine the economic impacts attributable to "elk viewing" in Elk and Cameron counties in Pennsylvania, suggested that an burgeoning interest in Pennsylvania's elk herd has directly led to increased tourism in these two counties (cf. Lord, Strauss, & Tzilkowski, 1998; 1999). In addition, Lord, Strauss, and Tzilkowski (1999) found that, 92% of the visits associated with elk viewing were by individuals residing outside Elk and Cameron counties. It has also been estimated that in 1998, elk viewing contributed a value added component of \$912 thousand and created 42 additional opportunities for local employment. Preliminary results of an ongoing study by Penn State University have estimated that the elk range draws up to 75,000 visitors annually (93% of whom are Pennsylvanians), who collectively spend an estimated \$1.7 million in the region for transportation, food and lodging (http://sites.state.pa.us/PA_Exec/PGC/elk/index.htm). These economic statistics suggest that the elk of Pennsylvania may have the potential to significantly impact those rural communities seeking to stimulate and stabilize their respective economies through tourism development.

Tourism Development

The call for local and public participation in the process and planning of tourism development has become quite commonplace in tourism literature, essentially because of the advantages attributed to its inclusion in tourism planning. For example, Murphy (1985) has pointed out that local participation can serve as an integral component in the assessment of impacts of tourism development, provide a balance to short-term objectives in tourism planning, be a most effective tool in dealing with local tourism-related issues, and should be incorporated because the local level is where the "action takes place". This "public participation" should theoretically include all stakeholders, but at a minimum include both experts and those affected by development of tourism (Murphy, 1985). Murphy also explicitly points out that public participation should be included in the tourism planning process early, "...before commitments are made and battle lines are drawn" (p. 171). Inskeep (1991) claimed that local participation leads to both economic and social diversification, which he believes is a precursor to a more integrated form of tourism development, and ultimately to the establishment of a sustainable tourism development framework. From his perspective, a diversified, integrated approach to tourism development can "...minimize the impacts [of tourism] on local development patterns and local society" (p. 30). Edgall (1999) explained that local residents could impact the diversification of tourism development by affecting the levels of novelty, excitement, comfort, and security that visitors experience at the tourism destination. Gartner's (1996) statement that, "all impacts associated with tourism development occur first and with the greatest intensity at the community level" (p. 300), certainly implies that it is only *fair and just* that the local residents have a voice in tourism initiatives and development. Beliefs such as these appear to have been seminal to the development of tourism planning models over the past few years, especially those involved with rural tourism planning (cf. Lewis, 1998; Sem, Clements, & Bloomquist, 1996; Walsh, Jamrozky, & Burr, 2001; Weaver & Wishard-Lambert, 1996).

Rural Tourism Planning

Almost by definition, rural communities are have been described as being more vulnerable to poor tourism development than other communities. These rural communities and their economies are more isolated, have fewer resources, and probably fewer options. In such communities, tourism can be very disruptive. Rothman (1998) contends that tourism development often results in "irrevocable change" for both the tourism destination and its residents. He believes that the loss of the very characteristics that make a place unique results from the fact that,

When tourism creates sufficient wealth, it becomes too important to be left to the locals. Power moves away from local decision makers, even those who psychically and socially invest in the new system that tourism creates, and towards outside capital and its local representatives. (p. 11)

Additionally, Rothman believes that tourism often “frays” community bonds, as it pits local special interest groups and individuals against one another, while they attempt to capture the economic benefits of tourism development. This is precisely why Middleton and Hawkins (1998) have advised that the management of local tourism destinations needs to be “proactive”, focused towards identifying and addressing issues that could potentially become areas of conflict between different individuals and/or groups impacted by tourism development.

While recognizing such a possibility, Burr (1996) believes that rural tourism can also provide an opportunity for greater community development, and he developed a conceptual model for facilitating rural tourism planning that he believes promotes such development (see Figure 1). Emphasizing the importance of establishing a supportive infrastructure for rural tourism development, Burr’s five-step process provides local stakeholders with a network of

social interactions, essentially creating communication patterns between groups and individuals that connect local input and feedback with the tourism promotion organizations prior to implementation of tourism initiatives.

While acknowledging that these individuals, communication patterns, and interactions will vary according to the specifics of the local area and the magnitude of the tourism scheme, Burr (1996) advocated involving a diverse set of participants in the process of rural tourism planning and development. His findings led him to conclude that private citizens, local leaders, business owners, elected officials, governmental agencies, special interest groups, and tourism planners and marketers all play key roles in the process of successful rural tourism development. The resulting social networks encouraged interactions at the local level, while at the same time, creating valuable ties to resources outside the local community. Connections to the “outside world” afforded

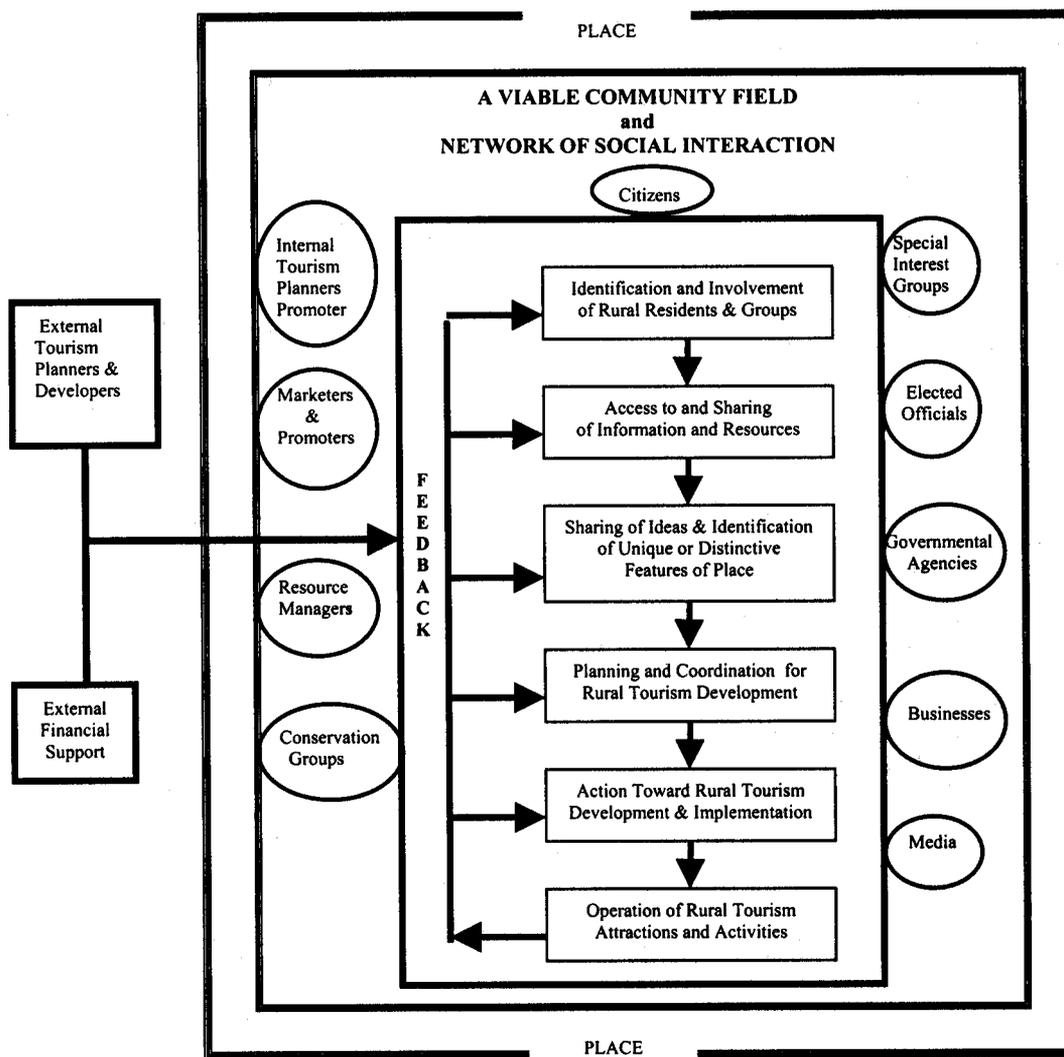


Figure 1. Burr’s Conceptual Process for Facilitating Rural Tourism Development

local communities' access to essential human resources, planning expertise, and financial support they might not otherwise have had, and can make significant contribution to a community's ability to become more agentic in its development strategies.

Of course, incorporating the perspectives of such a diverse set of stakeholders in rural tourism planning is no simple matter and is sure to result in the promotion and advocacy of a multitude of disparate personal and organizational agendas. Often times, the final product of such a process is dependent upon the success with which individuals, groups, and/or organizations *position* themselves and their respective goals in the minds of other stakeholders involved in the planning process (cf. Eyre & Jamal, 1998).

Positioning

Positioning, according to Crompton (1999), refers to the place that something or someone occupies in the minds of others. Differing from *image*, positioning relates to a frame of reference or a comparison to similar entities or alternatives. In the context of rural tourism development, where a diverse set of stakeholders have been incorporated into the planning process, the positioning of one's beliefs, perspectives, and/or ideas can significantly impact the amount of support or opposition for one's idea or viewpoint. In other words, if a particular tourism development initiative is positioned favorably in the minds of stakeholders, it will be supported over less favorably positioned alternatives. This is precisely why rural tourism planning models often begin with an assessment or an investigation of public opinion/attitudes or the general mood of the community; to better understand what *position* tourism development holds in the minds of community members (e.g. Bouke & Luloff, 1996; Lewis, 1998; Sem, Clements, & Bloomquist, 1996). Such investigations can provide tourism development advocates and promoters valuable insights as to how they might strengthen a current *position* or possibly *reposition* tourism development to garner more local support and/or minimize dissonance to such development. Crompton (1999b) also warns that, "repositioning is likely to take many years of effort..." (p. 5), and "...is a difficult task because it involves shifting a widely held, long established attitude..." (1999a, p. 113). This leads him to the assertion that the identification and establishment of a strong, preferred position can be the most important aspect of strategic planning. A lack of attention to *positioning* can often be a main cause of local dissonance associated with rural tourism development. In situations where two or more individuals, groups, and/or organizations have differing views on tourism development strategies, discord and friction increases as these entities compete for favorable *position* in the minds of other stakeholders. A better understanding of the influential role *positioning* can serve in rural tourism planning and development may help minimize the amount of the local dissonance and social disruption often linked to such development.

Methodology

Based on the fact that two local newspapers – the Lock Haven Express and the Renovo Record – frequently

published articles and editorials related to the PGC's management of the elk herd, the researchers chose to conduct a content analysis of both newspapers. Using a modified snowball approach within this content analysis, the investigators also found several other documents related specifically to the PGC's Elk Trap & Transfer Project. The main purpose of this investigation was to gather constructive information to document the process by which the PGC involved various stakeholders in the development and implementation of its Elk Trap and Transfer Project. More specially, the researchers searched for dates and locations of public meetings, workshops, seminars, etc., as well as evidence regarding who was invited and/or attended these venues. Documents were reviewed for pertinent information related to the following questions:

- What factors have contributed to the current public dissonance related to the PGC's Elk Trap & Transfer Project?
- Could this dissonance have been reduced or eliminated?
- Who are the key stakeholders of the PGC's Elk Trap & Transfer Project?
- What process did the PGC follow to implement its three-year Elk Trap & Transfer Project?
- How do the PGC's actions, related to this project, compare to the steps in Burr's (1996) Model for Rural Tourism Development?

This information was then utilized to construct a chronological timeline that included the date of the event, key contacts, purpose and outcomes of each meeting/event, and individuals and groups in attendance (see Figure 2 as example). It was anticipated that having developed such a timeline, the researchers could better identify key stakeholders in the Elk Trap and Transfer Project, as well as, better understand the comprehensiveness and inclusiveness of the planning process.

These stakeholders (individuals and groups) were then classified in accordance with categories contained within Burr's (1996) Model for Facilitating Rural Tourism Development in an attempt to correlate individuals and groups involved with the PGC's elk project and *types of stakeholders* identified in Burr's work. Finally, a minimal number of personal interviews with stakeholders were conducted in an attempt to verify the accuracy of the newspaper articles and editorials, as well as, the researchers' interpretations of these articles.

Findings

Over 200 documents and articles related to the PGC's Elk Trap and Transfer Project were reviewed, the vast majority of which were published between 1996 and 2000. The following individuals and groups were identified from these documents, and labeled as "stakeholders" in the PGC's Elk Trap and Transfer Project based on the fact that they either attended or sent representatives to meetings, contributed articles, and/or were invitees to specific events related to the project. These "stakeholders" have been classified into the following categories of stakeholders found in Burr's (1996) model for rural tourism planning.

HISTORICAL TIMELINE FOR THE PENNSYLVANIA GAME COMMISSION'S ELK TRAP & TRANSFER PROGRAM			
<i>Date</i>	<i>Source</i>	<i>Groups</i>	<i>Comments</i>
1976	Webpage	PGC Dept. of Environmental Resources' Bureau of Forestry (BOF)	Developed an elk policy directing the agency to improve elk range in Elk & Cameron Counties
1982	Webpage	PGC BOF Local farmers Sportsmen	Elk committee (sounding board – not a regulatory board)
1990	Webpage	Rocky Mountain Elk Foundation (RMEF) PGC	Donation of \$38,000 to purchase State Games Land 311 – 1,600 acres at Winslow Hill, Elk County for elk habitat
1996 Sept.	Newsbrief	PGC	Developed their Elk Management Plan – 90 elk over a three-year period to be trapped and transferred to Clinton County Elk Field Tour to Benezette
Oct. 3	PGC memo	PGC County Commissioners Legislators	
1997 Sept. 19	Express	Consolidated Natural Gas Corp (CNG)	Sponsored luncheon at Sportsman Restaurant, Renovo for stakeholders Public meeting announced for St. Marys, PA to discuss the Elk Management Plan and the feasibility of establishing an Elk Hunt. Also identified RMEF, Pennsylvania State University (PSU), Frostburg State University, and Purdue University as partners in the elk program.
Nov. 6	Express	PGC DCNR BOF	
1998 Oct. 10	Express	Residents – Kettle Creek Valley	Petition of 50 residents opposed to a second release of elk in their backyards. Sponsored meeting in Cross Fork (Chapman Township) of 50 residents' presentation of petition of 79 people in favor of Trap & Transfer Program.
Oct. 21	Express	Clinton County Economic Partnership	

Figure 2. Elk Trap & Transfer Project Timeline

The findings also indicated that at least 33 meetings/events were held related to the PGC's management of the elk herd, the majority of which focused specially on its Elk Trap and Transfer Project. While many of these meetings were organized to increase the public's awareness of the PGC's on-going efforts to manage the elk, sessions also involved an assortment of public and private forums intended to: promote events, share research findings, planning future initiatives, manage conflict, and to gather public input.

The content analysis revealed that there was a substantial amount of local dissonance evolving from the PGC's Elk Trap and Transfer Project. This dissonance stemmed from competing values, those supporting the PGC's expansion of the elk range into Clinton County and those local farmers and landowners opposed to such efforts. Those landowners arguing against the project viewed the PGC's efforts to be in competition with their individual property rights as landowners. The PGC, on the other hand, described its efforts as beneficial to the general public, local communities, and in the best interest of the elk herd.

Conclusions & Implications

The implementation of the PGC's Elk Trap and Transfer Project appears to have acted as a catalyst to the unveiling of conflicting values within some local communities in central Pennsylvania. A comparison of the findings of this investigation with both the process, and the stakeholder groups, within Burr's (1996) conceptual model for rural tourism development reveals genuine similarities. The most obvious difference is that while the PGC appears to have integrated the vast majority of Burr's stakeholders in the **implementation** of this project, it failed to include a significant group of local residents and citizens from the initial **planning** of the project. It is easily discernible from newspaper articles that this project has illuminated a local dissonance involving the PGC's elk trap and transfer project. Although some local dissonance is inherent to the development of rural tourism in an environment of disparate values, evidence in this case study suggests that the PGC developed and implemented an elk management strategy that incited a significant amount of public controversy, a consequence of the clashing of stakeholders' competing values.

Governmental Agencies & Groups

PA Game Commission (PGC)
PA Dept. of Forests & Water
Dept. of Env. Resources – Bureau of Forests (BOF)
Dept. of Conservation & Natural Resources (DCNR)
U.S. Forest Service
Cameron County Soil & Water Conservation District
Northcentral PA Reg. Planning & Development Comm.
PA Economic Development District
Clinton County Farm Bureau
PA Farm Bureau
PennDot

Universities

Pennsylvania State University
Frostburg State University
Purdue University
Indiana Univ. of Pennsylvania

Elected Officials

State Legislators
Clinton County Commissioners
Game & Fish Commission of the Pennsylvania House of Representatives
Pennsylvania General Assembly

Additional Individuals or Groups of Individuals

Property Owners
Residents
Farmers
Hunters

Special Interest Groups

PA Federation of Sportsmen's Clubs
PA Chap. of the Nat. Wild Turkey Fed. (NWTF)
Elk County Federation of Sportsmen Club
Western Clinton County Sportsmen's Association
Elk Hunt Advisory Committee
Rocky Mountain Elk Foundation (RMEF)
PA Wildlife Habitat Unlimited (PAWHU)
Lehigh Valley Chapter of the Safari Club International
Northcentral PA Conservancy

Citizen Groups

Benezette Homeowners Group
Citizens Against the Exploitation of Private Prop. Rights
Clinton County Elk Support Group
Sproul Forest Chapter of RMEF

Internal & External Planners and Developers

Northcentral PA Economic Development Corporation
Clinton County Economic Partnership
State Park Planners
Town and County Planners
Forest Planners
Tourism Industry Representatives

Corporations

P & N Coal Company
Consolidated Natural Gas Corporation (CNG)

The PGC appears to have been facing the conundrum of balancing the greater good and will of society with individuals' rights. An expanding elk herd would lead to elk hunts and increased elk viewing tourism, both of which seem to be in the general public's best interest. On the other hand, a larger herd needs more space, a space like that in northcentral Pennsylvania, one with few residents and farmers. The decision was made that the PGC develop and implement an elk trap and transfer project intended to expand the existing elk range and at the same time provided more tourism opportunities. A direct consequence of initiating this strategy was the generation of local dissonance between those supporting the elk project and those opposed to it. The most vocal detractors of the PGC, and most adamantly opposed to the elk relocation project were local landowners and farmers who contended that the PGC was impinging on their individual rights by transferring the elk near their properties. Some of these disenfranchised stakeholders also contended that they were being routinely excluded from access to the media, and constrained from publicly sharing their viewpoints. Finally, there is evidence that suggests that the PGC's implementation of this elk project may have negatively impacted its *position* in the public's mind.

While there may not have been a way to avoid this "public" conflict, its intensity and the negative publicity associated with it, may have been minimized had Seeking's (1980) warning that, "...all major policy proposals should be thoroughly ventilated in public [deliberately subjected to public scrutiny and debate] before becoming officially adopted as policy" (in Murphy, 1985, p. 173) been observed. This type of a proactive approach to tourism development affords stakeholders with divergent values constructive opportunities to explore differences in a collaborative process rather than simply fighting over differences in the media (Eyre & Jamal, 1998). Initial planning stages should have been designed to openly address the concerns of those who now see themselves as having been *marginalized* by the process. Although extremely difficult to quantify, it seems only logical that the PGC's position in some people's minds has worsened and that it may now need to allocate significant additional time and energy to *reposition* itself in the public arena as direct result of implementing its Elk Trap and Transfer Project the way it did.

References

- Bourke, L., & Luloff, A. E. (1996). Rural tourism development: Are communities in Southwest rural Pennsylvania ready to participate? In L. C. Harrison & W. Husbands (Eds.), Practicing responsible tourism: International case studies in tourism planning, policy, and development (pp. 277-295). Toronto, Canada: Wiley & Sons.
- Burr, S. W. (1996). A conceptual process for facilitating rural tourism development. In W. F. Kuentzel (Ed.), Proceedings of the 1996 Northeastern Recreation Research Symposium (Gen. Tech. Rep. NE-232, pp. 15-18). Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station.
- Crompton, J. L. (1999a). Financing and acquiring park and recreation resources. Champaign, IL: Human Kinetics.
- Crompton, J. (1999b). Measuring the economic impact of visitors to sports tournaments and special events. Ashburn, VA: Division of Professional Services, National Recreation and Park Association.
- Edgall, D. L. (1999). Tourism policy: The next millennium. Champaign, IL: Sagamore.
- Eyre, M. E., & Jamal, T. B. (1998). Addressing stakeholder conflicts. Parks & Recreation, 33(9), 86-94.
- Gartner, W. C. (1996). Tourism development: Principles, processes, and policies. New York: John Wiley & Sons.
- http://sites.state.pa.us/PA_Exec.PGC/elkhunt/02_hunt/eh20_01.htm, March 15, 2001, p.1
- Inskeep, E. (1991). Tourism planning: An integrated and sustainable development approach. New York: Van Nostrand Reinhold.
- Lord, B. E., Strauss, C. H., & Tzilkowski, W. M. (1999). Economic impact of elk viewing in rural Pennsylvania. In G. Kyle (Ed.), Proceedings of the 1999 Northeastern Recreation Research Symposium (Gen. Tech. Rep. NE-269, pp. 251-256). Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northeastern Research Station.
- Lord, B. E., Strauss, C. H., & Tzilkowski, W. M. (1998). Economic impact of elk viewing in rural Pennsylvania. Paper presented at 1998 National IMPLAN Conference, Washington, DC.
- Lewis, J. B. (1998). The development of rural tourism. Parks & Recreation, 33(9), 99-107.
- Middleton, V. T. C., & Hawkins, R. (1998). The marketing process for sustainable tourism at destinations. In Sustainable tourism: A marketing perspective (pp. 118-130). Boston: Butterworth-Heinemann.
- Murphy, P. E. (1985). Tourism: A community approach. London: Routledge.
- Rothman, H. (1998). Devil's bargains: Tourism the twentieth century American West. Lawrence, KS: University Press of Kansas.
- Sem, J., Clements, C. J., & Bloomquist, P. (1996). Tourism and recreation management: Strategies for public lands. Parks & Recreation, 31(9), 93-104.
- Walsh, J. A., Jamroz, U., & Burr, S. W. (in press). Sense of place as a component of sustainable tourism marketing. In S. F. McCool & R. N. Moisey (Eds.), Tourism, recreation and sustainability. CAB: Wallingford, UK.
- Weaver, G., & Wishard-Lambert, V. (1996). Community tourism development: An opportunity for park and recreation departments. Parks & Recreation, 31(9), 78-83.

IMPACTS OF WILDLIFE VIEWING AT DIXVILLE NOTCH WILDLIFE VIEWING AREA

Judith K. Silverberg, Ph.D.

New Hampshire Fish and Game Department, 2 Hazen Drive, Concord, NH 03301, (603) 271-3211, jsilverberg@wildlife.state.nh.us

Peter J. Pekins, Ph.D.

University of New Hampshire, Department of Wildlife Ecology, James Hall, Durham, NH 03824, (603) 862-1017

Robert A. Robertson, Ph.D.

University of New Hampshire, Department of Resources and Economics, James Hall, Durham, NH 03824, (603) 862-4789

Abstract: Dixville Notch Wildlife Viewing Area provided an opportunity to examine the motivations, knowledge level and attitudes of wildlife viewers as well as the response of wildlife to observation and other human caused stimuli at a designated wildlife viewing site. Using integrated social science and biological information allowed recommendations to be made for managing wildlife viewing sites where moose (*Alces alces*) were the focus.

Introduction

The purpose of this study was to use multiple disciplines to integrate sociological and biological data related to wildlife viewing, wildlife viewers, and viewed wildlife to determine impacts and develop management recommendations for wildlife viewing areas. The study specifically examined wildlife viewing impacts on moose, the motivation of wildlife viewers, their attitudes about forest and wildlife management practices, and their knowledge levels about related management activities. Stimuli-response interactions between human activity at a wildlife viewing site and moose behavior were also examined. Due to space limitations in the proceedings, this article focuses on an overview about the wildlife viewers and on the conclusions and recommendations for inclusion in a wildlife viewing management plan. Additional information is available from the author and will also appear in forthcoming publications.

Nonconsumptive recreational activities have grown in popularity relative to traditional wildlife and fish recreational pursuits over the past 35 years (More, 1979; Duffus & Deardon, 1990; Mangun et al., 1992; Flather & Cordell, 1995). Wildlife viewing activities grew steadily from the mid-1970s through the early-1990s, with an average annual rate of increase that exceeded all other wildlife-oriented recreation. In the early 1990s, a memorandum of agreement amongst state and federal agencies addressed the increased activity in wildlife-related

recreation with the development of wildlife viewing programs (Vickerman, 1991). A wildlife viewing program integrates education and wildlife viewing components (Duda & Young, 1994). Watchable wildlife programs are based on the assumption that if we fail to provide a sufficient amount of high quality habitat, our children and grandchildren will not have the current opportunities to enjoy wildlife (Hudson et al., 1992).

Historically, environmental impacts of nonconsumptive recreation were considered benign, however, the notion that such recreation has no environmental impact is no longer tenable (Flather & Cordell, 1995). Recreationists often degrade the land, water, and wildlife resources that support their activities by simplifying plant communities, increasing animal mortality, displacing and disturbing wildlife, and distributing refuse (Boyle & Samson, 1985).

Research in the area of human impacts on wildlife has been relatively sparse and fragmented (Larson, 1995). Wildlife viewers and photographers actively seek and approach wildlife, unlike other recreationists who mostly encounter wildlife accidentally. Thus, these activities are potentially more disturbing to wildlife as encounters are more frequent and of longer duration (Boyle & Samson, 1985). In order to minimize potential conflict between recreational use and wildlife management goals there is a need to: 1) understand the responses of wildlife to recreational activities, 2) understand the factors that influence the nature and magnitude of impacts, 3) improve research methods, and 4) develop and implement new management strategies (Cole and Knight 1990). An assessment of potential wildlife impacts should consider types of visitors to an area, their recreational activities, their interaction with wildlife and wildlife habitat, and the behavioral and physiological response of wildlife (Pomerantz et al., 1988).

To date, most studies that have used a human dimensions approach to examine human wildlife interactions have focused on recreational activities such as hunting and fishing. There are basic gaps in our knowledge about wildlife viewers and factors that influence people to participate in this activity. For example, what are people's motivations for taking wildlife viewing trips, what is the relationship between knowledge of wildlife and unintended impacts to wildlife, and to what extent do interactions with wildlife influence knowledge of wildlife (Vaske et al., 1995).

Not only has scant attention been paid as to why wildlife viewers choose such recreation, few have attempted to integrate findings across ecological and social science research (Kuss et al., 1990s; Decker et al., 1992). This lack of integration of the available empirical evidence has limited the application of research data to visitor impact management. Natural resource planners must contend with both ecological and social issues. At issue is how can wildlife viewers achieve maximum overall satisfaction and have minimal impact on the wildlife they are viewing. Research needs to be applied to both development of viewing programs and to mitigation strategies for recreational impacts (Larson, 1995).

In New Hampshire, the Fish and Game Department developed a concept proposal for a watchable wildlife program in 1991. The proposal outlined a statewide program that included a wildlife viewing guide, a variety of viewing sites with varied levels of facilities development, and public programs (Silverberg, 1992). Arguably, wildlife watching was extremely popular already and important by any measure. For example, moose (*Alces alces*) were a primary tourist attraction in the northern part of the state, as evidenced by entrepreneurial moose viewing tours and town promoted moose festivals.

Research Objectives

The overall objective of this study was to integrate sociological and biological data collected about wildlife viewing, wildlife viewers, and viewed wildlife to assess potential impacts and develop recommendations for management of wildlife viewing areas as part of a wildlife viewing management plan. Specific objectives were:

- 1) to compare whether moose changed their rate and time of visitation at the salt lick after construction of the wildlife viewing site,
- 2) to survey wildlife viewers to determine their demographics, knowledge level, motivation for wildlife viewing, and attitudes toward specific wildlife viewing management techniques,
- 3) to determine whether there was a predictable response by moose to viewing behavior and other human-caused stimuli,
- 4) to utilize information from this research to develop optimal management protocols for wildlife viewing sites.

Study Area

The New Hampshire Fish and Game Department, in partnership with the New Hampshire Scenic and Cultural Byway program, built a wildlife viewing area on Route 26 in Dixville Notch during the fall of 1996. A number of factors led to this choice as a wildlife viewing site, the primary being the presence of a salt lick caused by runoff of road salt that attracted numerous visible moose; moose exhibit natural craving toward sodium (Schwartz & Renecker, 1997). A second factor was the proximity of clear cuts with abundant forage (Peterson, 1955).

A six-car parking lot, trail, and viewing blind were built in December 1996. A trail approximately 125 m in length led to a viewing blind that held up to twenty people. The viewing blind had slits which faced the main lick and a moose trail that entered the lick from the east. A kiosk at the parking lot had information about wildlife viewing ethics, services in the area, and nearby designated viewing sites. Nine educational signs were located along the trail and covered topics about wildlife management, wildlife found in the area, suggestions for successful wildlife viewing, and viewing etiquette.

Biological Study to Determine Impacts of Wildlife Viewing on Moose Use of Roadside Licks

Two segments of this research focused on determining the biological impacts on moose using the roadside licks where wildlife viewing took place. The findings are summarized here. The first segment of the research focused on the rate, use, and time of use of the roadside salt lick. There were no significant changes in the diurnal or nocturnal patterns of moose encounters when comparing data from 1996 prior to construction of the viewing blind with data from 1997-1999. Encounters were most frequent at 2200-2400h and 0400-0600h. There was no annual difference in the time patterns of moose encounters in a 24-hour period at the viewing site versus the control site.

Observers recorded reactions of moose to stimuli associated with people visiting the viewing site during June and July 1997-1999. Typically, multiple moose behaviors and human stimuli were recorded during each observation period. Seven specific human stimuli were categorized: car passing, truck passing, car stopped, car stopped with human outside of vehicle, visitor walking to or from blind, visitor in the blind talking, visitor talking loudly or creating a disturbance.

Moose responses were defined as one of six behaviors: feeding, looking, alert, moving, fleeing, and grooming. A moose was considered feeding if it was actively feeding or licking mud. Looking was defined as when a moose appeared to stare at the stimulus. Alertness was defined as when a moose stopped its previous behavior, stared, and had its ears in a 45 degree position (deVos, 1958). A moose was regarded as moving if it took several steps and resumed its previous behavior. Fleeing meant a moose rapidly moved from the lick to perceived cover. Grooming was defined as licking or moving to repel insects.

All responses and stimuli were noted during each recorded minute. Because moose were not marked, and moose have affinity for specific salt licks, the same moose was probably observed on different days. Multiple observations occurred each observation period. These two facts meant that observations were not independent.

The standard visitor approached the blind quietly, did not talk while in the blind, and usually was in the blind before moose visited the lick. Presumably, moose rarely detected the presence of the standard visitor or, at the very least, showed no reaction to the standard visitor. Baseline moose behavior was recorded only when the standard visitor was present and there were no other human stimuli.

Analysis of single and multiple combinations (2-4) of human stimuli were necessary because multiple stimuli often occurred simultaneously (e.g., car stopped and truck passing). Moose response was quantified by totaling the number of observed responses and calculating the percentage of each response that was exhibited for individual and combinations of stimuli. A Chi-square test ($p \leq 0.05$) of independence (Zar, 1996) was used to

compare the distribution patterns of the various behavioral responses to different stimuli to the pattern of responses associated with the standard visitor.

A total of 48 observation periods occurred; 9 in 1997, 19 in 1998, and 20 in 1999. Observation periods ranged from 5 - 93 minutes; the average period lasted 22 minutes. During an observation period an average of 6.4 cars passed, 1.6 trucks passed, 3.2 cars stopped and 0.9 humans were out of their car. During the 342 minutes of observation when the standard visitor was present, moose spent 34% of time feeding, 20% of time looking, and approximately 25% of time alert. They moved within the lick almost 15% of the time. Little grooming behavior (<2%) was witnessed and moose fled without apparent reason <4% of the time).

Differences in behavioral response patterns when compared to the standard visitor response pattern were found when a truck passed ($X^2=26.5$, df 5, $p=0.000$) and a car stopped ($X^2=18.8$, df 5, $p=0.002$). The behavior that most dramatically changed with these stimuli was that the moose fled from the lick.

Wildlife Viewers Characteristics, Motivations and Attitudes

Survey data were collected in two phases. Initially, a five-minute site interview was conducted in the parking lot prior to a viewer visiting the educational signs and viewing platform. Subsequently, a survey was mailed to a subset of interviewees to further assess additional demographic information, knowledge level and attitudes, motivations for stopping, and satisfaction with the experience using the Dillman method (1978). Data were compiled and analyzed with SPSS. The level of significance for all tests was $p=0.05$. Each interviewee was assigned an identification number that was used to track their interview and survey results. Descriptive statistics were derived for each variable including frequency, %, mean, and median.

Demographics

A total of 431 interviews were conducted with 222 completed in 1997 and 209 in 1998. In 1997, 97% of the interviewees agreed to complete the mail survey, while in 1998 only 66% agreed. A total of 335 surveys were mailed, 202 in 1997 and 133 in 1998. Analysis was conducted on 209 completed surveys. It is acknowledged that the mail survey group was self-selected as they agreed to be surveyed after their site interview.

About half (55%) of the viewers surveyed were non-residents of New Hampshire, 42% lived in the nine other counties of New Hampshire with 5% from local Coos County, and 3% were visiting the United States. Almost half (48%) came to the site as couples, and a third (33%) were with families. A third of the viewers were on a day trip; the rest lodged somewhere in New Hampshire with 19% at the BALSAMS.

The interview sample was 57% female, while the mail survey was completed almost equally by males (48%) and females (52%). Viewers were overwhelmingly white (97%). Nearly half (49%) of the respondents were college graduates, 25% had attended some college, trade or business school, 23% graduated from high school, and 3% did not finish high school. The income level varied from 2% with an income of <\$10,000, to 11% with an income >\$100,000. A similar proportion fell into the \$20,000-39,000 (26%), and the \$40,000-\$59,999 range (27%). Viewers varied in age with 10% between 18-29, 16% were 30-39, 31% were 40-49, 26% were 50-59, 14% were 60-69, and 3% were > 70 years (Table 3). The average age was 44.6 years. The majority (57%) did not belong to any conservation organization; 23% held membership in one organization, 11% were members of two, and 9% belonged to three or more conservation organizations.

Two-thirds of the viewers did not see a moose that day; however, the majority (81%) saw birds and about half (51%) saw small mammals. They spent 0-≥21 days viewing wildlife in the past year. Viewers had visited different types of wildlife viewing areas including sites along roads (69%), remote sites (45%), sites with informational signs (29%), and developed sites with parking lots and trails (27%).

Knowledge

Eight knowledge-based questions were asked, including several questions worded similarly to those in the site interview. Answers to these questions were found in the educational signs located at the viewing site. Each wildlife viewer was assigned a percent correct for the pre- and post-tests. Chi square analysis was conducted to determine if there were differences in how the respondents scored on their pre- and post-tests. Analysis of variance was used to determine if there were differences in knowledge based upon age, income, and level of education. All statistical tests performed were at a significance level of $p=0.05$.

Less than 10% of the interviewees considered themselves knowledgeable about moose, with 28% believing they had limited knowledge. However nearly a quarter scored 100% on the pretest, over half scored ≥ 75%, and only 13% scored ≤ 50%. Neither education level ($F=1.115$, df 4, $p=0.330$) or income ($F=1.111$, df 6, $p=0.357$) was related to pre-test scores. The mean score of male (67.4 ± 1.9 (mean \pm std. dev.)) and female viewers (64.6 ± 1.6) was not different ($F=1.197$, df 1, $p=0.274$). On the mail survey all viewers answered at least one question correctly. Over 70% of viewers scored >75%; <5% scored <50%. Sixty-five percent of the viewers increased their score on the post-test, and 33% scored lower; post test scores were higher ($78.7\% \pm 1.1$) than pre-test scores ($66\% \pm 1.3$) ($X^2=124.88$, df=42, $p=0.000$). Scores also increased on the three questions that appeared on both the interview and the survey: why moose were attracted to muddy areas ($X^2=41.6$, df 1, $p=0.000$), what adult moose eat ($X^2=10.4$, df 1, $p=0.000$), and the best time to view wildlife

($X^2=137.5$, $df 1$, $p=0.000$). Scores on the post test were not influenced by level of education ($F=0.487$, $df 4$, $p=0.745$), age ($F=1.154$, $df 5$, $p=0.154$), or gender ($F=1.051$, $df 1$, $p=0.306$). Scores of those earning $> \$80,000$ were lower ($F=4.482$, $df 6$, $p=0.000$) than those of other income levels.

Attitudes Toward Wildlife Management Techniques

Specific attitudes toward wildlife management techniques at wildlife viewing areas were explored. A Likert five-point scale was used, with 1 as totally unacceptable and 5 as totally acceptable. Frequency distributions, mean, and median were derived for each technique. Responses of viewers to proposed wildlife management techniques are presented in Table 1.

Motivations of Dixville Notch Wildlife Viewers- Wildlife viewing is a leisure activity and as such viewers

were measured using a standard list of fourteen questions drawn from Driver's (1983) recreational experience preferences and adapted for wildlife viewing. A five-point Likert scale was used with 1 being not important and 5 being extremely important. The majority (76%) of viewers were actively looking for wildlife, and 84.5% of these were specifically looking for moose. An overwhelming majority (86%) had seen at least one moose in the wild, and 23% saw a moose previously that day. The primary reasons for stopping were because they saw the sign (27%), they were looking for moose (24%), they were curious (14%), they were told (8%), or they had combinations of other reasons (27%). The mail survey examined people's motivations for stopping (Table 2). Four groupings of motivations were identified by factor analysis using principal component analysis with varimax rotation and were labeled general, creative, experiential, and opportunist (Table 3).

Table 1. Response of Viewers at the Dixville Notch Wildlife Viewing Area to Proposed Management Activities, 1997-1998

	No. Of Viewers	Mean	Percent of Responses				
			Totally Unacceptable	Unacceptable	Neutral	Acceptable	Totally Acceptable
Educational information present	208	4.38	.5	1.9	13.5	26.9	57.2
Arrest people for harassing wildlife	209	4.38	6.7	4.3	3.8	13.9	71.3
No hunting zones	207	4.35	7.2	4.3	6.8	9.2	72.5
Some habitat off limits	208	4.31	5.3	2.3	9.1	14.4	66.3
Close sites if impacted	207	4.15	6.8	7.7	7.2	19.8	58.5
Distances people allowed should be controlled	209	4.03	5.3	7.2	13.9	25.8	47.8
Forest should be kept in this stage to ensure moose	207	3.74	7.7	9.7	23.2	18.8	40.6
Naturalist on site	208	3.35	7.2	8.7	41.8	26	16.3
All sites should be as developed as this one	206	3.25	10.7	13.6	37.4	16.5	21.8
No. of people should be limited	208	3.00	18.8	13.9	32.3	18.3	16.8
Salt should be placed in the lick	209	2.09	45.5	19.1	23.4	4.8	7.2
Wildlife that injures people should be killed	206	1.97	49	17.5	23.8	6.8	2.9
Allowed to get as close to moose as they want	209	1.44	73.2	16.7	5.7	1.4	2.9
Wildlife should be held captive	209	1.12	92.8	4.3	1.4	1.0	.5

Table 2. Rank Order, Mean Score of Motivations and Percent of Viewers Identifying a Motivation as Moderately or Strongly Important for Stopping at the Dixville Notch Wildlife Viewing Area 1997-1998

Motivations	Number of Respondents	Mean	% of Moderate to Strongly Important
To experience new and different things	207	4.02	73.4
To see what was there	209	3.99	68.4
To learn or study about nature	207	3.84	65.2
To do something with my family	203	3.59	51.9
To experience a quiet time in the north woods	208	3.45	47.7
To get away from the usual demands of home and office	205	3.37	54.7
To develop my wildlife viewing skills and abilities	204	3.17	43.3
To experience excitement	204	3.13	42.7
To get exercise	204	2.65	29.9
To be with my friends	195	2.49	27.7
To share my outdoor knowledge with others	197	2.27	20.8
To have a personal spiritual experience	198	2.27	21.2
To do something creative, such as sketch, paint or take photographs	198	2.18	9.3
Because someone told me it was a good place to stop	189	2.17	20.6

Table 3. Preferred Experiences Based on Factor Analysis Using Principal Component Analysis with Varimax Rotation of Motivations of Visitors to the Dixville Notch Wildlife Viewing Area 1997-1998

	Eigenvalue	% Var.	Factor 1	Factor 2	Factor 3	Factor 4
Motivation Factor 1-General	5.078	36.3				
Experience a quiet time			0.80632	0.14460	0.18473	-0.14099
Get away from the usual demands			0.79168	0.13129	0.03789	0.35180
Do something with family			0.72590	0.00809	0.03789	0.35180
To get exercise			0.59724	0.33054	0.20441	0.13231
To be with friends			0.55727	0.31701	-0.08522	0.37550
Motivation Factor 2-Creative	1.314	11.5				
To do something creative			0.06076	0.81847	0.09986	-0.02857
Share outdoor knowledge			0.15384	0.73543	-0.07727	0.31880
Personal spiritual experience			0.23258	0.64456	0.16356	0.21181
To develop wildlife viewing skills			0.26957	0.53343	0.49815	0.15407
Motivation Factor 3-Experiential	1.624	9.4				
To see what was there			-0.10422	-0.09537	0.77579	0.14535
To experience new and different things			0.28811	0.18381	0.73920	-0.07210
Learn about nature			0.4.568	0.02272	0.65978	0.02483
Motivation Factor 4-Opportunist	0.925	6.6				
Someone told me it was a good place to stop			0.02636	0.26516	0.02651	0.78785
To experience excitement			0.38906	0.09090	0.37506	0.55099

Satisfaction Levels of Dixville Notch Wildlife Viewers

The majority of viewers (74%) indicated that they thoroughly enjoyed their visit to Dixville Notch; 65% wanted to return, and 71% felt that travel was a worthwhile expense. Five questions, with a five point Likert scale from strongly disagree (1) to strongly agree (5), were used to examine the viewer's overall satisfaction with their wildlife viewing experience at Dixville Notch (Ditton et al., 1981). The five statements were scaled to form an overall satisfaction level of the viewers' experience at the Dixville Notch Wildlife Viewing Area. The majority (71%) were satisfied or highly satisfied with their experience,

22% were dissatisfied or highly dissatisfied, and 7% were neutral.

Daily temperature, cloud and blackfly conditions were recorded by the interviewers. Using simple linear regression, there was no relationship between satisfaction level and ambient temperature ($R^2= 0.000$, Beta 0.0829, Significance 0.2371), cloud condition ($R^2= 0.0090$, Beta-0.0949, Significance 0.2371), and blackfly condition ($R^2= 0.0023$ Beta 0.0476 Significance 0.4908). The majority (68%) felt that seeing a moose would be the highlight of their day, while 10 % felt that seeing either a moose, bear, or deer would be their highlight. In actuality only 33% of

the viewers saw ≥ 1 moose at the site. There was no relationship found between having a satisfactory experience and seeing a moose ($F=0.203$, $df 6$, $p=0.976$).

Twenty-six variables including motivation factors, age, income, education and recreational activities were used to build a stepwise regression model using backward then forward procedures to identify the variables which explain the most variation in satisfaction. The appropriate multiple regression model for the examined data includes three independent variables: Motivation Factor 1, Motivation Factor 3 and Motivation Factor 4. It was found that those viewers influenced by Motivation Factor 1 were more likely to be satisfied with the experience at Dixville Notch Wildlife Viewing Area, ($\beta=0.429$, significance =0.000) while viewers influenced by Motivation Factor 4 were also likely to be satisfied ($\beta=0.184$, significance =0.000). Those influenced by Motivation Factor 3 had a negative influence on satisfaction ($\beta = -0.195$, significance = 0.000). The R square indicates that about 26% of the variance is explained by the 3 predictor variables. Motivation Factor 1 had the most influence on satisfaction and explained the greatest variance (18.8%), while Motivation Factor 3 explained 3.7% of the variance and Motivation Factor 4 explained 3.4%.

Summary of Findings

1. The visitation rate of moose at the Dixville Notch salt lick did not change after the construction of the wildlife viewing area.
2. There was no significant change in the time of day moose visited the Dixville Notch salt lick after construction of the wildlife viewing area.
3. Moose predominantly used Dixville salt licks nocturnally with the highest diurnal visitation occurring at 0400-0800h.
4. Travel patterns immediately adjacent to the viewing blind changed after construction of the site.
5. Quiet viewers in the blind had minimal effect on moose behavior.
7. Moose were generally tolerant of human-caused stimuli exhibiting the greatest percentage of behavioral changes when cars stopped and trucks passed.
8. Wildlife viewers to Dixville Notch were predominately families and couples visiting northern New Hampshire.
9. The majority of Dixville Notch wildlife viewers did not belong to a conservation organization.
10. Viewers expected wildlife viewing sites to include educational opportunities.
10. Knowledge levels of viewers increased after their visit presumably because of educational signs.
11. Education and income level were not related to viewer knowledge of moose.
13. Viewers were amenable to regulations.
14. Viewers were less accepting of wildlife management techniques that created artificial situations.

15. There was a slight discrepancy between viewers' understanding of moose habitat requirements and acceptance of forestry management for habitat enhancement for moose.
16. Dixville Notch viewers were motivated by a variety of factors categorized as general, creative, experiential, and occasional.
17. Satisfaction regarding the viewing experience in Dixville Notch was not related to viewing moose but was related to the general, experiential, and occasional motivation factors.

Conclusion

The Dixville Notch Wildlife Viewing Area presented viewing opportunities for individuals, couples and families. Most of the viewers were visitors to the region and spent purposeful time looking for moose and other wildlife. Motivations of viewers fell into four groupings, general, experiential, creative and opportunist. Although the majority did not see moose at the site, most had a satisfactory experience.

Marketing Programs Based on Demographics

Viewers participated in a number of recreational activities that provided opportunities to view wildlife. Certainly, the impacts of moose viewing on tourism and business opportunities in the area needs further exploration. Marketing programs to attract wildlife viewers to the area should be based upon the area offering new and different experiences in a relaxed environment with opportunities to learn about nature. Programs should be designed to reach a middle-aged, family oriented, gender equal audience with higher than average income. Marketing efforts should be focused both in and out of state. Marketing efforts can also be based on the motivational preferences such as emphasizing wildlife viewing as a way to enjoy a quiet time, get away and do something with family and friends.

Education and Conservation

A desire to learn and study about nature was an important motivation dimension. Wildlife viewers expected interpretive information to be available and felt that education was completely acceptable as a management tool. This study indicated that knowledge can be increased while visiting a site through the presentation of information on signs. Since knowledge plays a role in influencing attitudes, it is essential to provide education at sites. For example, while wildlife managers often rely on habitat site enhancements, some wildlife viewers don't understand the reasons behind such activities. Educational materials should explain how and why site enhancement activities occur and what are the projected results. Interpretive techniques should be tailored for different types of sites and situations. Since wildlife conservation is a goal of viewing programs, it is worthwhile to explore how viewers not involved with conservation organizations could be involved in conservation activities at viewing sites.

Wildlife Viewing Management

In considering management of wildlife viewing sites in a region there is a need for a variety of sites as evident by a third of the viewers felt that not all sites should be as developed at Dixville. Based on the types of sites visited by viewers in other locations, the mix of sites should include roadside, remote sites, and those accessible by foot travel. Motivation preferences should also be taken into account when designing a site. The four experience preferences found in this study can serve as a framework for developing specific wildlife viewing opportunities. The experience based management approach can be useful in meeting the recreational aspects of wildlife viewing. However because the goals of viewing programs extends beyond just a recreation activity, it will be helpful to use the characteristics of the four motivation factors to design activities and sites. Through designing opportunities that fulfill the outcomes of these desires, wildlife viewers will generally have a satisfactory experience.

There are a number of wildlife and recreational management activities wildlife viewers readily accept and can be used at wildlife viewing sites including providing educational opportunities, rules and regulations to minimize impacts and site selected habitat enhancements. An important component in developing a wildlife viewing management program or site is understanding potential impacts on the species being viewed. Studies such as this one, provide a better understanding of impacts of viewers on a wildlife resource.

In summary, the primary reason that resource management agencies developed wildlife viewing programs was to promote wildlife conservation. One of the greatest benefits of developing wildlife viewing sites is that they provide a place to provide educational materials, demonstrate wildlife management techniques and ultimately help viewers develop a sense of stewardship toward wildlife and other natural resource. The biological studies and survey of wildlife viewers at Dixville Notch provides a list of elements important to wildlife viewers for inclusion into a wildlife viewing management plan.

References

- Boyle, S. A., & Samson, F. B. (1985). Effects of nonconsumptive recreation on wildlife: A review. Wildlife Society Bulletin, 13, 110-116.
- Decker, D. A., Brown, T. A., Connelly, N. A., Enck, J. W., Pomerantz, G. A., Purdy, K. G., & Siemer, W. F. (1992). Toward a comprehensive paradigm of wildlife management: Integrating the human and biological dimensions. In W. T. Mangun (Ed.), American fish and wildlife policy: The human dimension. Carbondale: Southern Illinois University.
- Dillman, D. A. (1978). Mail and telephone surveys: The total design method. Pullman: Washington State University.
- Duda, M. D., & Young, K. C. (1993). Wildlife viewing in Maryland: Participation, opinions and attitudes of adult Maryland residents toward a watchable wildlife program. Harrisburg, VA: Responsive Management.
- Duffus, D. A., & Dearden, P. (1990). Non-consumptive wildlife-oriented recreation: A conceptual framework. Biological Conservation, 53, 213-231.
- Flather, C. H., & Cordell, H. K. (1995). Outdoor recreation: Historical and anticipated trends. In R. L. Knight & K. J. Gutzwiller (Eds.), Wildlife and recreationists: Coexistence through management and research. Washington DC: Island Press.
- Kuss, F. R., Graefe, A. R., & Vaske, J. J. (1990). Visitor Impact Management: A review of the research (Vol. 1 & 2). Washington, DC: National Parks and Conservation Association.
- Larson, R. A. (1995). Balancing wildlife viewing with wildlife impacts: a case study. In R. L. Knight & K. J. Gutzwiller (Eds.), Wildlife and recreationists: Coexistence through management and research. Washington DC: Island Press.
- Mangun, J. C., O'Leary, J. T., & Mangun, W. R. (1992). Nonconsumptive recreation in the United States identity and dimension. In W. T. Mangun (Ed.), American fish and wildlife policy: The human dimension. Carbondale: Southern Illinois University.
- More, T. A. (1979). The demand for nonconsumptive wildlife uses: A review of the literature (Gen. Tech. Rep. NE-52). Broomall, PA: USDA, Forest Service.
- Peterson, G. L. (1974). Evaluating the quality of the wilderness environment: Congruence between perception and aspiration. Environment and Behavior, 6(2), 169-193.
- Pomerantz, G. A., Decker, D. J., Goff, G. R., & Purdy, K. G. (1988). Assessing impact of recreation on wildlife: A classification scheme. Wildlife Society Bulletin, 16, 58-62.
- Schwartz, C. C. & Renecker, L. A. (1997). Nutrition and energetics. In A. W. Franzmann & C. C. Schwartz (Eds.), Ecology and management of North American moose (p. 475). Washington DC: Smithsonian Institution Press.
- Silverberg, J. K. (1992). A New Hampshire watchable wildlife concept paper. Unpublished report prepared for NH Fish and Game Department. Concord, NH.
- Vaske, J. J., Decker, D. J., & Manfredi, M. J. (1995). Human dimensions of wildlife management: An integrated framework for coexistence. In R. L. Knight & K. J. Gutzwiller (Eds.), Wildlife and recreationists: Coexistence through management and research. Washington DC: Island Press.
- Vickerman, S. (1989). Watchable wildlife: A new initiative. Defenders of Wildlife.
- Zar, J. H. (1996). Biostatistical analysis. NJ: Prentice Hall.