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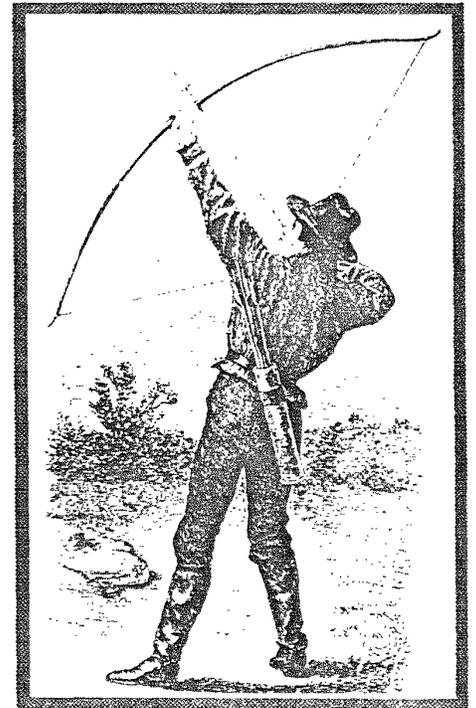
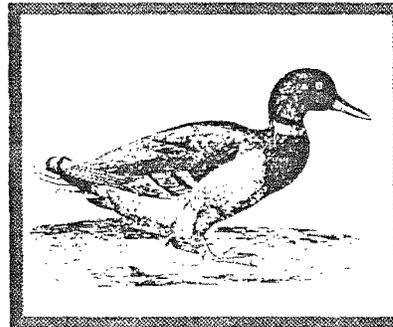
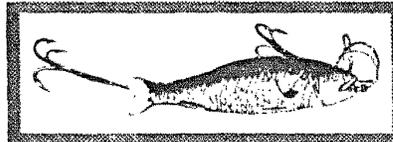
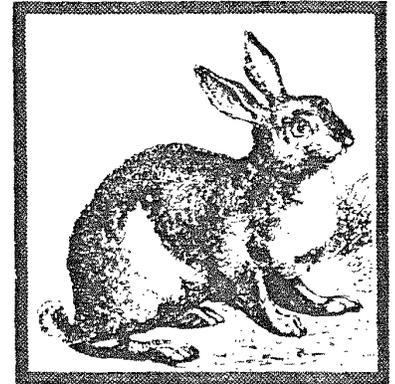
Northeastern Forest
Experiment Station

General Technical
Report NE-198



Proceedings of the 1994 Northeastern Recreation Research Symposium

April 10-12, 1994
Saratoga Springs, New York



NORTHEASTERN RECREATION RESEARCH MEETING POLICY STATEMENT

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



*Melding Research and
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PROCEEDINGS of the 1994 NORTHEASTERN RECREATION RESEARCH SYMPOSIUM

**April 10-12, 1994
State Parks Management and Research Institute
Saratoga Springs, New York**



Compiled and Edited by:

Gail A. Vander Stoep, Michigan State University

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NOTE: If you are interested in getting additional information about any of the papers that were presented but were not submitted for publication, please contact the authors directly. A list of those papers is included here to assist you in identifying authors.

POSTER SESSION

Fees, Expectations and Behavior in Developed Campgrounds. Tom More, USDA Forest Service.

Spatial Inquiry, Analysis and Display of Site-specific Perceived Impacts to the Recreational Boating Experiences: A Comparison of GIS Software Packages and Procedures. John Confer, Jr., Alan Graefe, Pennsylvania State University; John Titre, U.S. Army Corps of Engineers.

OUTDOOR RECREATION MANAGEMENT

Visitor Impact Monitoring: Evaluating the Effectiveness of Management Actions. Jeff Marion, Virginia Tech, National Biological Survey.

Undergraduate Tourism Education in New Hampshire and Hungary: A Comparative Study of the Curriculum Development Process. Margit Mundruczo, Robert Robertson, University of New Hampshire.

The Gericke Farm Project. John Wood, Clay Pit Ponds State Park Preserve.

INTERPRETATION, EDUCATION AND OUTREACH

Evaluating the Effectiveness of Alternative Media Messages. James Petruzzi, Cinnamon Baldwin Foster, Jerry Vaske, Maureen Donnelly, Colorado State University.

Public Outreach" Implications for Natural resource Recreation Management. William DeINegro, David Loomis, University of Massachusetts.

DEMOGRAPHICS

Demographics and Angler Diversity: Cohort-specific Analysis of Massachusetts Anglers. Al Ortiz, David Loomis, University of Massachusetts.

RECENT CHANGES IN FEDERAL AGENCY RECREATION RESEARCH AND TRAINING PROGRAMS

Recreation, Social Science and Human Dimensions--Fitting Together. Alan Watson, USDA Forest Service, Aldo Leopold Institute.

Future of Social Science in NPS and NBS. James Carroll, National Biological Survey, Washington, D.C.

OUTDOOR RECREATION: SATISFACTION AND CONFLICTS

The Hidden Public: Subculture Differences in Attitudes and Satisfaction. Rodney Zwick, Lyndon State College; David Tucker, Northeast Kingdom Community Action; Susan Bulmer, Vermont Department of Forests, Parks and Recreation.

ENVIRONMENTAL PERCEPTIONS AND ETHICS

State Park Stewardship Survey--1993 State of the Parks Report. Allison McLean, Wilbur LaPage, New Hampshire Division of Parks and Recreation; Rob Robertson, University of New Hampshire.

PLANNING AND G.I.S.

Boating Opportunities: A Geographical Analysis of Travel Patterns and Motivations. John Confer, Jr., Alan Graefe, Pennsylvania State University; John Titre, U.S. Army Corps of Engineers, WES.

The Moosalamoo Partnership: Using GIS and CPS for Composite Trail Maps. David Capen, Daniel Coker, University of Vermont; Mary-Jeanne Packer, Green Mountain National Forest.

MEASURING AND IMPROVING CUSTOMER

SATISFACTION WITH GOVERNMENT

SERVICES

Glen D. Alexander

Chief, Ohio Department of Natural Resources, Division of Parks and Recreation, 1952 Belcher Dr. C-3 Columbus, OH 43224

Two years ago, Ohio State Parks developed a methodology of measuring customer satisfaction to gauge the effectiveness of our customer service. What follows is a discussion of our installation of systems to measure and improve customer satisfaction, the interpretation of the data, and the positive results we have enjoyed.

Measuring Customer Satisfaction

We elected to develop our own customer satisfaction survey form (see Figure 1 on following pages) to enable our customers to respond to us about how they enjoyed their visit to one of our Ohio State Parks. This form is pre-franked and is mailed directly to our Columbus headquarters. It contains both structured and unstructured response sections. The survey is run for the five summer months of May, June, July, August, and September when 80% of the visitation to Ohio State Parks occurs. Since it takes at least two employees to operate and imposes a strain on many other managers it is not cost effective to operate during the seven off season months.

In Columbus the structured response section is entered into our computer data base and means and standard deviations are calculated from this base for the Ohio State Park system as a whole and for each of the 72 individual parks.

We are most interested in the responses to the question: "How would you rate your visit to this park overall?". A five point scale is used for responses to all structured questions with excellent = 5 and unacceptable = 1. The customer returns are tabulated by park and means are calculated to 3 decimal places. The comparison in how these means fare from month to month is tracked by park and for the Ohio State park system as a whole. We have found a very high correlation with what is going on in a park and the trend of this mean. When it goes down we can usually identify the reasons why; and likewise when it goes up. Certainly small spot random variations do occur, however they easily are weeded out by trend line analysis. (The table of means calculated for 1992 and 1993 is attached in Table 1; see following pages.)

The balance of the structured portion of the questionnaire is used to spot problem areas in particular service categories and to make rough comparisons of service categories between parks.

The unstructured response areas of the questionnaire provide the park staff with ideas, examples, and data on how they improve customer satisfaction by resolving problems, instituting innovations, and capitalizing on particularly customer pleasing situations. In the unstructured portions of the customer survey forms we find many of our best ideas and innovations. We do read these in Columbus and do an anecdotal analysis of these returns over the winter period.

To provide a statistical validation of our in-house analysis of the customer survey returns, we have engaged The Ohio State University Polymetrics Laboratory to run a random telephone survey concurrently in the same time period each year that we are operating our own survey. They use exactly the same questionnaire form and gather some additional information as well. The results of the OSU surveys, randomly conducted with

rigorously sound statistically protocols, have provided means that are not statistically different from our own means. The OSU means have an error factor of $\pm 4.4\%$ for the 305 valid response sample they use. We feel quite confident that our "N's" which equal 9,800 returns in 1992 and 20,200 returns in 1993, are sufficiently high enough to give us statistically valid data as corroborated by the OSU surveys. (A comparison of OSU means and our own means is shown in Table 2.) Ohio State Parks experience 65,000,000 visitors annually who picked up about 600,000 surveys in 1993. The 20,200 received in Columbus represents a return of 3.5%, which is excellent by industry standards.

Improving Customer Satisfaction

We have established Total Quality Management (TQM) feedback loops with the employee teams in each of our parks as one of our methods of continuously making improvements in customer satisfaction. Copies of the surveys are returned to each park each week. The entire park staff sits down as a team and reviews the results of the surveys and especially the non-structured comments. Our central office also returns the means calculated for each park on a monthly basis with comparisons with the previous year, some indication of how the division is doing as a whole, and trends in how other parks are doing.

Each park staff team has been empowered to unilaterally make whatever changes are appropriate to improve customer satisfaction. The Ohio State Park system has 72 parks and some of those are large enough to have separate employee team meetings along functional lines. Golf course employees for example tend to meet by themselves and work on improving golf course customer satisfaction. With many, many teams operating, the results drive customer satisfaction far better than any possible effort from some central administration. Literally hundreds of changes in the way we do business are implemented each visitor season by the employees themselves.

Ideas implemented by these park teams have ranged from changing the hours of checking in and out of campsites and cabins to the acceptance of credit cards in the state system for the first time, and providing multiple picnic tables for groups staying together in cabins or campsites. We are overhauling the entire check-in procedure for cabins and campgrounds and eliminating all but one simple universal form statewide at employees' suggestion. This will speed up check-in time and greatly simplify check-in procedures which pleases our customers. One park built a small, inexpensive fish cleaning station. Another rehabilitated a shower building into a model of what a modern shower house should be like. Yet another changed its entire cleaning schedule to meet customer preferences.

Most importantly is the feedback received on cleanliness of facilities. This is the most commented upon service and the one we have been able to influence most significantly as a direct result of this feedback. The 1993 OSU survey found a statistically significant increase in customers' favorable perception of cleanliness in Ohio State Parks versus 1992's users. The OSU survey also indicated that a significant increase in favorable response to our campground employees was seen as well. Expansion of pet camping to all parks in the system, the systematic improvement of food service at restaurants, camper store services of firewood, ice, and other products, and greatly increased naturalist programs are additional examples of how this feedback is driving increased customer satisfaction in Ohio State Parks today.

Many parks post the customer survey results and significant returns on bulletin boards. The Chief of Parks writes a personal letter to any employee who gets a personal mention on the forms coming back in. We provide annual awards for the parks whose means achieve 4.500 or better. In 1992 ten parks made that rating. In 1993 seventeen parks made that rating. The plaque presented at the annual managers conference is large enough for the names of all the employees in that park to be engraved as recognition of the idea that customer satisfaction is a team effort that all employees

must participate in to be successful. The employees like the system, like the feedback which is over 80% positive, and like the freedom to make changes they see fit.

Positive Results We Have Enjoyed

Since its inception the customer survey means for the Ohio State Park system as a whole have increased each and every month over the previous month's means for ten straight months (5-month summer seasons each in 1992 and 1993). A graphic display of those means is shown in Figure 2. Whether one agrees with the "elegance" of our statistical approach or not, the indisputable fact remains that each month we have impressed more of our customers favorably, and fewer customers unfavorably, than the previous month. The actual numerical counts of complaints are down and the numerical counts of compliments are up.

Favorable mention of this program and focus upon pleasing our customers has begun to appear in the press. Legislators are also becoming aware of the "new look" in parks and are responding favorably to more satisfied constituents.

Our employees are responding favorably to this program in a variety of ways. As mentioned above they particularly like the positive feedback dimension from the people they serve. It simply means more to employees to receive feedback from their customers as opposed to their boss. They also like the recognition they receive in the form of letters, plaques, and peer awards. Our employees have adopted a "go out of your way to please our customers" attitude as a major positive result. This new attitude in our employees is gaining favorable comment from many quarters as the "new look" in Ohio State Parks.

Certainly not the least benefit from our increased customer satisfaction has come at the polls in November, 1993 in the form of a \$200.0 million referendum passed to rebuild Ohio Parks infrastructure. Ohio State Parks was fortunate enough to be the point agency in the Ohio Parks and Natural Resources Fund bond issue authorization. This bond issue authorization had to pass the Ohio General Assembly by a 60% margin as a referendum and then be successful at the polls with all voters. The goal of this referendum is to rehabilitate, renovate, and modernize existing facilities in Ohio State Parks and other natural resource areas in Ohio. It included a dimension of matching grants for local park systems.

In our efforts to pass this referendum with state legislators first, and then in a grass roots effort with our park users and neighbors, we constantly came across the feedback that the parks had seen many changes for the better in customer service. People seemed to be responsive to our customer satisfaction emphasis and felt that if the referendum passed, its funds would likely be put to good use to take care of our customers. The referendum passed by a 61% to 39% margin which reflected in part the growing support for serving our customers right in Ohio's state parks.

As chief of the Ohio Department of Natural Resources, Division of Parks and Recreation, I strive to provide the best possible experience for all park visitors. Your comments can help me make our parks a better place for you to visit. Please take just a few minutes to fill out applicable sections of this evaluation form and drop it in the mail to me.

How would you rate your visit to this park overall? Excellent Good Average Poor Unacceptable

Specifically, how would you rate the following ...

	Excellent	Good	Average	Poor	Unacceptable	
General Park						
Appearance	<input type="checkbox"/>	Comments: _____ _____ _____				
Cleanliness	<input type="checkbox"/>					
Convenience	<input type="checkbox"/>					
Employee Helpfulness	<input type="checkbox"/>					
Facilities Condition	<input type="checkbox"/>					
Your Experience	<input type="checkbox"/>					
Services You Received	<input type="checkbox"/>	_____				
Campground						
Cleanliness	<input type="checkbox"/>	Comments: _____ _____ _____				
Appearance	<input type="checkbox"/>					
Employee Helpfulness	<input type="checkbox"/>					
Facilities Condition	<input type="checkbox"/>					
Cabin						
Cleanliness	<input type="checkbox"/>	Comments: _____ _____ _____				
Comfort	<input type="checkbox"/>					
Facilities Condition	<input type="checkbox"/>					
Lodge						
Activities	<input type="checkbox"/>	Comments: _____ _____ _____				
Facilities Condition	<input type="checkbox"/>					
Cleanliness	<input type="checkbox"/>					
Employee Helpfulness	<input type="checkbox"/>					
Picnic Areas						
Cleanliness	<input type="checkbox"/>	Comments: _____ _____				
Facilities Condition	<input type="checkbox"/>					
Food Service						
Quality	<input type="checkbox"/>	Comments: _____ _____				
Service	<input type="checkbox"/>					
Beach						
Employee Helpfulness	<input type="checkbox"/>	Comments: _____ _____ _____				
Cleanliness	<input type="checkbox"/>					
Facilities Condition	<input type="checkbox"/>					
Marina						
Cleanliness	<input type="checkbox"/>	Comments: _____ _____ _____				
Facilities Condition	<input type="checkbox"/>					
Employee Helpfulness	<input type="checkbox"/>					
Golf Course						
Course Condition	<input type="checkbox"/>	Comments: _____ _____ _____				
Employee Helpfulness	<input type="checkbox"/>					
Cleanliness	<input type="checkbox"/>					
Pro Shop Services	<input type="checkbox"/>					

Name _____
 Address _____
 City _____ State _____ Zip _____
 Date of Visit _____ Park Visited _____

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Figure 1. Customer satisfaction survey for Ohio State Parks.

Table 1. Summary of results of Ohio State Parks customer satisfaction survey for all parks.

**OHIO DIVISION OF PARKS AND RECREATION
Customer Satisfaction Survey
SUMMARY OF ALL PARKS**

As of 10/29/93

	1993	1992	% CHG
Total Surveys Returned:	20,213	9,832	105.6%

	AVERAGE RATING		PERCENT
	1993	1992	CHANGE
OVERALL Average:	4.358	4.283	1.8%
GENERAL PARK Average:	4.321	4.268	1.2%
Appearance:	4.471	4.445	0.6%
Cleanliness:	4.319	4.303	0.4%
Convenience:	4.237	4.229	0.2%
Employees:	4.473	4.412	1.4%
Facilities:	4.030	3.996	0.9%
Experience:	4.323	4.290	0.8%
Services Received:	4.370	4.301	1.6%
CAMPGROUND Average:	4.318	4.244	1.7%
Cleanliness:	4.385	4.336	1.1%
Appearance:	4.419	4.367	1.2%
Employees:	4.465	4.400	1.5%
Facilities:	4.017	3.905	2.9%
CABIN Average:	4.140	4.093	1.1%
Cleanliness:	4.214	4.195	0.5%
Comfort:	4.066	4.099	-0.8%
Facilities:	4.062	3.999	1.6%
LODGE Average:	4.222	4.238	-0.4%
Activities:	4.187	4.145	1.0%
Facilities:	4.225	4.262	-0.9%
Cleanliness:	4.246	4.271	-0.6%
Employees:	4.286	4.316	-0.7%
FOOD Average:	3.941	3.800	3.7%
Quality:	3.906	3.768	3.7%
Service:	3.986	3.842	3.7%
PICNIC Average:	4.277	4.240	0.9%
Cleanliness:	4.384	4.354	0.7%
Facilities:	4.157	4.129	0.7%
TRAIL Average:	4.295	4.360	-1.5%
Cleanliness:	4.346	4.467	-2.7%
Condition:	4.245	4.267	-0.5%
BEACH Average:	3.950	3.941	0.2%
Employees:	4.164	4.158	0.1%
Cleanliness:	3.938	3.944	-0.2%
Facilities:	3.850	3.861	-0.3%
MARINA Average:	4.162	4.101	1.5%
Cleanliness:	4.210	4.141	1.7%
Facilities:	4.063	4.000	1.6%
Employees:	4.255	4.252	0.1%
GOLF COURSE Average:	4.413	4.324	2.1%
Condition:	4.420	4.220	4.7%
Employees:	4.411	4.366	1.0%
Cleanliness:	4.510	4.473	0.8%
ProShop:	4.315	4.295	0.5%

Table 2. Comparison of Write Right™ and Ohio State Customer Satisfaction Surveys summarizing results for all state parks.

OHIO DIVISION OF PARKS AND RECREATION
 Comparison of "Write Right" and Ohio State Customer Satisfaction Surveys
 Summary for All Parks
 1993

Total Valid Responses:
 "WRITE RIGHT..." 20,213
 OHIO STATE 305

	Average		% DIFF	Number of Responses									
				5 Excel		4 Good		3 Avg		2 Poor		1 Unacc	
	W/R*	OSU		W/R*	OSU	W/R*	OSU	W/R*	OSU	W/R*	OSU	W/R*	OSU
Overall Percent Distribution				49.7%	38.9%	39.8%	52.2%	8.0%	8.3%	1.6%	0.7%	0.9%	0.0%
OVERALL Average	4.358	4.292	1.5%	10,044	117	8,043	157	1,616	25	327	2	179	0
GENERAL PARK Average	4.321	4.174	3.5%										
Appearance	4.471	4.262	4.9%	10,372	112	6,940	159	1,114	27	173	3	43	0
Cleanliness	4.319	4.176	3.4%	8,799	105	7,004	153	1,853	35	395	7	119	1
Employees	4.473	4.239	5.5%	10,440	79	5,062	118	1,316	16	246	4	159	1
Facilities	4.030	4.017	0.3%	6,246	71	7,245	170	2,760	41	928	11	368	1
Services Received	4.370	4.195	4.2%	8,258	75	5,971	140	1,416	25	222	0	155	1
CAMPGROUND Average	4.318	4.270	1.1%										
Cleanliness	4.385	4.323	1.4%	5,991	39	4,318	49	904	8	201	0	86	0
Appearance	4.419	4.320	2.3%	5,946	39	4,262	50	780	8	153	0	55	0
Employees	4.465	4.299	3.9%	6,331	35	3,225	46	747	4	164	1	113	1
Facilities	4.017	4.138	-2.9%	3,890	22	4,381	64	1,551	7	642	1	290	0
CABIN Average	4.140	4.420	-6.3%										
Cleanliness	4.214	4.520	-6.8%	903	15	713	8	233	2	76	0	33	0
Facilities	4.062	4.320	-6.0%	683	10	781	13	302	2	90	0	28	0
LODGE Average	4.222	4.201	0.5%										
Activities	4.187	4.075	2.7%	710	16	707	26	215	10	62	1	17	0
Facilities	4.225	4.169	1.3%	922	22	772	33	222	9	80	1	28	0
Cleanliness	4.246	4.246	-0.0%	987	24	753	34	210	6	92	1	28	0
Employees	4.286	4.295	-0.2%	1,043	23	673	35	196	2	71	0	42	1
FOOD Average	3.939	3.870	1.8%										
Quality	3.904	3.793	2.9%	1,167	20	1,403	58	781	25	217	6	102	2
Service	3.983	3.946	0.9%	1,293	23	1,311	68	642	15	199	4	104	2
PICNIC Average	4.277	4.158	2.9%										
Cleanliness	4.384	4.210	4.1%	5,861	66	4,415	124	947	18	174	2	55	0
Facilities	4.157	4.106	1.2%	4,334	49	4,223	132	1,320	25	414	1	180	0
TRAIL Average	4.292	4.291	0.0%										
Cleanliness	4.343	4.374	-0.7%	3,667	68	2,851	88	672	7	165	0	42	0
Condition	4.243	4.207	0.8%	2,979	51	2,934	98	789	13	188	2	44	0
BEACH Average	3.950	3.710	6.5%										
Employees	4.164	3.789	9.9%	2,882	20	2,818	59	966	28	225	5	106	2
Cleanliness	3.938	3.707	6.2%	2,787	24	3,257	81	1,386	36	582	14	249	2
Facilities	3.850	3.654	5.4%	2,315	18	2,963	84	1,551	38	582	14	250	2
MARINA Average	4.159	4.079	2.0%										
Cleanliness	4.208	4.014	4.8%	1,916	11	1,938	51	560	4	101	3	67	0
Facilities	4.060	4.090	-0.7%	1,609	15	1,814	44	619	7	209	1	103	0
Employees	4.255	4.151	2.5%	1,903	14	1,478	34	478	4	89	1	74	0
GOLF COURSE Average	4.413	3.740	18.0%										
Condition	4.420	4.158	6.3%	810	5	689	12	64	2	23	0	10	0
Employees	4.411	4.053	8.8%	820	3	596	14	106	2	18	0	13	0
Cleanliness	4.510	4.368	3.2%	910	8	553	10	80	1	10	0	5	0
ProShop	4.315	2.125	103.1%	684	0	638	1	148	2	13	11	13	2

OHIO STATE PARKS OVERALL PARK RATING

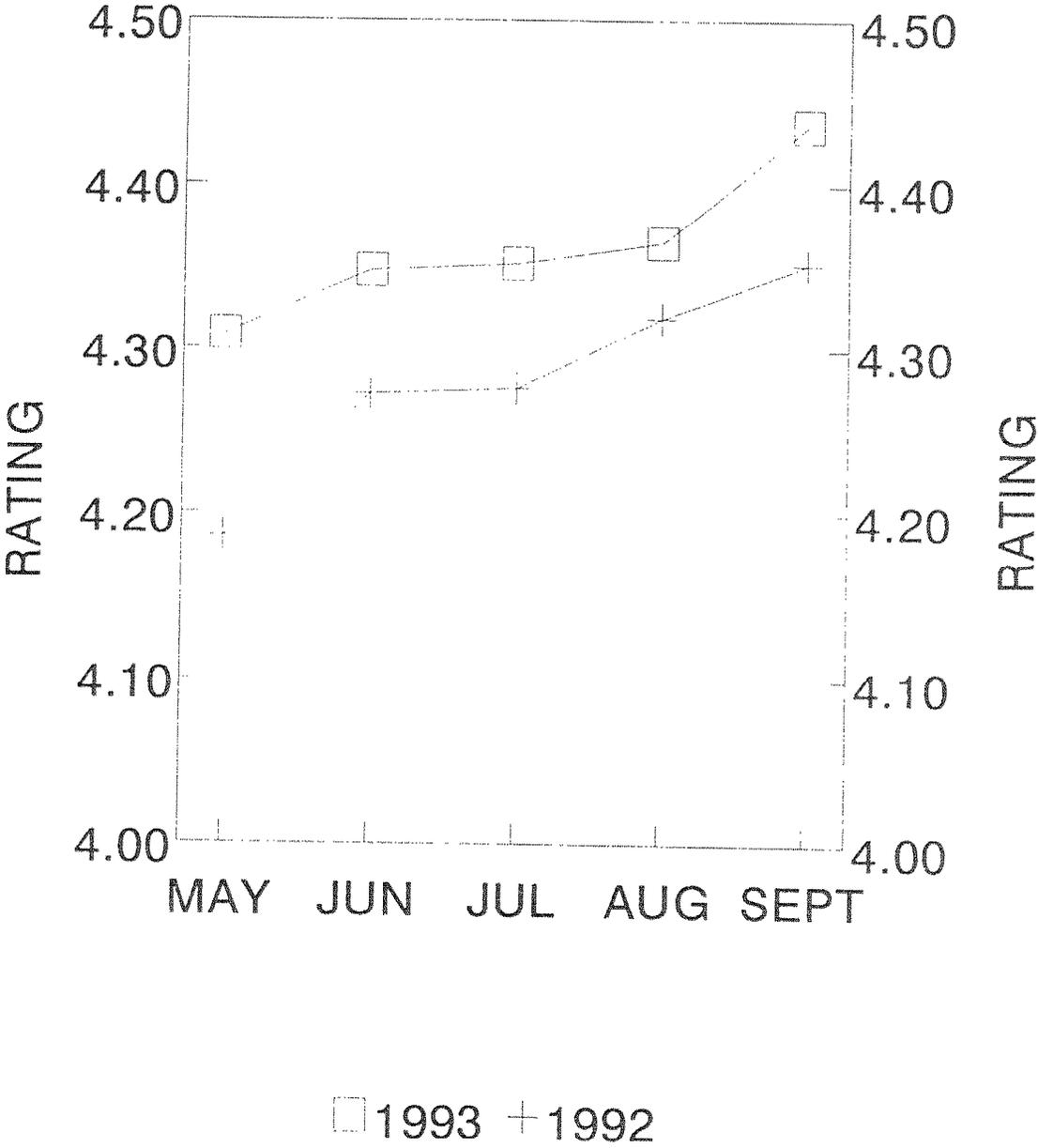


Figure 2. Graphic display of overall park rating for Ohio State Parks for 1992 and 1993.

THE RESOURCE AND THE STORYLINE:

AN INTERPRETIVE BALANCING ACT*

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The long era of "protection of natural resources through acquisition" is gradually drawing to a close. The budget-busting era of "protection through management" is forcing us to look for new funding mechanisms. But the idea of facilitating protection through enlightened self-interest is ripe for growth. Resource interpreters can provide the link with visitors and other constituents to influence "resource protective" behavior and develop a land ethic.

Trails without signs! Parks with unexplained origins! A battle field without battle plans or casualty lists! A poet's home without poetry! Whose failures are these? The most beautiful theater in the world doesn't merit more than one visit if it has no stage program. In fact, that theater would never be built without the guidance of producers, directors, set designers, lighting specialists, and dozens of other "interpreters". But, when was the last time you were asked to participate in the development and design of a park, trail, beach, wildlife refuge or historic area? Have you ever suggested that the park's "storyline" might be enhanced by park design; or that park interpretation might be compromised by the wrong design? Or does your role begin later on? Are you an "extra" on the set?

True public appreciation of our outdoors, and historic sites comes only from an exposure to both the physical resource and information about that resource - - either one by itself won't work. Historically, parks professionals have viewed their job as primarily that of providing opportunities to use resources. The knowledge about those resources, and how to use them, was considered to be the responsibility of each visitor. Some visitors would do their "homework"; most would not. In that situation, appreciation develops minimally, if at all. And, in the absence of appreciation, resource decline is inevitable.

A little reflection (or library research) will quickly reveal America's public parkland's history as having been cyclical: long periods of extensive budgetary neglect, interspersed with brief periods of high profile reinvestment and public atonement! Overuse and misuse was invariably blamed on an inadequate supply of public lands! And, the prescribed remedy is equally predictable: buy more land! Perhaps we should have been making America more like a park instead of accentuating the differences between ownership? You do find yourself wondering how things might be different today if our past national focus had been on building public appreciation for ALL lands, not just acquiring those deemed worthy of "protection." Expanding the public lands empire doesn't insure public land appreciation - it may even have the opposite effect. Achieving a balance between resources and their interpretation requires a conscious elevation of goals from protection to appreciation. In past years, whenever budget reductions were mandated in parks, we cut interpretation - - sometimes completely out of the system (like a cancer?!). Given a legacy of balance, cutting interpretation would have been as unthinkable as selling off the public lands to balance the budget!

I'd like to share with you two basic truths and a challenge. The truths are: 1) every parcel of public land has a story to tell - why else would it be public land? and 2) only rarely is that story being told - although it's probably the land's best possible protection. The challenge obviously is to reverse this situation - make

interpretation the rule, not the exception! Accepting the challenge will not be easy. It requires that you become activists and come out of your comfortable niche as scholars and get on the firing line. Stop accepting the role of an "extra" and become a "star"! You should seek to make interpretation the fundamental reason for your agency's existence. You must insist that the term "protection" include appreciation as its goal. Demand the opportunity to review all development plans for their interpretive sensitivity. Become involved in promotional efforts to insure their relevance. Assume leadership in training so that every employee has an interpretive role, including the law enforcement group. In short, seize the moment, stage a silent coup! I've just described for you, the most valued people in my organization - those who care.

I am convinced that this is your moment in conservation history. The long era of "protection through acquisition" is gradually drawing to a close. The budget-busting era of "protection through management" is forcing us to look for new funding mechanisms (which still may not be adequate). But the idea of protection through enlightened self-interest is just waiting for you to nurture it into the most successful strategy for conservation that America has ever known. And it all begins by building appreciation and pride! I hope you will accept the challenge. I doubt that you have a choice!

Frankly, I don't know anyone better qualified than our interpretive specialists to set the agenda for our public lands. You best represent the Marshalls, Muirs, Tildens, Sloanes, Adam's, Porters, Leopolds, Carsons, Muries, and those hundreds of writers and artists who have tried to tell us that the land is more than just resources. It is a whole collection of states of mind: adventure, opportunity, freedom, pride, and wonder. We sometimes forget that those national symbols which we cherish so much, here become the real thing! In Freeman Tilden's special way of looking at things: "It is the duty of the interpreter to jog our memories". At the very top of your daily agenda I hope you will try to jog the memories of administrators, planners, and budgeters. Remind them also that every "park" is a demonstration area - for good or for worse. A parks' existence demonstrates that someone once cared. Its' condition demonstrates that someone still does - - or does not! Its' development demonstrates our sensitivity, our awareness, and our credibility as environmental educators and resource stewards. In short, every park is a "classroom." How proud are you of the lessons being taught?

* Adapted from a keynote address at the National Association for Interpretation, Region I Workshop, Pinkham Notch, N.H., March 30, 1992.

CURRENT TRENDS AND ISSUES:

PENNSYLVANIA STATE PARKS

Roger Fickes

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Background - Pennsylvania State Parks

114 state parks
275,000+ acres
19 pools
71 beaches (18 at Presque Isle alone)
40+ sewer systems
1400 pit latrines
14 water systems
588 full time employees
1200+ wage employees during the summer
\$40 million - Operating Budget
\$55 million - Total Budget

Issues

Two major issues (among others) face the Pennsylvania Bureau of State Parks at this time:

1. Aging infrastructure
2. Aging staff

Infrastructure

\$150-200 million backlog of roads, sanitary, and water systems, building renovation, and other infrastructure needs. In 1993 a bond issue was passed which would dedicate \$17 million to state parks for infrastructure renovations.

Also, beginning in 1995, 15% per year of the realty transfer tax will be dedicated to the Bureau of State Parks for infrastructure repair, which amounts to approximately \$8 million a year. Over time this "Keystone Recreation and Conservation Fund" will provide the needed revenues to bring the Pennsylvania State Park facilities up to standard.

Aging Staff

The average experience of the Bureau of State Park staff is 20 years. They have continually been asked to do more with less.

Most staff have seen every motivational technique known to man which makes it very difficult to ask them to do more for less.

Many changes in personnel over the past year causing ripple effect throughout the entire staffing structure. Many managers see recent promotional opportunities as their last opportunity before retirement. Obviously only one person can be selected to fill any given position leaving many with 20 years of experience behind.

As a side note, when I came to the organization nearly two years ago there was only one female manager in the system. Now there are five female managers, all promoted from within the system (none recruited from outside). In Pennsylvania, there are many females in the educational system, i.e. colleges and universities. However, very few, if any, apply for positions in state government (e.g., Bureau of State Parks). I do not know why!

Trends

Customer service is extremely important to the delivery of recreation in Pennsylvania. However, we are increasing our emphasis on resource stewardship. This resource stewardship emphasis is an outgrowth of strategic planning that was completed in 1991 (State Parks 2000). To place more emphasis on resource stewardship, we have developed and implemented a natural areas program and a classification system of parks.

- Multiple-use overnight parks
- Multiple-use day-use parks
- Limited overnight parks
- Limited day-use parks
- Environmental Education centers
- Specialized-use parks

The second trend that has grown from State Parks 2000 strategic plan is environmental education (teaching stewardship).

We expect to broaden the scope of our environmental education efforts (act locally, think globally). We will expand our education efforts into classrooms and schools. State parks will also become classrooms for local schools and we will administer environmental education grants to schools, conservation groups, community organizations, etc.

A specific trend of interest is our volunteerism effort. Not only the typical clean up, trail type volunteers but those who build structures. We must be wary of those more sophisticated volunteer organizations that they don't drive our planning and development programs in the name of volunteer help.

*OUTDOOR RECREATION
PLANNING*



ESTIMATING DISPERSED RECREATIONAL USE ON MICHIGAN'S STATE AND NATIONAL FORESTS

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A study to estimate dispersed recreational use on three Michigan public forests was conducted April-December 1992. Use was estimated to be 9.3 hours per acre over the period. Travelers to the forests accounted for 45% of the use and inholders within the forests who did not drive a car or truck onto the public lands accounted for 55%. Hunting, offroad vehicle use and hiking/walking were the most frequently cited principle dispersed activities.

Introduction

The state of Michigan has 6.5 million acres of public forests. There are 6 state forests totaling 3.9 million acres and four national forests with 2.7 million acres (Wells and Eidelson, 1991). Much of this public acreage remains undeveloped and open for dispersed recreation, recreation occurring without the benefit of facilities developed specifically for an activity, such as designated trails, campgrounds, etc. Examples of dispersed activities include fishing, camping, hunting, nature observation, picking berries, and ORV riding done without benefit of a human made facility.

In January of 1992, the Department of Park and Recreation Resources of Michigan State University (MSU) entered into a Cooperative Agreement with the USDA Forest Service (USFS) and into a contract with the Michigan Department of Natural Resources (DNR) Forest Management Division to estimate dispersed recreational use on the 950,000 acre Huron-Manistee National Forests and the 760,000 acre AuSable State Forest. These forests comprise approximately 1.7 million acres of public lands within dedicated boundaries of 3.4 million acres and are located in North Central Lower Michigan.

The project had a number of unique features. First was that state and national forest managers cooperated so their lands were sampled with the same instrument and procedures. The rationale for this cooperation is many fold:

1. Both ownerships are poorly signed, thus recreationists may not be certain on which lands they are recreating;
2. Their properties often adjoin, thus recreationists cross property lines during a single activity;
3. Both agencies are involved in managing for and regulating similar activities with recent cooperative efforts including promulgation of similar land use rules for off-road vehicles (ORV).

Second, the measurement of dispersed use differs markedly from the typical estimates of recreation at developed facilities. For example, at developed campgrounds, campers are congregated at known locations and mandatory registration and fees provide

reasonably accurate estimates of use. Similar situations exist at trail heads, designated boating access sites, scenic overlooks and picnic grounds, interpretive centers, etc. where vehicle counters can readily be used to estimate visitation when combined with visual observations. Dispersed recreation is different. Recreationists are unlikely to be concentrated and shift locations throughout the year based on activity type. Further, one recreationist may range over a number of square miles in the course of one activity. Finally, registration may not be mandatory or voluntary and access and egress may be essentially unlimited and not under control of the land managing agency or agencies.

Third, few examples in the literature are available concerning methodology for measurement of dispersed use in a forest-wide setting especially with unlimited access, no registration and significant private in holdings. For example, James and Henley (1968) suggest cordon sampling, but it is not feasible with numerous access roads not controlled by the forest managers. Ryel et al. (1982) and Hussain et al. (1987) reported estimates of dispersed use in the Pigeon River Country State Forest in Northern Lower Michigan. Their methodology was similar to that recommended by McCurdy (1970). It was to count parked vehicles within large sample areas. Then a postcard questionnaire was left with the vehicle to determine the recreational activities of the occupants while parked, the number of people in the vehicle and the length of time the vehicle was parked within the sample area. Data was then extrapolated to estimate total dispersed use. Estimates of dispersed use over a 12 month period in the 100,000 acre forest were that use was approximately 3.5 hours per acre per year. The most common principal activities of respondents were: fishing, hunting, mushroom/berry picking and hiking/walking. The period April through December accounted for 96% of dispersed recreational use of the Forest.

The Pigeon River Country State Forest area however, differed significantly from the Huron-Manistee and the AuSable Forests. The acreage of the Huron-Manistee and AuSable Forests was 17 times the size of the Pigeon River Forest. Second, approximately 50% of the land within the dedicated boundaries of the Huron-Manistee and AuSable Forests is private versus less than 5% in the Pigeon River Forest.

Hence, the basic methodology applied at Pigeon River was appropriate for recreationists who travel to the site with a reduction in the proportion of the forest sampled due to the immense acreage. An additional methodology was necessary for adjacent inholders. These landowners and their guests were readily able to ski, walk, ride a bicycle, horse, snowmobile or ORV across their property line to the public land without the use of a car or truck.

The objectives of this study of dispersed recreation on the Huron-Manistee National Forests and the AuSable State Forest were to:

1. Estimate dispersed recreational use hours and key dispersed activities for each forest.
2. Determine the management implications of this use.
3. Explore improvements in methodology for estimating use on large acreage with limited financial and personnel resources.

Methods

To meet the objective of estimating dispersed use on a forest-wide basis, and taking into account substantial differences between various parts of the forests, sample areas were chosen on a stratified, random basis across the 1.7 million acre public area. Strata selected were the 7 Ranger Districts in the Huron-Manistee and the 3 Forest Areas in the AuSable. Within these strata, the most convenient division of lands that would allow random selection of a set of sample of areas from each strata were forest compartments. On the AuSable, these compartments averaged about 1,750 acres in size, while on the Huron-Manistee they were considerably smaller, averaging approximately 800 acres per compartment.

Compartments were randomly selected within each forest area to sample 5-6% in each strata. For the Huron-Manistee, compartments were paired to provide a comparable size to the AuSable compartments. The total area sampled was 5.1% in the AuSable (39,050 acres) and 5.8% in the Huron-Manistee (55,100 acres).

To sample tourists (those who drive to the forest and park), once compartments had been selected they were grouped into clusters for ease of travel by researchers. Clusters typically contained 6 sample compartments. Travel distance among the compartments within a cluster were typically 80 miles. In addition, researchers might have to travel up to 75 miles one way to reach the cluster from their home base centrally located within the forests.

Ten sample days for each cluster were selected for each season (spring April-June; summer July-September; fall October-December) for a total of 30 sample days. Based on the even division between weekend and weekday use for monitored Northern Lower Michigan State Parks, 5 weekend and 5 weekday sample days were systematically chosen with a random start for each season. Based on the Pigeon River data which showed very low dispersed use levels during the winter (Hussain et al. 1987), coupled with the likelihood of unplowed roads and budget constraints, the authors and the agencies mutually decided not to sample during January - March.

On a cluster's sample day, a researcher driving a two wheel drive vehicle would visit each compartment in the cluster. No developed recreational sites (should there be any within the cluster) would be sampled. At all other locations, all vehicles visible from roads, parked within or adjacent to the each sample compartment on public lands or road rights of way, would be sampled by counting the vehicle, recording the date on a vehicle log for each compartment and placing a business reply postcard questionnaire on the windshield of the vehicle. If the occupants of the vehicle were present, the card would be handed to them and if they were ready to leave, the researcher would encourage them to complete the questionnaire at that time and would receive it when they had done so. Researchers typically spent 1 hour in each compartment with 20 minutes drive time between compartments. Sampling was done between 8 AM and 6 PM. Researchers varied their routes through the clusters to maximize the number of different times of day they sampled any given compartment. Two researchers worked 5 days per week for 9 months on the field portion of this project. Once post cards were returned to the authors, the data was entered for analysis using SPSS PC.

Data were weighted to account for length of stay bias. Length of stay bias occurs when parties recreate on a site for differential lengths of time. For example, one party may be there 1 hour, while another may be parked for 48 hours. This provides a much greater chance of sampling those staying 48 hours than those staying 1 hour. The weighting procedure followed was to weight cases by the reciprocal of the number of hours the car was parked at the site where sampled (e.g. for example 1/1 for 1 hour and 1/48 for 48 hours).

Landowners within the sample compartments were identified by county plat book and their address located through the office of the county assessor. A mail questionnaire with postage paid return envelope was sent to a systematically selected sample of 50% of these landowners from each forest. It asked about the dispersed recreation use of the adjacent public lands April-December 1992 when the landowner, members of their household and guests didn't park a car or truck on the public lands or on a public right of way. The number of landowners identified in this manner is likely to be conservative as parcels less than 5 acres in size are unlikely to be separately listed in plat books. Hence, the dispersed use landowners make of the public forest is likely to be somewhat greater than that identified by this methodology. Two mailings of the landowner questionnaire were done, the first in March 1993 and a second, certified mailing in April 1993.

Results and Discussion

April-December 1992, 1,531 vehicles were counted and sampled in the compartments. Of those, 826 (54%) of the drivers responded. For the mail questionnaire, of the 679 landowners sampled 45 had invalid addresses identified by the US Postal Service. Of the 634 with valid addresses, 460 (73%) responded.

Dispersed Use Estimation

Dispersed recreational use hours of tourist recreationists for each forest were estimated on a seasonal basis by multiplying:

1. the mean number of people per vehicle,
2. the mean hours of stay per vehicle,
3. a factor that extrapolates the size of the sample areas to the size of the entire forest,
4. a factor that extrapolates the 10 sample days in each season to the number of days in a season (spring, summer, fall), and
5. a factor that extrapolates the mean hours of stay per vehicle in each season to the average hours of daylight per day in each season. (This was done as sampling was only carried out for 1 hour on a sample day in a given compartment. Thus a person there for 5 hours in a day with 15 hours of daylight had only a 1 in 3 chance of being sampled, even on a sample day.)

Adjacent landowners computed their dispersed use hours and those of their households and guests over the April-December period for the nearby public forest. The mean was then extrapolated by a factor that included all named ownerships in the sample compartments. This was then multiplied by a factor that extrapolated those results to the entire forest.

Table 1 (next page) shows the aggregated dispersed use estimate for the forests during April-December 1992. Approximately 45% of the estimated use was by tourist recreationists and 55% by adjacent inholders and their households and guests. Use levels were below one 12-hour recreational visitor day per acre. This level of use offers substantial opportunities for solitude.

Dispersed Activity Implications

The main activity reason for tourist dispersed recreationists being found in the sample forests is shown in Table 2.

Hunting was the most frequently cited main reason for visiting the forest. Species that were legal to hunt during the sampling period included wild turkey (spring, fall) ruffed grouse/woodcock (late summer, fall) and white-tailed deer (fall). However, activities related to deer hunting such as blind building, baiting and scouting were legal throughout the sampling period, and many reported they were involved in these deer hunting activities in September (late summer) prior to the October 1 (fall) opening of archery deer season.

ORV riding was much more likely to be cited in the AuSable State Forest rather than the Huron-Manistee National Forests. Both forests have identical ORV regulations (all areas closed unless posted open) and no designated ORV riding areas or trails were sampled. However, law enforcement on the state forests is limited to conservation officers, who are also responsible for fish, wildlife and environmental law enforcement on public and private lands. Their staffing level is approximately 1 officer per 175,000 acres of public and private land. Conversely, U.S. Forest Service Special Agents and Level II officers can both enforce National Forest ORV regulations and issue citations. Their staffing levels greatly exceed those of conservation officers and their duties are confined only to national forest lands. Also, the Forest Service had closely cooperated with the Cycle Conservation Club, a state-wide ORV group, to organize volunteer safety patrols on the Huron-Manistee to provide peer pressure to keep riders on designated trails and in designated areas.

Table 1. Estimate of dispersed recreation hours during April-December 1992 for tourists and adjacent landowners on the Huron-Manistee National and the AuSable State Forests.

Forest/Visitor Type	Recreation visitor hours (thousands)	12-hour recreation visitor days (thousands)	Recreation hours/acre
Huron-Manistee			
Tourist	3,564.3	297.0	3.8
Adjacent landowner	4,369.0	364.1	4.6
Total	7,933.3	661.1	8.4
AuSable			
Tourist	3,653.5	304.5	4.7
Adjacent landowner	4,587.7	382.3	6.0
Total	8,241.2	686.8	10.7
Combined			
Tourist	7,217.8	601.5	4.2
Adjacent landowners	8,956.7	746.4	5.2
Total	16,174.5	1,347.9	9.3

Table 2. Percentage of tourist dispersed recreationists citing activity as main reason for visit to the Huron-Manistee National or AuSable State Forests during April-December 1992.

Activity	%		
	Huron-Manistee	AuSable	Combined
Deer hunting	44.8	34.4	39.8
ORV riding	1.8	25.4	12.1
Grouse/woodcock hunting	6.2	11.7	8.7
Fishing	7.8	4.0	6.2
Nature observation	4.3	7.7	5.8
Hiking/walking	5.2	2.2	3.9
Picking berries/mushrooms	6.1	0.6	3.7
Other hunting	5.2	0.6	3.1
Canoeing	2.2	2.0	2.1
Turkey hunting	2.3	1.1	1.8
Swimming	0.0	2.9	1.3
Horseback riding	1.4	0.2	0.9
Camping	1.0	0.4	0.7
Backpacking	0.2	0.0	0.3
Other activities	11.6	7.2	9.6
Total (a)	100.1	100.2	100.0

(a) Total may not add to 100.0% due to rounding.

When landowners were asked to identify the most important dispersed use they, their household and guests made of the adjacent public forest without driving a car or truck onto the

public lands or a public right of way, they most often cited deer hunting (Table 3).

Table 3. Percentage of adjacent landowners citing activity as most important dispersed recreation on nearby Huron-Manistee National or AuSable State Forests during April-December 1992.

Activity	%		
	Huron-Manistee	AuSable	Combined
Deer hunting	44.2	43.5	43.8
Hiking/walking	26.8	27.9	27.2
Nature observation	7.9	5.2	6.7
ORV riding	4.2	7.1	5.5
Snowmobiling	2.6	5.2	3.8
Fishing	5.3	1.3	3.5
Picking berries/mushrooms	2.1	3.9	2.9
Grouse/woodcock hunting	1.1	2.6	2.0
Horseback riding	1.6	1.3	1.4
Turkey hunting	0.5	1.3	0.9
Swimming	1.1	0.0	0.6
Camping	0.5	0.0	0.3
Other hunting	0.5	0.0	0.3
Other activity	1.6	0.6	1.2
Total	100.0	99.9	100.1

(a) Total may not add to 100.0% due to rounding.

An activity that was cited much more as the most important use by landowners than tourists cited as their main reason for visiting the forest was hiking/walking. ORV use was less likely to be cited by landowners than by tourists to the AuSable State Forest.

The ever more numerous gateways to the public forests as a result of fragmentation of inholdings and the development of vacant land have resulted not only in landowner households accessing public lands but also guests. When asked how many people were in their household, landowners on the AuSable had a mean response of 2.6 and on the Huron-Manistee 2.5. However, when asked how many members of their household and guests accessed the public lands without a car or truck from their inholding to participate in the most important activity, a mean of 6.0 people did on the AuSable and 6.2 on the Huron-Manistee.

Of the landowner respondents, 71.3% in the AuSable and 68.7% in the Huron-Manistee had first or second homes on their inholding. This concentration of homes can encourage access to the forest on a year-round basis and provide support facilities for household members and guests on the doorstep of the public lands regardless of holidays or the weather.

Methodology Refinement

Two major refinements to methodology are suggested as a result of this study. Both are designed to increase efficiency while not detracting from the randomness of sample site selection.

First, instead of randomly selecting single 1,750 acre compartments within a ranger district or forest area, compartments should be paired or grouped in threes. This allows the random selection of one compartment group or pair to account for a larger amount of forest area. This results in fewer compartment pairs or groups that need to be selected and cuts drive time between compartments. During 1993-1994 in Michigan's Upper Peninsula, this strategy was used in a dispersed recreation study to select sample compartments on the Hiawatha National and the Lake Superior State Forests. It resulted in an ability to sample 10% of the forest area versus 5% in the Huron-Manistee/AuSable study with a decrease in drive time between compartments.

Second, profitable use of the drive time between sample compartments is possible. In the current Upper Peninsula study, unstaffed parking areas at developed day use facilities on the travel route are being sampled. The same postcard questionnaire that is used with dispersed tourist recreationists is used and baseline data is being gathered about use of these sites. This is done by simply coding the site location in a manner that allows differentiation between developed and dispersed sites. Developed day sites include motorized and non-motorized trail heads, boat launches, picnic areas and historic markers. Approximately 1/3 of these developed, unstaffed day use facilities within the two forests are being sampled.

Conclusions

Cordell et al. (1990) suggests that the demand for many dispersed recreational activities is likely to increase over the next 50 years. Unfortunately little research attention, especially longitudinal research, has been devoted to the amount and type of dispersed use on the public forests outside of wilderness and primitive areas. Since less than 1% of the forest land in the Huron-Manistee National Forests and the AuSable State Forests is designated wilderness and none of these areas were sampled in this study, dispersed use in the working/multiple use portions of these public forests appears to be substantial. It is vital that this use be understood and considered in the planning and management of public forests. The methodology presented provides a cost effective way to estimate dispersed use and could be adapted to most forest areas.

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- Acknowledgments**
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IDENTIFIED RECREATION OPPORTUNITIES AND PREFERENCES FOR THE LOWER PENOBSCOT RIVER, MAINE

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The Penobscot River has been the focus of a major Atlantic Salmon restoration effort for the last 25 years. The river has received national and international attention with the proposal of an additional 38-megawatt hydroelectric facility on its main stem. This study was conducted in response to a need to identify recreation enhancement and mitigation options related to licensing of the proposed facility. Our research to date describes recreation use patterns and preferences, and associated perceptions of recreation experiences and constraints. Detailed findings are published in Maine Agricultural and Forest Experiment Station Miscellaneous Report No. 381: Penobscot River Recreation Study, May 1994. Additional research will look more fully into factors related to leisure constraints in the study area.

Introduction

The Penobscot River drains one-fourth of the State of Maine, approximately 8000 square miles, an area greater in size than the State of Massachusetts. The Penobscot watershed has a diversity of history, topography, and current uses. Generally considered an outdoor enthusiast's paradise throughout its expanse, the watershed plays an intimate part in the fabric of Maine life. The Penobscot tributaries begin in the northwest reaches of the state and course their ways through timberlands and farmlands, urban areas and coastal regions. The Penobscot River provides bountiful wild water recreation and multitudes of locations for quiet solitude. The river's mighty power is put to work as it leaves Maine's unorganized territories and passes through into the urban heartland. The legislature and local governments have responded to the opportunities created by the river, and to the diversity of interests in the watershed. Reckless indifference to the watershed has been replaced by a growing sense of nurture and care for the waters, while retaining both the working and recreational opportunities afforded by the Penobscot. Significant areas addressed through legislation include shoreland zoning, air and water pollution, deteriorating dams, preservation of wetlands, fisheries issues, and pesticide issues.

Methodology

The study was developed under the auspices of the Parks, Recreation, and Tourism Program of the University of Maine in the summer of 1992. The study area was defined as the portion of the lower Penobscot River from Bangor to Milford, Maine. The intent of the study was to gather information on area residents' perceptions of the river, the quality of recreation on the river, recreational use rates, and barriers to river recreation. The study also sought to determine residents' attitudes toward and desires for different types of recreation that have been proposed for the specified region of the Penobscot River.

The study was accomplished through the use of a mail-out survey. A random sample of households from the nine communities in closest geographic proximity to the study area was selected as the survey population. The sample was stratified based on individual populations of the chosen communities.

We used the Total Design Method (TDM) to develop the survey and, due to time and budget constraints, a modified TDM to administer the survey (Dillman 1978). In September 1992, we mailed a map of the study area and a questionnaire to each of the households in the sample. Two sets of follow-up postcards were mailed in October and November, to remind people to return their surveys and to thank those who had already completed their surveys. Replacement questionnaires were mailed to those who requested them.

Results

The following are selected results from the survey, and highlight many of the important issues associated with the study. The key issues that we identified are:

- 1) How do people use the river now?
- 2) How do people want to use the river?
- 3) What constraints limit participation in river recreation?
- 4) How does access affect recreation?
- 5) What adds to or detracts from the quality of a recreation experience?
- 6) What potential recreation opportunities exist?

A total of 555 questionnaires were completed and returned by persons actually living in the survey region. Twenty-seven percent of the questionnaires were answered by women and seventy-three percent were answered by men, a result likely influenced by the household lists. The respondents varied in age from 22 to 88 years of age. Only 8% of the respondents were less than 30 years old. More than 45% of the respondents were 31 to 50 years old, and about 35% were 51 to 70 years old. Three-quarters of the respondents have lived more than ten years in the study region. The average age of male and female respondents was nearly equal, and the men generally had lived in the region about 20% longer than the women. More than one-quarter of the respondents belonged to a conservation or sports organization. The proportions of male and female respondents belonging to such organizations were nearly equal. People who were members of such organizations used the study area about 1-1/2 times more frequently than did nonmembers.

How Do People Use The River Now?

Seventeen percent of the respondents had never used the river for recreational purposes. Of those respondents who had used the river, the date of their last visit ranged from July 4, 1931, to a few days before completing the survey. The median last visit occurred three months before the time of the survey. About 32.3% of the respondents visited within the previous 2 months, 49.6% visited within the previous 4 months, and 54.2% visited within the previous year. At least 62.7% had visited in the previous 2 years, but 31.9% had not visited the study area in more than 4 years.

When questioned about 22 different types of river recreation, between 30% and 50% of the respondents indicated a preference to use the area near the river primarily to relax, walk or hike, or to picnic (Figure 1). Canoeing or kayaking, fishing from the bank, bird watching, and fishing from a boat were the next most popular activities, according to approximately 20% to 30% of the respondents. These activities were followed closely by motorboating, bicycling, and cross-country skiing (7% to 11% participation). Participation rates for the remainder of the 22 activities ranged from less than 1/2% to less than 7%.

Table 1. Characteristics of the 1992 Penobscot River recreation study respondents.

Characteristics	Male	Female
Average Age (Median Age)	50 years old (48 years old)	49 years old (47.5 years old)
Average Number of Years as an Area Resident (Median Number of Years)	30 years (27 years)	25 years (23 years)
Typical Employment Status	Full Time	Full Time
Median Household Income	\$40,000-\$50,000	\$25,000-\$30,000
Average Number of People that Income Supports	2.83 persons	2.17 persons
Percentage of Respondents who are Members of a Conservation or Sporting Organization	28.0%	26.4%
Median Number of Months Since Last Visit to the Penobscot River	3 months	3 months

The lack of either real or perceived opportunities is reflected in the large number of respondents desiring an activity versus the number of respondents currently participating in that activity in the study area. Of the 22 types of recreation listed, the number of people who desired a particular type of recreation was 1-1/2 to 110 times as great as the number of people who currently use the river, or the area near the river, in those ways, except for canoeing/kayaking and bicycling.

Canoeing/kayaking and bicycling were among the bottom 5 of 22 types of recreation ranked in order of desirability, and were the only two categories in which there were fewer respondents who desired the activity than currently participated in those activities in the study area. Specifically, only 15.9% of the respondents believed canoeing and kayaking were desirable in the study area, yet 25.4% canoed or kayaked in that same portion of the river. Similarly, only 4.8% of the respondents thought that bicycling was a desirable type of recreation along the river in the study area, yet 7.6% of the respondents bicycled in the same area.

Current Recreation Activities on Penobscot River

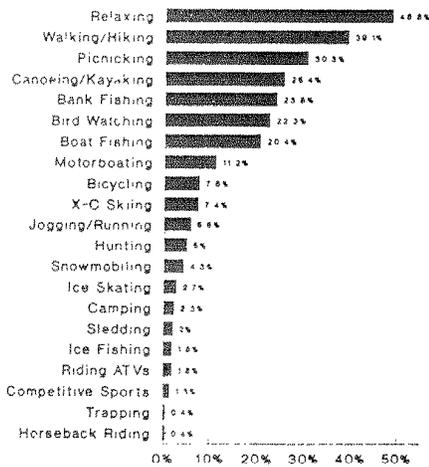


Figure 1. Current recreation on the Penobscot River.

How Do People Want To Use The River?

To determine the desirability of those same 22 recreational activities for the study area, respondents were asked to rate the activities on a scale ranging from extremely desirable to not very desirable. We combined the "extremely desirable" and "quite desirable" responses to produce the percentages shown in Figure 2. In signifying their desires, the respondents again showed a definite preference for using the area near the river to relax or to walk or bike. The number of respondents who would like to have motorboating opportunities on the Penobscot River represents a six-fold increase over current motorboat use. The desires for picnicking and fishing opportunities are double the rates of current participation. About two-fifths of the respondents would like to use the area near the river for bird watching, horseback riding, cross-country skiing, motorcycling, and jogging or running. Currently, opportunities for cross-country skiing and jogging or running are limited, and opportunities for horseback riding and motorcycling are almost nonexistent.

Ranked Desirability of Recreation on the Penobscot River

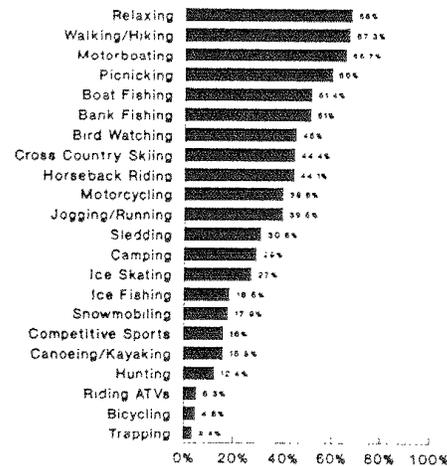


Figure 2. Ranked desirability of recreation on the Penobscot River.

What Constraints Limit Participation In River Recreation?
 Constraints to recreation in the study area, listed in Table 2, are ranked according to significance as indicated by respondents.

Table 2. Constraints to Penobscot River recreation.

Category	Percent
Don't know what's available	52.3
Lack of access	50.0
Not enough free time	50.2
Programs, etc. not available	48.4
Not sure how to use resources	40.7
Work is main priority	33.6
Too much litter	26.4
Too many family obligations	25.8
Not enough money	25.5
Family & friends limit me	19.9
Don't feel safe	19.8
Don't feel like doing anything	19.5
No one to do things with	15.0
Location not appealing	13.2
River recreation not appealing	12.7
Don't have the physical skills	12.4
Not fit enough	10.2
Don't like people who go there	5.0

Constraints to recreation are a key issue in this study because two-thirds of the constraints identified can be addressed by management. Additionally, constraints are interrelated to other key issues identified above. One example: How do people want to use the river? Half the respondents indicated that they do not know what is available and that programs and facilities are not available. Another 40% are not sure how to use the resources that are available. Still others report they either are not fit enough or do not have the physical skills to use the river. Another example: How does access affect recreation? Half the respondents indicated that lack of access limits their recreational use of the river. A third example: What adds to or detracts from the quality of a recreation experience? Respondents also noted constraints such as too much litter, not feeling safe, unappealing locations, and finding river recreation unappealing. Management can address the constraints through informational and educational means, proper facility design, maintenance, and security. Efforts geared toward providing high quality recreation experiences help give appeal to river recreation.

How Does Access Affect Recreation?

The issue of how access affects recreation is graphically displayed in Figures 3 and 4. These two figures take on increased emphasis in light of the fact that over 50% of the respondents identified lack of access as a leading constraint. Just under 57% believe access in the study area is fair to very poor, indicating that a fair access rating is considered by many as constraint. Forty-seven percent of the respondents thought that their recreation would increase at least some, to perhaps a great deal, if access were improved.

Because of three existing dams, the remnants of one dam, and a natural ledge obstruction on the main stem of the Penobscot River, the study area is somewhat segmented. When we examined previous studies, we found that field data on actual river use showed heavier use in segments where access was good, and almost no use in segments where access was poor. In response, additional access in the form of new boat launching facilities, purchases of undeveloped land (subsequently donated to a local land trust organization), and conservation easements in the riparian zone has been provided by the local utility.

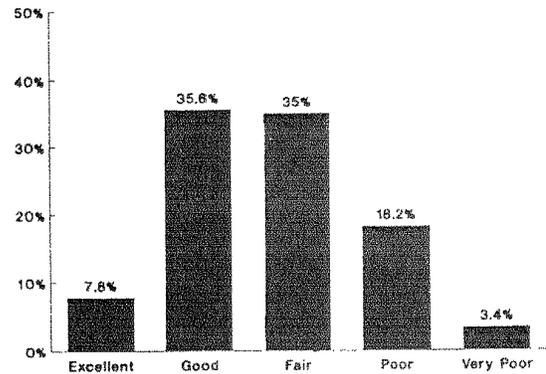


Figure 3. Recreation access rating.

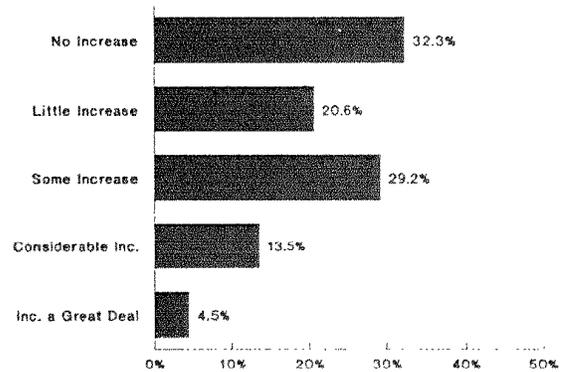


Figure 4. Recreation use if access improved.

What Adds to or Detracts from the Quality of a Recreation Experience?

Figures 5 and 6 show what adds to or detracts from respondents' recreation experiences. The opportunity to observe or interact with wildlife is valued by respondents as indicated in several portions of the survey. In particular, a person can see or encounter bald eagles, osprey, waterfowl, moose, black bear, migrating Atlantic Salmon, muskrats, beaver, raccoons, etc. Of importance to managers are the conflicting factors that affect the quality of a recreation experience. For example, domestic animals add to the recreation experience for some respondents, and detract from the experience for others. Likewise, meeting other groups of people has a positive effect for some and a negative effect for others.

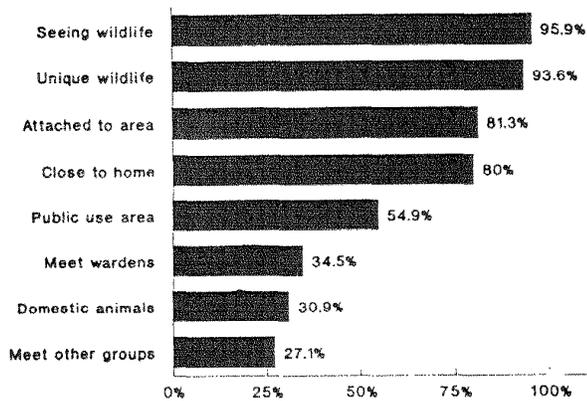


Figure 5. Adds to quality of experience.

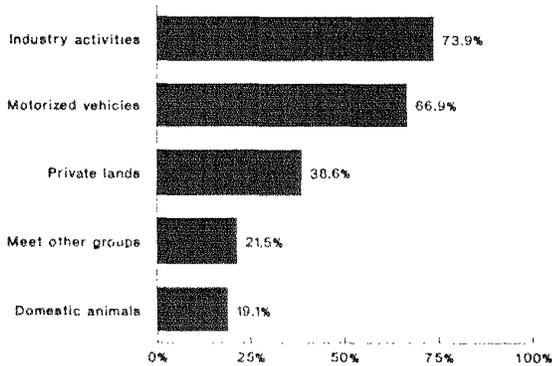
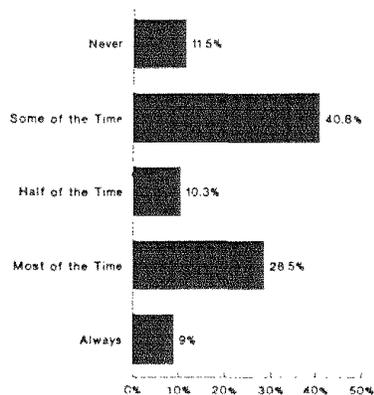


Figure 6. Detracts from quality of experience.

A pertinent question for managers is: Can the study area provide high quality recreation? The results of the survey (Figure 7) show that a high quality recreation experience is an attainable goal.



Note: excludes those who said they never use river.

Figure 7. Frequency of high quality recreation experience.

What Potential Recreation Opportunities Exist?

Various groups in the region have proposed facilities such as visitor centers and trail systems. In reviewing visitor center attributes important to respondents (Table 3), we noted again the importance of wildlife, the importance of preferred activities such as picnicking, and the importance of information. It is possible to locate visitor centers near undeveloped areas that have abundant wildlife. At least one location in the study area could include a fish-viewing window, enabling people to watch migrating species such as Atlantic Salmon, eels, and alewives, or resident species such as bass and pickerel.

Table 3. Preferred visitor center attributes.

Visitor Center Attributes	Percent
Wildlife areas	74.3
Picnic areas	67.8
Information panels	61.7
Historic artifacts	55.5
Brochures	53.7
Fish viewing window	50.3
Playgrounds	48.9
Dioramas	44.1
Hands-on displays	34.6
Video displays	33.1
Interactive displays	30.7
Bookstore	30.0
Slideshows	28.0
Gift shops	18.5
Commercial & industrial tours	18.3
Cafeteria	17.5

Trail attributes preferred by respondents (Table 4), show preferences for things that would enhance interaction with wildlife -- a top priority among respondents throughout the survey -- and for things that would provide information, such as signs and brochures. Additionally, it is interesting to note that although very few respondents felt that canoeing (15.9%) and bicycling (4.8%) were currently desirable, almost 60% preferred those activities when associated with a trail system.

Table 4. Preferred trail attributes.

Trail Attributes	Percent
River views	86.4
Limited access	82.7
Through forests	80.0
Wildflowers	75.3
Loop trails	72.7
Away from neighborhoods	71.3
Solitude	70.1
Vista areas	63.4
Nature descriptions	61.6
Picnic areas	59.2
Directional signs	58.9
Brochures	58.7
Restrooms	58.6
Canoe access	57.9
Designated bike trails	56.4
Through open areas	49.5
Patrolled trails	43.7
Long trails	39.2
Natural trails	27.7
Near roads	18.8
Manicured lawns	12.5

Management Implications

- 1) Baseline studies now exist.
- 2) Baseline studies identify constraints that can be addressed.
- 3) Incompatible uses should be identified.
- 4) Multiple areas versus multiple-use areas should be considered.
- 5) Private sector funding may be available for studies.

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**OUTDOOR RECREATION OPPORTUNITIES
AND LAND USE CHANGE IN VERMONT'S
LAKE CHAMPLAIN BASIN**

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Outdoor recreation resources are eroding in Vermont's Lake Champlain Basin due to urban expansion. This study measured urban growth in the Basin and identified critical areas for open space protection. The study's hypothesis, that there was no difference between the Champlain Basin and other parts of urbanizing New England that have lost outdoor recreation resources, was accepted.

Problem

Vermont's Lake Champlain Basin is the fastest growing region in Vermont. Its population increased 11 percent during the past decade from 331,125 persons in 1980 to 368,172 in 1990 (USDC 1980-90). This population growth and accompanying economic development creates a demand for rural open space surrounding the Basin's cities and suburbs. This conversion of rural to urban land destroys both outdoor recreation resources and the public's access to them.

Study Hypothesis and Objectives

The study hypothesis was that there is no difference between Vermont's Lake Champlain Basin and other parts of New England that have urbanized and lost outdoor recreation resources as a result of the urbanization process. One might assume that because of Vermont's historically rural nature and long standing environmental protection laws that this region would not succumb to the intensity of urbanization that has affected major portions of southern New England, Maine, New Hampshire, and other parts of the northeast for the past several decades. The study was designed to test this assumption. Its objectives were: (1) to measure the urban consumption of rural lands in Vermont's Lake Champlain Basin and (2) to identify critical outdoor recreation resources for protection from urban encroachment.

Vermont's Lake Champlain Basin

Vermont's Lake Champlain Basin is 55 miles wide and 120 miles long. The Lake itself is 109 long, has a maximum width of 11.2 miles, and a 587 mile shoreline. The Green Mountains form the eastern boundary of the Lake's watershed, and together with rural open space represent the Basin's major outdoor recreation and tourism resources. Six major rivers drain the Basin and with their associated wetlands provide an abundance of recreation opportunities for outdoor enthusiasts (New England River Basins Commission 1975).

Basin dairy farming has been declining in rapidly urbanizing counties like Chittenden. Many farms have been subdivided for residential, commercial, and industrial purposes stimulated by profits taken from increasing land values and the costs incurred from rising property taxes (State of Vermont 1992). In this rural to urban conversion process, privately owned open space, which has often provided free public recreation, is eliminated as an outdoor recreation resource (Table 1).

Table 1. Decline in the number of Vermont dairy farms in Vermont's Lake Champlain Basin, 1991-1993.

County	1991	1992	1993	% Change
Addison	381	184	170	-7.0
Caledonia	177	184	170	-4.0
Chittenden	113	106	101	-12.0
Franklin	515	508	498	-3.0
Rutland	181	177	180	-0.6
Washington	90	87	85	-6.0

Source: Vermont Department of Agriculture

Method

The study included 133 towns in Vermont's Lake Champlain Basin which were divided into five study areas of 24 to 30 towns each. Two towns in each of the 5 planning areas, having the highest and lowest populations, were further studied for growth rate impacts on remaining open space. Land use in each of the 5 planning areas was studied using GIS generated maps (State of Vermont 1986). Three socioeconomic characteristics of the population were used to measure urban expansion: population growth, school enrollments, and new housing permits (State of Vermont and the Vermont Rural Studies Center 1993). Three other socioeconomic characteristics of the highest and lowest populated towns were studied to determine if population migrations were occurring from towns of high population density to towns of low population density. They included residents' age, household income, and occupation. Thirty students enrolled in an outdoor recreation planning course at the University of Vermont's School of Natural Resources collected and analyzed the data.

If a town showed more than average growth in population, school enrollments, and new housing starts it was classified a "high growth" town. If two out of these three elements showed above average increases for the decade a town was classified as a "medium growth" town. If only one element showed above average growth the town was considered a "low growth" town. Some towns actually showed zero or negative growth in one or more variables.

Results

The population of the Basin and its five planning areas, as defined by this study, averaged 11 percent over the past decade from a low of 9 to a high of 13 percent (Table 2). Almost all of this growth took place in communities surrounding established city centers and extended outward towards the rural towns. School enrollments paralleled population growth increases with central city schools showing no growth or declining enrollments, suburban towns showing rapid growth, and most outlying rural towns currently maintaining level enrollments. As expected, new housing permits coincided with the first two growth indicators with the greatest number of new housing starts located in the satellite communities. Using the procedure described in the method section growth indicators were computed for each of the 5 basin planning areas, and the results shown in Table 3.

The planning areas containing the cities of Burlington and Rutland (Planning Areas 2 and 5) had the largest percentage of towns, 38 percent and 39 percent, with high growth rates. Medium and high growth towns accounted for 66 percent and 91 percent of the communities located in these same two planning areas. The remaining three planning areas contained a lower percentage of high growth towns but still registered 16 to 17 percent. The high, medium, and low growth towns were then plotted on a map of the basin to determine if any growth patterns were evident.

INDICATORS AND STANDARDS OF THE QUALITY OF THE VISITOR EXPERIENCE AT A HEAVILY-USED NATIONAL PARK

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Contemporary approaches to determining and managing carrying capacity of national parks and similar areas focus on indicators and standards of quality. The National Park Service is currently developing the Visitor Experience and Resource Protection process which adopts this approach to carrying capacity. This process is being applied at Arches National Park, Utah, through a two-phase research program aimed at identifying indicators and standards of the quality of the visitor experience.

Introduction

As the name suggests, national parks are resources of national and, increasingly, international significance. The national park system contains natural, historical, and cultural resources of great importance to the nation and, in many cases, to the international community. Given the significance of this resource base, public demand to see and experience these areas should not be surprising.

Data on national park visitation dramatically support this premise. Annual visitation to the national parks is now counted in the hundreds of millions. In the decade of the 1970s, visitation increased by 30 percent. In the 1980s, visitation rose another 35 percent. If this trend continues, the national parks can expect an additional 60-90 million recreation visits by the year 2000.

The increasing popularity of the national parks presents both an opportunity and challenge to the National Park Service (NPS). The opportunity is to fulfill the mission of the NPS "to provide for the enjoyment" of the national parks. The accompanying challenge, of course, is to conserve park resources for the enjoyment of future generations. This can prove difficult under conditions of high visitation.

Implicit in this dual mission of the NPS is the issue of the *quality of the visitor experience*. The quality of visitor experiences must be maintained at a high level for the national parks to contribute their full potential to the enjoyment of society. Moreover, high quality visitor experiences are more likely to develop public appreciation of, and support for, conservation of national park resources.

It is ironic that one of the greatest threats to the quality of national park visits is commonly seen as their increasing popularity. To many observers the national parks, at least in some places and at some times, are crowded, and this detracts from the quality of the visitor experience. In more formal terms, the use of some national parks, or portions thereof, have exceeded their *carrying capacity*.

This paper explores the theory and application of carrying capacity of the national parks. The first section briefly traces the theoretical development of the carrying capacity concept. The second section describes a process now being developed to help determine and manage carrying capacity in the national parks.

The final section outlines research now underway to apply this carrying capacity process. The importance of indicators and standards of quality is highlighted throughout this discussion.

The Concept Of Carrying Capacity

The question of how much public use is appropriate in a national park is often framed in terms of carrying capacity. Indeed, much has been written about carrying capacity of the national parks and related areas. The underlying concept of carrying capacity has a rich history in the natural resource professions. In particular, it has proven a useful concept in wildlife and range management where it refers to the number of animals of any one species that can be maintained in a given habitat (Dassmann 1964). Carrying capacity has obvious parallels and intuitive appeal in the field of park management. In fact, it was first suggested in the mid 1930s as a park management concept in the context of the national parks (Summer 1936). However, the first rigorous applications of carrying capacity to park management did not occur until the 1960s.

These initial scientific applications of carrying capacity to park management suggested the concept was more complex in this new management context. At first, as might be expected, the focus was placed on the relationship between visitor use and environmental conditions. The working hypothesis was that, in absence of compensatory management, as visitor use intensity increases, it causes greater environmental impact as measured by soil compaction, destruction of vegetation, and related variables. It soon became apparent, however, that there was another critical dimension of carrying capacity dealing with social aspects of the visitor experience. Wagar (1964), for example, in his early and important monograph on the application of carrying capacity to recreation reported that his study

"...was initiated with the view that the carrying capacity of recreation lands could be determined primarily in terms of ecology and deterioration of areas. However, it soon became obvious that the resource-oriented view must be augmented by consideration of human values."

Wagar's point was that as more people visit a park, not only can the environmental resources of the area be affected, but also the quality of the visitor experience. Again, the working hypothesis was that, in the absence of compensatory management, as visitor use intensity increases, it causes greater social impacts as measured by crowding and related variables. Thus, as applied to national parks and related areas, carrying capacity has two components: environmental *and* social.

The early work on carrying capacity has since blossomed into an extended literature based on environmental and social aspects of outdoor recreation and their application to carrying capacity (Stankey and Lime 1973; Manning 1985; Kuss et al. 1990; Shelby and Heberlein 1986; Lime and Stankey 1971; Manning 1986; Graefe et al. 1984; Cole 1987; Hammitt and Cole 1987). But despite this impressive literature base, efforts to determine and apply carrying capacity to areas such as the national parks have often resulted in frustration. The principal difficulty lay in determining how much impact was too much. Theoretical development, backed up by empirical research, generally confirms that increasing visitor use leads to increasing environmental and social impacts. But how much impact should be allowed in a national park? The basic question is often referred to as "the limits of acceptable change" (Lime 1970; Frissell and Stankey 1972). Given substantial demand for public use of a national park, some decline or change in resource quality and/or in the quality of the visitor experience appears inevitable. But how much decline or change is acceptable or appropriate?

The relationship between intensity of visitor use and environmental/social impacts is illustrated hypothetically in Figure 1. It is clear that visitation causes impacts and that in the absence of compensatory management, these impacts increase with increasing visitation. What is not clear is the point at which carrying capacity has been reached. Again, the difficulty in

carrying capacity determination lies in deciding how much impact is appropriate or acceptable.

To emphasize and further clarify this issue, some writers have suggested distinguishing between descriptive and evaluative components of carrying capacity determination (Shelby and Heberlein 1986). The descriptive component of carrying capacity focuses on factual, objective data such as the types of relationships in Figure 1 (see next page). For example, what is the relationship between the number of visitors entering an area and the number of encounters that occur between groups of visitors? Or what is the relationship between the intensity of visitor use and visitor perceptions of crowding? The evaluative component of carrying capacity determination concerns the seemingly more subjective issue of how much impact or change in the recreation experience is acceptable. For example, how many contacts between visitor groups are appropriate? What level of perceived crowding should be allowed before management intervention is necessary?

Recent experience with carrying capacity suggests that answers to the above questions can be found through formulation of management objectives and development of indicators and standards of quality (National Park Service 1992; Shelby et al. 1992). This approach to carrying capacity focuses principal emphasis on defining the type of visitor experiences to be provided and maintained, and then monitoring conditions over time to assess whether or not acceptable conditions have been exceeded.

Management objectives are broad, narrative statements which define the type of visitor experience to be provided. They are based on a review of the purpose and significance of the area under consideration. Formulation of management objectives may involve review of legal, policy and planning documents, consideration by an interdisciplinary planning/management team, and public involvement.

Indicators of quality are more specific measurable variables which reflect the essence or meaning of management objectives. Indicators of quality may include elements of both the physical and social environment that are important in determining the quality of the visitor experience. Standards of quality define the quantitative and measurable condition of each indicator valuable.

By defining indicators and standards of quality, carrying capacity can be determined and managed through a monitoring program. Indicator variables can be monitored over time and once standards have been reached, carrying capacity has been reached as well. This approach to carrying capacity is central to contemporary park planning frameworks, including Limits of Acceptable Change (LAC) (Stankey et al. 1985), Visitor Impact Management (VIM) (Graefe et al. 1990), Carrying Capacity Assessment Process (CCAP) (Shelby and Heberlein 1986), and the Visitor Experience and Resource Protection (VERP) process currently under development by the NPS (National Park Service 1993).

Carrying Capacity in the National Parks: The Visitor Experience and Resource Protection (VERP) Process

The NPS has long recognized the need to apply the carrying capacity concept in parks that have been experiencing problems from increasing public use. The 1978 General Antiquities Act requires each park's general management plan to include "identification of and implementation commitments for visitor carrying capacities for all areas of the unit." Although NPS management policies and planning guidelines acknowledge this responsibility, there has been little direction or agreement on a methodology for how to identify a park's carrying capacity. Indeed, there has been no agency-wide agreement on the meaning of the term carrying capacity. Park managers are often uncomfortable saying that their parks, or areas within their parks, are receiving inappropriate or excessive use, because they lack the conclusive data and the rationale they need to make these controversial decisions.

For the past several years, NPS planners and consultants have been developing a process intended to help park planners and managers make sound decisions about visitor use. However, it is important to note that the VERP process is still being refined and has not yet been formally adopted by the NPS. The VERP process is based on many of the same elements and techniques included in the LAC and VIM methodologies. A major premise of the VERP process is that the NPS should manage visitor use continuously, the same way it manages resources. Visitor use management begins with a plan, but this is only a starting point; it continues as an iterative process of monitoring, evaluation, and adjustment. Moreover, the VERP process places principal emphasis on identification of indicators and standards of quality.

As shown in Figure 2 (see page 27), the VERP process consists of nine steps. The first six steps are requirements of general park planning, and ideally should be a part of each park's general management plan. The later steps in the process require annual review and adjustment, and are more appropriately handled through park operations and management activities.

Carrying Capacity of Arches National Park

The VERP process described above currently is being pilot-tested at Arches National Park, Utah. The purpose of this test application is to refine the VERP process and provide a model for application to the national park system. Below we describe research in progress aimed at defining indicators and standards of the quality of the visitor experience.

Arches National Park is comprised of 73,000 acres of high-elevation desert with outstanding slick rock formations, including nearly 2,000 stone arches. Most of the park's scenic attractions are readily accessible through a well-developed road and trail system. Visitation to arches has been increasing rapidly. The number of visits increased 91 percent in the decade of the 1980s, and the park received over three quarters of a million visits in 1993.

The carrying capacity research program at Arches was approached in two phases. Phase I was conducted in the summer of 1992 and aimed at identifying potential indicators of quality of the visitor experience (Manning et al. 1993). Personal interviews were conducted with 112 visitors throughout the park. In addition, ten focus group sessions were held with park visitors, park staff, and local community residents. Respondents and participants were selected through a purposive rather than random sampling procedure. Thus, data are primarily qualitative in nature. This exploratory effort was to begin learning about a variety of human-use aspects of visitation to Arches and to develop insights into potential indicators of the quality of the visitor experience. Interviews and focus group sessions were guided by a standardized questionnaire.

The questionnaire contained two major sections that focused on identifying potential indicators of the quality of the visitor experience. The first section contained a battery of open-ended questions which probed for park conditions and issues which visitors and others considered important to determining the quality of the park experience.

The second section of the questionnaire contained a battery of close-ended questions which also probed for indicators of quality. Fifty-three wide-ranging park conditions or issues were presented to respondents who were asked to indicate whether each item was considered to be a "big problem," a "small problem," or "not a problem;" a "no opinion" option was also presented. The items presented were developed on the basis of literature review, discussion with park planners and staff, and personal observations in the park.

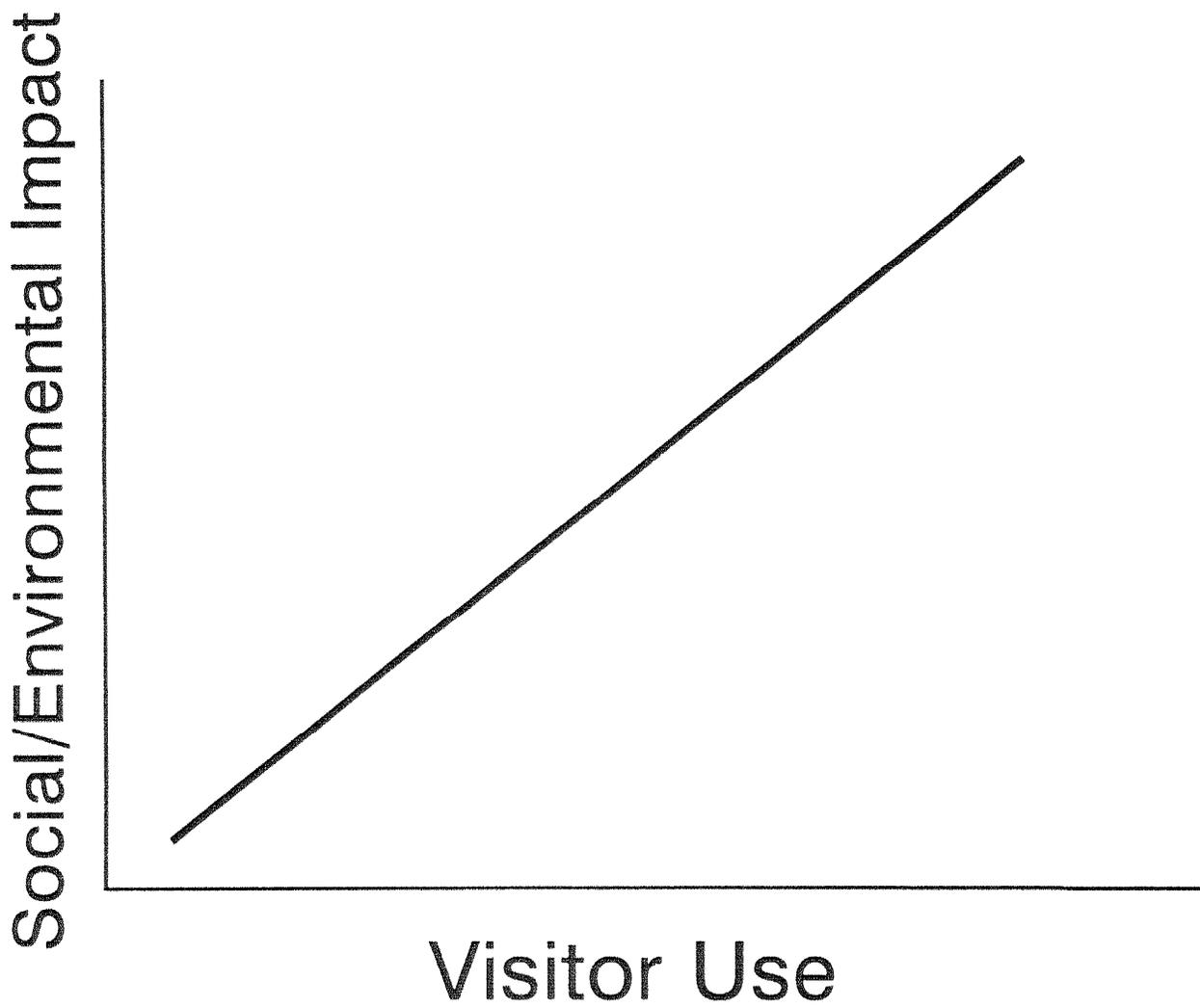


Figure 1. Hypothetical relationship between intensity of visitor use and environmental/social impacts.

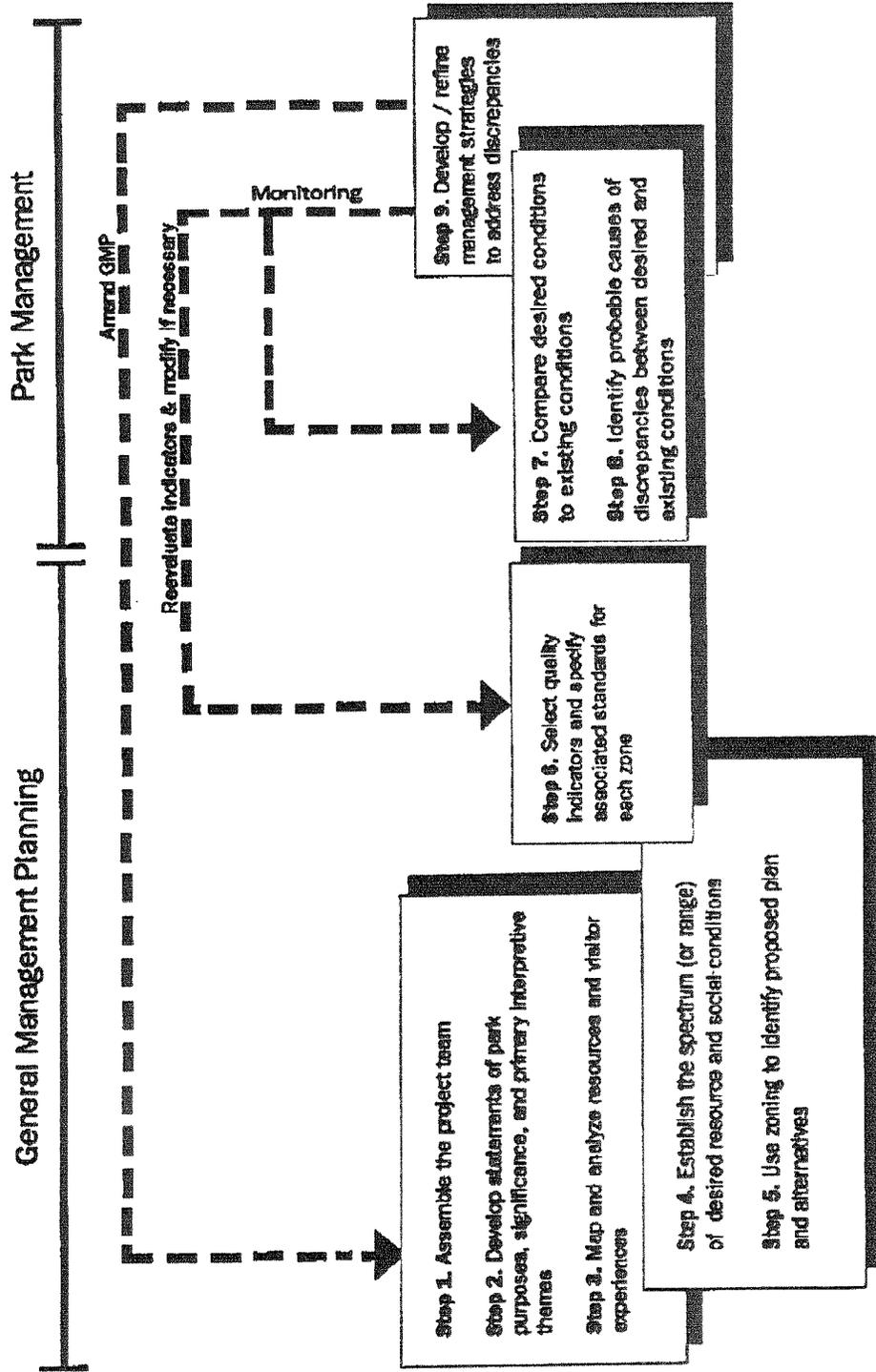


Figure 2. Visitor Experience and Resource Protection (VERP) process.

Responses to the battery of open-ended questions were coded into 91 categories. These categories were then grouped into eight similar subject matter classes or issues: 1) information/education, 2) facilities, 3) crowding, 4) visitor behavior and activities, 5) resource impacts, 6) park management actions, 7) natural features of the park, and 8) miscellaneous. It is apparent that visitors contacted perceive a variety of issues which have some importance in determining the quality of their park experience. Beyond this diversity, however, there is some consensus as well.

Good information, education, and interpretive facilities and services were often cited as contributing to the quality of the visitor experience, but relatively large numbers of visitors expressed a desire for more such programs. Many visitors feel it is important to know about the availability and location of visitor opportunities within the park and to learn more about the significance of park resources. An especially important theme of information and education efforts concerns the importance and knowledge of how to reduce visitor-caused impacts to park resources. For example, the opportunity to interact directly with a ranger through an interpretive program or informal conversation in the park is important to many visitors, and they frequently expressed the need for this activity to be expanded in the park.

Facility-related issues were also cited by many respondents. Many respondents found the hiking trails to their liking and appreciated the extent to which many of the park's major attractions were readily accessible. Visitor attitudes about other activity-related issues were more divided. The primary facility need appears to be more vehicle-accessible campsites. A host of other facilities were suggested by visitors, but each facility was mentioned by only a small minority of visitors. This was offset by a number of visitors who liked the general lack of facilities (or at least, commercial facilities) or felt no additional facilities should be developed in the park.

Many visitors contacted were concerned with crowding-related issues in the park. Twenty percent of respondents felt generally that there were "too many people in the park." Smaller numbers perceived some degree of crowding in selected locations such as parking lots, certain attraction sites, and trails.

Respondents expressed concern about a large variety of inappropriate visitor activities and behaviors. The most important of these behaviors was objection to visitors walking off trails.

Considerable visitor concern was focused on a variety of issues related to the resource impacts of public use. Relatively large numbers of respondents noticed and objected to resource impacts caused by off-trail hiking, graffiti, and litter.

Relatively few visitors included in the sample mentioned issues related to park management activity. The most frequently mentioned issue was that visitors found the park to be well maintained with a lack of visually obtrusive development, and that this contributed to the quality of their experience. For example, an especially positive condition was the general lack of signs and guard rails along park roads which, when present, detract from the visual quality of the setting.

Finally, the most frequently offered comment -- far and away -- was enjoyment and appreciation of the park's natural features, including the arches and the general scenery. While this is not surprising, it suggests that some indicator variable(s) be developed and monitored to ensure this opportunity is not diminished through damage to outstanding natural features or through facility development which detracts from their prominence or appreciation, or through diminished atmospheric visibility.

Responses to close-ended questions also illustrated that there were some widely shared concerns. A majority of respondents rated 14 of the 53 issues as a small or big problem. These 14 issues clustered into five categories:

1. Respondents reported considerable concern over visitors walking off trails and otherwise engaging in behaviors which caused *damage to park resources*.
2. Respondents expressed concern about selected aspects of *crowding* in the park.
3. Respondents expressed some concern over a perceived *lack of rangers* in the park.
4. Respondents expressed concern over two *facility-related issues*: lack of campsites and lack of drinking water.
5. Respondents expressed concern over a perceived *lack of public education programs* in the park.

Findings from the exploratory research in 1992 provided important insights into park conditions and issues which add to or detract from the quality of the visitor experience at Arches National Park. Potential indicators of quality range widely, spanning a variety of broad categories, including:

1. Orientation, information, and interpretive services
2. Visitor facilities
3. Visitor crowding
4. Visitor behavior and activities
5. Resource impacts of visitor use
6. Park management activities
7. Quality and condition of natural features

Phase II of the research program was conducted in 1993. The primary objectives of this phase of the research were to determine the relative importance of indicator variables and to set standards of quality for each indicator variable. A survey of park visitors was conducted in the summer and fall of 1993 at several locations throughout the park. The survey was administered to a representative sample of park visitors and was conducted by means of personal interviews and mail-back questionnaires.

The survey instruments contained two major sections related to carrying capacity. The first section focused on determining the relative importance of indicator variables identified in Phase I research. Fourteen indicator variables were distilled from the previous phase of research and respondents were asked to rate the importance of each variable in determining the quality of their experience at the particular location in the park where they were interviewed. This section of the questionnaire was needed for two reasons. First, Phase I research was qualitative in nature; its purpose was simply to explore for potential indicator variables. Phase II research was needed to become more quantitative by asking respondents to rate the relative importance of these potential indicators of quality. This required a larger and more representative sample. Second, it was hypothesized that indicator variables might vary by location within the park. Sampling was conducted at several areas within the park and questions were keyed directly at those specific areas. This would allow for a zoning approach to carrying capacity determination and management which was felt to be appropriate to a relatively large area such as a national park.

The second major section of the survey questionnaires was directed at determining standards of quality for selected indicator variables. Three indicator variables received special attention: 1) the number of people at one time at major attraction sites within the park, 2) the number of people at one time along major trails, and 3) the amount of environmental impact caused to soil and vegetation by off-trail hiking. All three of these variables were addressed by a series of photographs which illustrated a range of impact conditions. Photographs were developed using a computer-based image capture technology (Pitt 1990; Lime 1990; Nassauer 1990; Chenoweth 1990). Base photographs of park sites were taken, and these images were then modified to present a range of impact conditions. A set of sixteen photographs was developed for each attraction site and trail presenting a wide-ranging number of visitors present. An analogous set of five photographs was developed for a range of environmental impacts caused by off-trail hiking. Respondents rated the acceptability of each photograph. Representative photographs are shown in Figure 3.

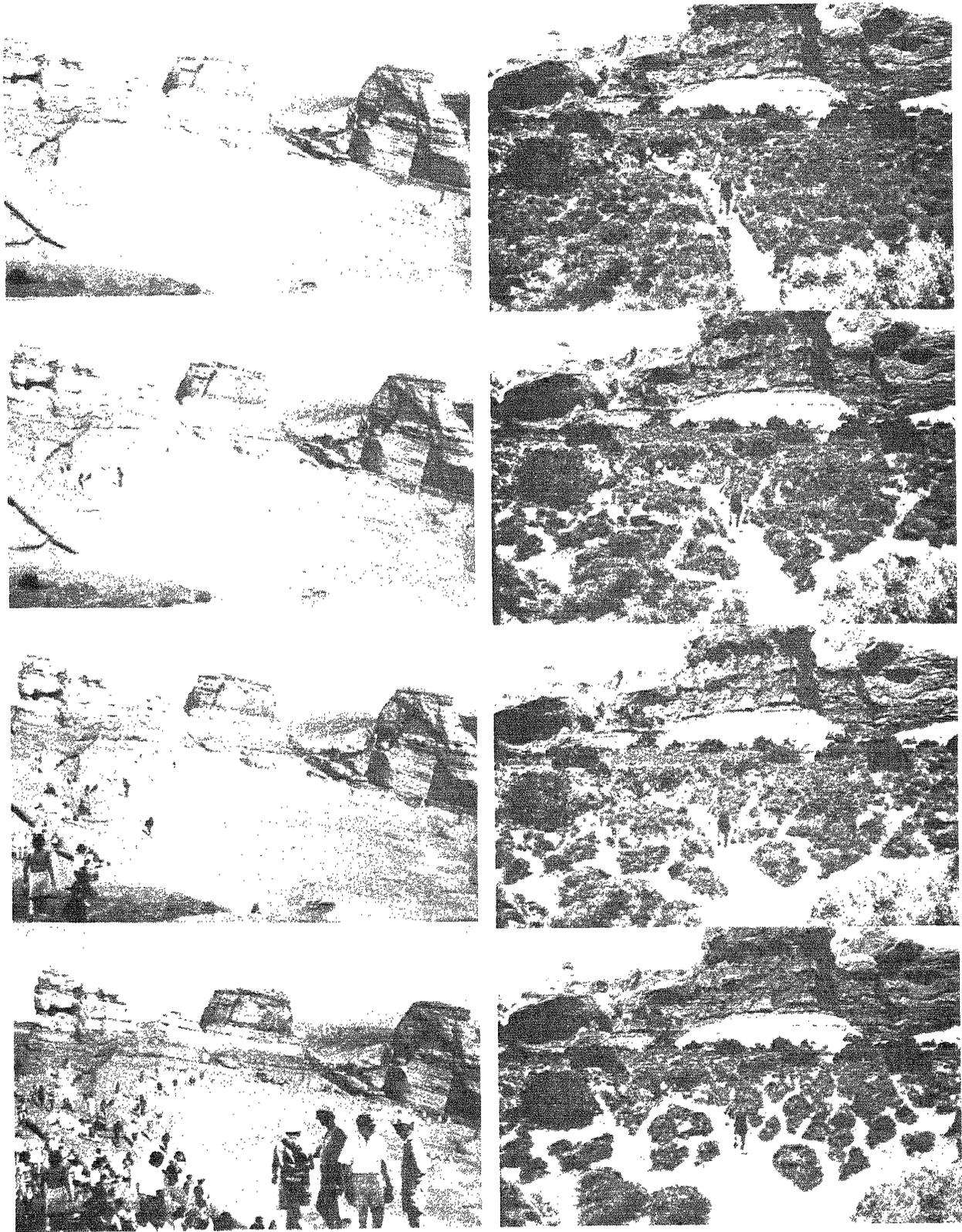


Figure 3. Representative photographs showing a) increasing levels of visitor use, and b) increasing levels of environmental impact.

Data from the second phase of the research program are now being analyzed. Standards-related data appear particularly promising. Figures 4 and 5 are illustrative. These graphs show the acceptability ratings of two of the sets of photographs described above. Figure 4 shows data for the number of people at one time at North Window, a major attraction site in the park. It is clear from the data that acceptability falls into the negative range between the photographs depicting 16 and 24 people. A regressed line plotted to these data crosses the "zero point" or "neutral line" at 20 people at one time. These findings provide a strong rationale for setting a standard of 20 people at one time at North Window.

Figure 5 shows data for the amount of environmental impact along trails at North Window. It is clear from the data that visitors are especially sensitive to this indicator variable. Only the first photograph in the series depicting the trail with no ancillary environmental impact or "social trailing" is judged acceptable. All other levels of environmental impact are judged unacceptable. These findings provide a strong rationale for setting a standard of no social trailing at North Window.

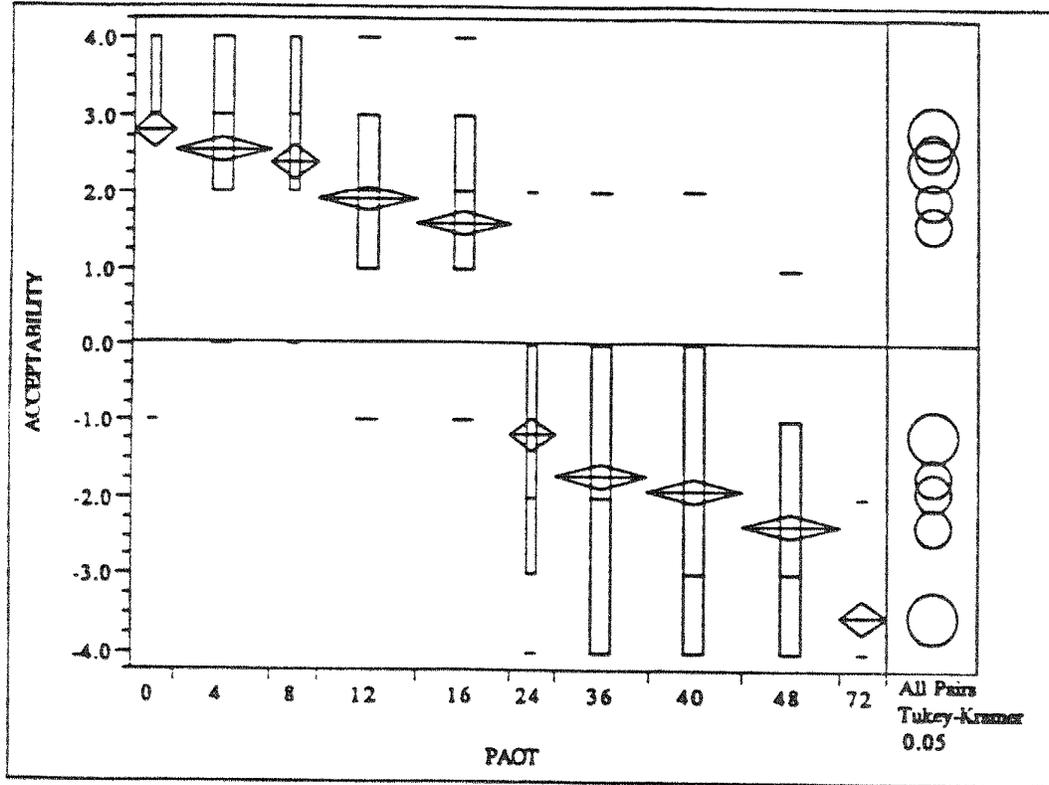


Figure 4. Normative standards for acceptability of the number of people at one time at North Window.

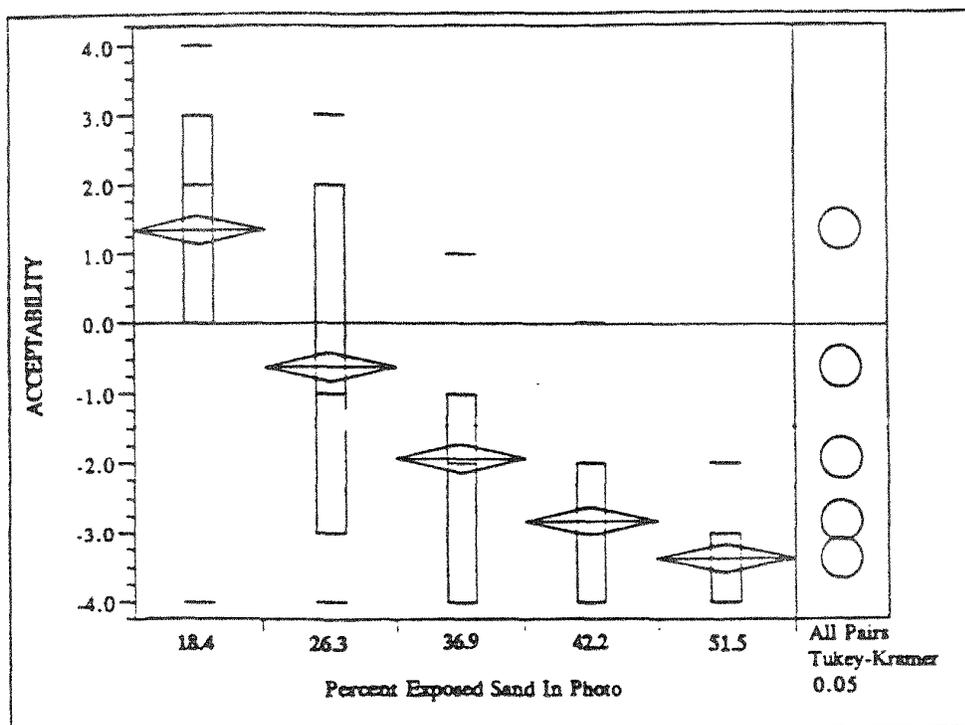


Figure 5. Normative standards for acceptability of environmental impact along trails at North Window.

Conclusion

The VERP program currently being developed by the NPS is designed to provide a theoretically sound basis for establishing and managing the carrying capacity of national parks and similar areas. The program focuses on identification of indicators and standards of the quality of the visitor experience. A monitoring program can then be established to determine whether or not standards, and thus carrying capacity, are being violated.

This program is now being applied at Arches National Park. A program of research has been conducted to identify indicators of the quality of the visitor experience and help set standards for these indicator variables. A variety of management actions will ultimately be initiated to manage the park within its defined carrying capacity. These actions might include the design capacity of attraction site parking lots and a trail/backcountry permit system. A monitoring program will be designed focused on indicator variables and will trigger management action if standards of quality are violated.

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*WILDLIFE AND FISHERIES
MANAGEMENT*



**MONETARY AND SOCIAL IMPACT
MEASURES OF VISITOR EXPERIENCE AND
THE EFFECTS OF A PIPING PLOVER
RECOVERY PROGRAM ON VISITOR
EXPERIENCE**

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This study examined visitor perceptions and attitudes towards their experience at a national wildlife refuge which limits access to its barrier beach during the nesting season of the threatened piping plover. It determined attitudes towards the closure, as well as what factors influenced these attitudes. It also examined how willingness to pay for refuge protection related to overall experience rating and attitudes towards wildlife protection and crowding. The data were gathered in 1993 in a self-administered user survey. The results indicate visitor support for the refuge and the beach closure, with those visitors interested in beach-related activities more likely to indicate less positive experiences and less support for the beach closure. A positive relationship was established between willingness to pay for refuge protection and a positive experience, as well as between willingness to pay and support for wildlife protection efforts and limiting the number of visitors.

Introduction

Parker River National Wildlife Refuge was designed to protect a species listed as threatened under the federal Endangered Species Act. The refuge beach was closed to all human recreational use for the past three years during the nesting season of the piping plover, lasting from April through July, to protect the shorebirds while they nested and reared their young. Since the refuge beach is a popular recreation destination during the spring and summer months, the closure has affected a number of refuge visitors. To analyze visitor satisfaction with the refuge experience, and the effect of the beach closure on visitor experience, this study analyzed visitor attitudes regarding their experience at the refuge, the value they place on the refuge as a recreational and natural resource, and how plover protection efforts affect these attitudes and values. It also examined how monetary measures of value related to perceptions of crowding and wildlife protection efforts, and whether experience ratings were related to willingness to pay into a refuge protection fund.

Although the same measures of visitor experience were not used in previous studies, studies conducted at beaches have shown that previous experience with a resource, knowledge of preservation issues, the visual landscape, and convenience all influence willingness to pay into coastal beach protection funds (Bell and Leeworthy, 1986; Lindsay et al. 1992). Perceptions of crowding and parking availability did not influence willingness to pay for resident Florida beach users, but tourists were willing to pay more for beach protection if they perceived increased crowding (Bell and Leeworthy, 1986). McConnell (1976) found that there was a relationship between number of people per acre of beach and willingness to pay for beach use, controlling for temperature, frequency of use, and income. Cicchetti and Smith (1976) also found a relationship between number of campsite and trail contacts and reduced willingness to pay levels.

Background

Parker River National Wildlife Refuge (Parker River, or The Refuge) is located on the southern two-thirds of Plum Island, located off Newburyport, Massachusetts, a coastal community approximately 60 miles north of Boston. The 4,462 acre refuge contains over six miles of undisturbed barrier beach and dunes, constructed dikes and lagoons for waterfowl resting areas, nature trails, observation towers, boardwalks, and a partially paved access road which runs the length of the refuge.

Currently, approximately 250,000 parties visit the refuge annually. The refuge serves as a popular recreation destination for beachgoers, bird watchers, wildlife and nature enthusiasts, environmental education classes, photographers, runners, bicyclists, and walkers. Clamming, waterfowl and deer hunting, berry picking and surf fishing are also active recreation activities which are permitted at various times of the year. This mix of activities has led to a wide variety of restrictions and active management strategies designed to mitigate the potentially adverse affects of human recreation on wildlife and wildlife habitat, and to minimize conflicts between different uses.

Methods

A visitor survey was conducted at the refuge from June through November of 1993. Visitors were given self-administered surveys as they entered the refuge. After pretesting, the survey was conducted between June and November of 1993, including summer months when the beach was open and closed, as well as autumn months. Results of the survey were analyzed using descriptive statistics, cross tabulation and chi-squared analysis, and analysis of variance.

Results

Visitor Experience at the Refuge

Ninety seven percent of respondents indicated that they had an excellent or good experience at the refuge (Table 1). Overall, they indicated strong support for the beach closure (Table 2), and did not feel that the closure either enhanced or detracted from their experiences (Table 3). Those visitors who came to the refuge to observe wildlife in general or birds in particular were more likely to indicate that the beach closure enhanced their experience (Figure 2), and were also more likely to support the closure (Figure 1). Those visitors who came to fish, walk, or use the beach indicated that the closure detracted from their experience, and were also less likely to support the closure.

Table 1. Visitor rating of overall experience at refuge.

Experience rating	Frequency	Percentage
Poor	4	1%
Fair	22	3%
Good	283	32%
Excellent	577	65%
TOTAL	886	100%

Table 2. Visitor support for beach closure.

	Frequency	Percentage
1= strongly support	554	62%
2	159	18%
3	109	12%
4	27	3%
5= strongly opposed	38	4%
TOTAL	887	100%

Table 3. Effect of beach closure on visitor experience.

	Frequency	Percentage
1= enhanced experience	93	11%
2	57	7%
3	475	57%
4	114	14%
5= detracted from experience	95	11%
TOTAL	834	100%

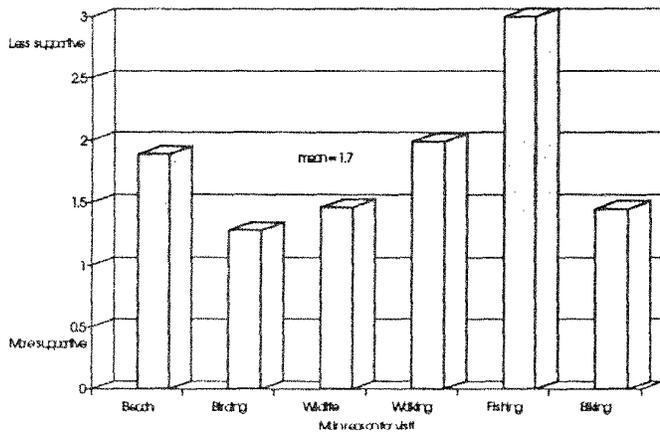


Figure 1. Support for beach closure by reason for visit.

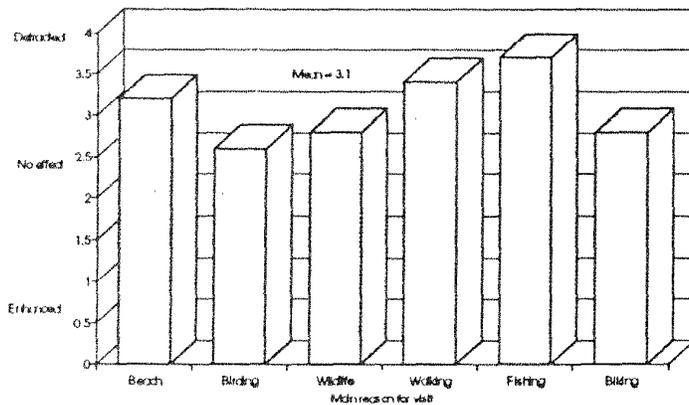


Figure 2. Effect of beach closure by reason for visit.

Specific questions were asked related to issues of crowding and perceptions of wildlife protection issues at the refuge. Visitors indicated slight disagreement with the statement that reducing the number of visitors at the refuge would be desirable, (a mean score of 2.49, with 1 = strongly disagree and 5 = strongly agree) indicating that crowding is not an important issue with the majority of visitors. The majority of visitors felt that wildlife protection measures are adequate at the refuge, or should be emphasized more, with 42 percent neutral and 35 percent agreeing or strongly agreeing with the statement "More measures

should be taken to protect wildlife and wildlife habitat at the refuge." Respondents also indicated that they did not feel measures to protect wildlife were overemphasized at the expense of recreation, with 72 percent indicating disagreement or strong disagreement with the statement "Wildlife protection has been overemphasized at the expense of recreation at the refuge." These responses indicated support for the mandate under which the refuge is managed, and are consistent with the support visitors indicated for current refuge management efforts. Given the fact that the most common reasons cited for visiting the refuge

involve recreation and wildlife observation, the support for existing protection efforts and the lack of perceived conflict between protection efforts and recreation indicate that visitors' experiences are not adversely affected by contact with other visitors, or by other uses of the refuge.

Monetary and Social Impact Measures of Visitor Experience

How visitors rated their experiences at the refuge was also assessed through determining the amount they were willing to pay into a fund dedicated to refuge protection. Of the 716 respondents answering the question, the average response was an annual contribution of \$24.44 per party.

To determine whether there was a relationship between monetary measures of the visitors' experiences and the social impact measures, one-way ANOVA tests were conducted. There is a significant and positive relationship between willingness to pay for refuge protection and positive experiences at the refuge: those who rate their experience highly are more likely to indicate greater amounts they are willing to pay for refuge protection efforts (Table 4). There is a positive and significant relationship between willingness to pay for refuge protection and support for existing or increased levels of wildlife protection measures at the refuge; those who value the wildlife protection measures at the refuge are willing to pay greater amounts towards further protection of the refuge than are those who do not place as much importance on wildlife protection (Table 6). There is also a positive and significant relationship between willingness to pay for refuge protection and support for reducing the number of visitors at the refuge (Table 7). Although more visitors disagree with the statement that the number of visitors should be reduced, those who do agree are willing to pay more for refuge protection.

Effects of the Beach Closure

Those visitors who rated their experience less highly were more likely to be visiting during the beach closure months (table 8). Support for the closure was not, however, influenced by when the visit took place. No statistically significant difference was noted between willingness to pay for refuge protection when the beach was open and when the beach was closed. The beach closure variable does not add explanatory power to the relationship between willingness to pay for refuge protection and visitor satisfaction expressed through experience rating; the relationship is not significantly affected by whether the beach is open or closed. Similarly, the beach closure variable does not change the significant and positive relationships between willingness to pay for refuge protection and beliefs regarding the importance of wildlife protection efforts and the desirability of reduced numbers of visitors.

Table 4. Relationship between rating of overall experience and willingness to pay for refuge protection.

How would you rate your experience at the refuge?	Mean willingness to pay for refuge protection	Frequency
Poor	\$10.00	4
Fair	\$19.00	15
Good	\$22.39	218
Excellent	\$25.17	466
TOTAL		703

a/ F statistic = 3.04*

Bartlett's test for equal variances:
 $\chi^2(3) = 0.7864$ Prob> $\chi^2 = 0.853$
 * = Significant at the .05 level

Table 5. Relationship between response to "Wildlife protection has been overemphasized at the expense of recreation" and willingness to pay for refuge protection.

	Mean willingness to pay for refuge protection	Frequency
1 = strongly agree	\$20.16	32
2	\$23.77	53
3	\$23.42	98
4	\$22.98	155
5 = strongly disagree	\$25.26	351
TOTAL		689

a/ F statistic = 1.17*

Bartlett's test for equal variances: $\chi^2(4) = 1.9175$
 Prob> $\chi^2 = 0.751$ * = Significant at the .05 level

Table 6. Relationship between response to "More measures should be taken to protect wildlife" and willingness to pay for refuge protection.

	Mean willingness to pay for refuge protection	Frequency
1 = strongly disagree	\$19.08	49
2	\$21.18	106
3	\$24.27	291
4	\$26.49	109
5 = strongly agree	\$25.11	130
TOTAL		685

a/ F statistic = 2.80*

Bartlett's test for equal variances: $\chi^2(4) = 3.8031$
 Prob> $\chi^2 = 0.433$ * = Significant at the .05 level

Table 7. Relationship between response to "Reduce number of visitors" and willingness to pay for refuge protection.

	Mean willingness to pay for refuge protection	Frequency
1= strongly disagree	\$21.39	140
2	\$22.44	210
3	\$25.25	249
4	\$27.62	60
5= strongly agree	\$30.86	29
TOTAL		688

a/ F statistic = 3.94*

Bartlett's test for equal variances: $\chi^2(4) = 3.6845$
 Prob> $\chi^2 = 0.450$ * = Significant at the .01 level

Table 8. Relationship between rating of overall experience and time of year.

	Experience:				TOTAL
	Poor	Fair	Good	Excellent	
Beach closed	3	10	82	153	248
Percent	75%	46%	29%	27%	28%
Beach open	1	12	201	424	638
Percent	25%	55%	71%	74%	72%
TOTAL	4	22	283	577	886
Percent	100%	100%	100%	100%	100%

a/ Pearson $\chi^2(3) = 8.4727$

Pr= 0.037*

* = significant at the .05 level

Summary

Results of the visitor survey revealed visitors had an overall positive perception of their experience, were supportive of the beach closure, and the majority felt that it neither enhanced nor detracted from their experience. Willingness to pay into a fund dedicated to refuge protection was positively related to positive perceptions of experience. When the visitors were attending the refuge (during the beach closure or when the beach was accessible) did affect visitor experience ratings, but did not affect support for the closure. Those most inconvenienced, including beach users and fishermen, were most likely to feel the closure detracted from their experience, while wildlife observers felt it enhanced their visit. The beach closure did not have a significant affect on willingness to pay for protection. Willingness to pay is also related to support for current or increased wildlife protection efforts at the refuge, and to decreasing use levels at the refuge.

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ANGLER SPECIALIZATION AMONG SALMON AND TROUT ANGLERS ON LAKE ONTARIO

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The angler specialization concept was studied using the expectancy model of motivation. An exploratory study of Lake Ontario salmon and trout anglers was conducted to test the relationships between the variables of the expectancy model of motivation and actual angling participation.

Introduction

The angling specialization concept was proposed by Bryan (1977, 1979) to explain the formation of motives and the general process of motivational change that leads an angler to seek different species, settings, equipment, and experiences. The hierarchical progression of angler social development proposed by Bryan

(1977, 1979) suggested that anglers could be categorized into four types: (1) occasional angler, (2) generalist angler, (3) tackle-species specialist, and (4) method-species-setting specialist. These angler types were based on angler equipment, target species, and fishing activities (e.g., dry fly trout angler) and tended to define the motivational context by association with the angling activity and equipment. The concept of angling specialization has been further explored by fisheries researchers interested in social interactions, angling motivations, and social implications for fishery management (Steele et al., 1990; Hahn, 1991; Ditton et al., 1992; Dawson et al., 1992a and 1992b).

One of the alternate motivational approaches to studying angler specialization is the expectancy theory (Dawson et al., 1992a). Expectancy theory provides an operational research approach to studying angler specialization and a comprehensive framework to assist managers in understanding the management implications of the findings. The expectancy model of motivation (Figure 1) used in this study is based on the work of Vroom (1964) and others (Hamner et al., 1983; Landy and Trumbo, 1983; Nadler and Lawler, 1983). The three variables of this theory are: (1) Expectancy -- the relative probability that an individual ascribes to his/her ability to perform a task successfully; (2) Instrumentality -- the relative probability that an individual ascribes to his/her ability to attain the desired outcome; and (3) Valence -- the relative value that an individual places on the expected outcome.

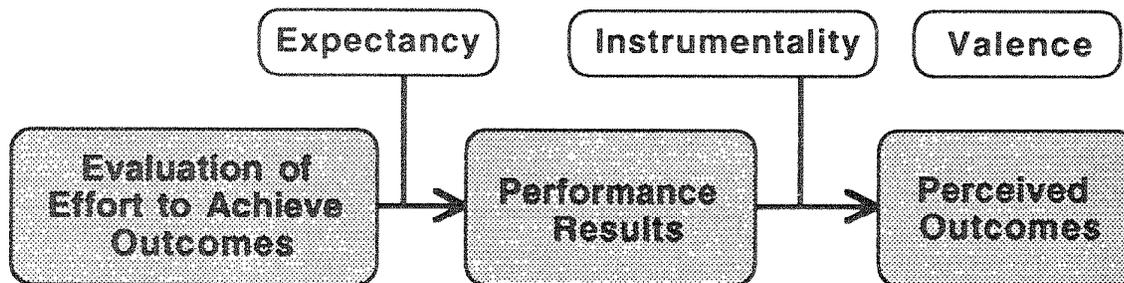


Figure 1. Expectancy model of motivation.

Methods

An exploratory study was conducted on Lake Ontario salmon and trout boat anglers to evaluate the angler specialization concept for the method-species-setting specialist category and test the relationships between the three variables of the expectancy model of motivation for specialized fishing activities. A sample of anglers was selected from respondents to a previous (1989) statewide survey of anglers who reported fishing in Lake Ontario during 1988 (Connelly et al., 1990). A random sample of 396 anglers was selected and sent a mail survey in 1992. Fifty-five surveys were undeliverable due to address changes by anglers. After two reminders, 190 anglers responded (56% response) of the 341 surveys deliverable.

Information collected on the mail survey included angling participation in Lake Ontario during 1991 for salmon and trout, fishing equipment and techniques used, and measures of angler expectancy, instrumentality, and valence. Salmon/trout angler expectancy was a self-reported rating of the individual's fishing skill or competence with a specific fishing technique for a specific species using a five point scale of: (0.00) Not competent, (0.25) Somewhat competent, (0.50) Competent, (0.75) Very competent, and (1.00) Extremely competent. Salmon/trout angler instrumentality was a self-reported rating of the individual's probability of catching one or more fish with given a fishing technique for a specific species using a five point scale of: (0.00) Not probable, (0.25) Somewhat probable, (0.50) Probable, (0.75) Very probable, and (1.00) Extremely probable. Salmon/trout

angler valence was self-reported participation in fishing on Lake Ontario during the years 1989 through 1992 (i.e., the number of years fished) for a specific species (i.e., Chinook & Coho salmon, Steelhead, Brown trout, and Lake trout); this assumes that the time and resources invested in participation is an index for the relative value of the outcome.

Anglers use different fishing techniques and equipment for different species depending on the season, fish location and depth, fish feeding habits and preferences, and angler equipment and ability. All anglers in the study fished Lake Ontario from a boat (i.e., the setting was similar for all anglers surveyed).

The first goal of this study was to investigate the three general variables in the expectancy model: expectancy, instrumentality, and valence. The statistical hypotheses examined were:

(1) Expectancy (technique competence) variables between species or between techniques were not associated; (2) Instrumentality (probability of catching fish) variables between species or between techniques were not associated; and (3) Valence (days of participation) variables between species or between techniques were not associated. The second goal was to investigate the relationship between the expectancy motivation scale score and actual participation for 1991 angling on Lake Ontario (the most recent year with complete annual participation information).

Results

Angler expectancy or fishing skill and competency ratings for each technique and species (Table 1) suggest that the average angler is reportedly competent in the use of downriggers and flatlining but somewhat less competent with planer boards. A high degree of variability in competency ratings was reported between anglers for each species and technique. The statistical hypotheses that these expectancy variables between species and techniques were not associated was rejected since the correlations between all 12 variables were statistically significant ($p < .001$) (Table 2).

Table 1. Mean reported fishing technique skill or competence (expectancy) ratings and standard deviations for each technique and species.

	Mean (rating)	Standard Deviation
Downriggers		
Salmon	.46	.29
Steelhead	.41	.30
Brown Trout	.43	.29
Lake Trout	.50	.32
Planer Boards		
Salmon	.27	.27
Steelhead	.28	.30
Brown Trout	.31	.31
Lake Trout	.26	.27
Flatlining		
Salmon	.44	.30
Steelhead	.41	.31
Brown Trout	.46	.31
Lake Trout	.41	.30

The self-reported angler instrumentality or probability of catching fish ratings for each technique and species (Table 3) suggest that the average angler considers it very probable that they can catch one or more fish with downriggers but somewhat less probable with planer boards and flatlining. A high degree of variability in instrumentality ratings was reported between anglers for each species and technique. The statistical hypotheses that these instrumentality variables between species and techniques were not associated was rejected since the correlations between the majority of all 12 variables were statistically significant ($p < .001$) (Table 4).

The average number of years (valence) that anglers have returned to fish for each species on Lake Ontario, since they were first contacted in 1988, suggests that the average angler more highly values salmon as a target species more than the other three trout species (Table 5). A high degree of variability in valence ratings was reported between anglers for each species. The statistical hypotheses that these valence variables between species were not associated was rejected since all of the correlations between the four variables were statistically significant ($p < .001$) (Table 5).

Table 2. Correlation coefficients for reported fishing technique skill or competence (expectancy) compared between technique and species (2-tailed significance test, and $p < .001$ for all correlations).

	Salmon	Downriggers			Salmon	Planer Boards			Salmon	Flatlining		
		Steel-head	Brown Trout	Lake Trout		Steel-head	Brown Trout	Lake Trout		Steel-head	Brown Trout	Lake Trout
Downriggers												
Salmon	1.00											
Steelhead	.85	1.00										
Brown Trout	.84	.79	1.00									
Lake Trout	.88	.76	.80	1.00								
Planer Boards												
Salmon	.62	.60	.52	.55	1.00							
Steelhead	.64	.70	.55	.57	.87	1.00						
Brown Trout	.62	.60	.62	.61	.84	.85	1.00					
Lake Trout	.54	.51	.51	.54	.82	.74	.77	1.00				
Flatlining												
Salmon	.55	.57	.51	.47	.46	.41	.37	.37	1.00			
Steelhead	.53	.67	.51	.44	.50	.57	.42	.44	.86	1.00		
Brown Trout	.58	.56	.64	.52	.42	.46	.53	.41	.80	.75	1.00	
Lake Trout	.44	.45	.45	.44	.37	.30	.30	.47	.82	.78	.72	1.00

Table 3. Mean reported probability for catching fish (instrumentality) ratings and standard deviations for each technique and species.

	Mean (rating)	Standard Deviation
Downriggers		
Salmon	.61	.29
Steelhead	.51	.30
Brown Trout	.55	.29
Lake Trout	.66	.30
Planer Boards		
Salmon	.34	.28
Steelhead	.38	.32
Brown Trout	.43	.33
Lake Trout	.34	.29
Flatlining		
Salmon	.38	.28
Steelhead	.40	.28
Brown Trout	.48	.30
Lake Trout	.38	.28

Table 4. Correlation coefficients for reported probability for catching fish (instrumentality) with a given technique compared between technique and species (2-tailed significance test, and $p < .001$ for all correlations greater than .26).

	Salmon	Downriggers			Salmon	Planer Boards			Salmon	Flatlining		
		Steel-head	Brown Trout	Lake Trout		Steel-head	Brown Trout	Lake Trout		Steel-head	Brown Trout	Lake Trout
Downriggers												
Salmon	1.00											
Steelhead	.77	1.00										
Brown Trout	.60	.60	1.00									
Lake Trout	.69	.62	.74	1.00								
Planer Boards												
Salmon	.47	.53	.34	.32	1.00							
Steelhead	.51	.65	.42	.45	.73	1.00						
Brown Trout	.45	.46	.59	.55	.54	.66	1.00					
Lake Trout	.19	.23	.35	.35	.57	.56	.58	1.00				
Flatlining												
Salmon	.38	.42	.21	.21	.57	.43	.26	.23	1.00			
Steelhead	.39	.47	.22	.29	.53	.63	.39	.39	.66	1.00		
Brown Trout	.32	.27	.46	.40	.24	.40	.64	.40	.40	.54	1.00	
Lake Trout	.11	.10	.24	.20	.26	.24	.20	.57	.47	.44	.52	1.00

Table 5. Mean number of years fishing for the target species (valence) and correlation coefficients for participation in fishing on Lake Ontario during the years 1989 through 1992 compared between species (2-tailed significance test, and $p < .001$ for all correlations).

Species	Mean (years of angling)	Correlation Coefficients			
		Salmon	Steel-head	Brown Trout	Lake Trout
Salmon	1.9	1.00			
Steelhead	1.3	.61	1.00		
Brown Trout	1.5	.54	.61	1.00	
Lake Trout	1.4	.45	.44	.66	1.00

The number of days that anglers have fished for each species using the three techniques on Lake Ontario suggests that the average angler prefers salmon as a target species more than the other three trout species (Table 6). A high degree of variability in participation was reported between anglers for each species and technique. The statistical hypotheses that these participation variables between species and techniques were not associated was rejected because the majority of the correlations between the 12 variables were statistically significant ($p < .001$) (Table 7).

The scale scores for motivation using the expectancy theory were calculated, on a case-by-case basis, by the formula that motivation = expectancy x instrumentality x valence. The highest scale scores were for salmon and lake trout fishing using downriggers (Table 8). The calculated scores range from 0 to 1 and had a high degree of variability. To test these motivation scale scores, they were compared with the participation variables for 1991 on Lake Ontario to determine if there was any correlation between motivation and actual angling participation.

the correlations between the motivation scale scores and actual participation were not as high as anticipated; ranging from .21 to .70 (Table 8). Stronger correlations were observed between the valence variable and actual participation (i.e., a one-variable comparison with participation and not the three-variable scale score that includes valence); ranging from .43 to .77 (Table 8). However, the correlation between valence and actual participation in 1991 also raises questions about the use of this variable (i.e., number of years fished) to represent valence in this study.

Discussion

The specialization concept suggests that method-species-setting specialists would tend to focus on specific target species and fishing techniques. This study attempted to hold the setting relatively constant by choosing Lake Ontario boating anglers who use three distinct angling methods and target four species of fish. Previous studies indicated that Lake Ontario anglers use different fishing techniques and equipment for different species depending on the season, fish location and depth, fish feeding habits and preferences, and angler equipment and ability. The anticipated results from this study were that: (1) distinct groups of anglers would be categorized by angling techniques used and target species sought (i.e., associations between the 12 species and fishing technique combinations would not be evident); and (2) the motivational scale score calculated by the expectancy theory

Table 6. Mean reported number of days fishing on Lake Ontario during 1991 and standard deviations for each technique and species.

	Mean (days of angling)	Standard Deviation
Downriggers		
Salmon	4.6	12.2
Steelhead	2.5	7.1
Brown Trout	2.2	6.1
Lake Trout	3.1	9.6
Planer Boards		
Salmon	0.4	2.0
Steelhead	0.9	3.7
Brown Trout	1.6	10.0
Lake Trout	0.1	0.7
Flatlining		
Salmon	0.6	2.0
Steelhead	0.7	2.7
Brown Trout	0.7	2.3
Lake Trout	0.3	1.0

Table 7. Correlation coefficients for reported number of days of fishing on Lake Ontario during 1991 compared between technique and species (2-tailed significance test, and $p < .001$ for all correlations greater than .25).

	<u>Downriggers</u>				<u>Planer Boards</u>				<u>Flatlining</u>			
	Salmon	Steel-head	Brown Trout	Lake Trout	Salmon	Steel-head	Brown Trout	Lake Trout	Salmon	Steel-head	Brown Trout	Lake Trout
Downriggers												
Salmon	1.00											
Steelhead	.72	1.00										
Brown Trout	.68	.82	1.00									
Lake Trout	.75	.80	.78	1.00								
Planer Boards												
Salmon	.44	.44	.37	.37	1.00							
Steelhead	.57	.42	.39	.40	.77	1.00						
Brown Trout	.41	.25	.15	.18	.89	.82	1.00					
Lake Trout	.17	.28	.21	.25	.19	.21	.09	1.00				
Flatlining												
Salmon	.25	.26	.30	.37	.16	.23	.07	.07	1.00			
Steelhead	.56	.46	.50	.51	.79	.76	.72	.06	.35	1.00		
Brown Trout	.32	.28	.37	.32	.18	.19	.11	.08	.23	.40	1.00	
Lake Trout	.13	.10	.06	.23	.01	.02	.01	.24	.58	.14	.26	1.00

approach would be highly correlated with actual participation (i.e., associations between motivational scale scores and actual participation for the 12 species and fishing technique combinations would be evident). Such results were not found in the statistical results presented herein nor in additional cluster and factor analysis study results conducted but not presented here.

Possibly a more extreme comparison between salmon/trout (e.g., cold-water fishery) and bass anglers (e.g., warm-water fishery) on Lake Ontario would have produced results that fit better with the general fishing specialization concept. However, additional variables on angler preferences and substitution for target species, angler preferences and substitution for fishing techniques, abundance and availability of target species, and others may be important to understanding the limits of the fishing specialization concept versus more opportunistic angler behavior.

The statistical correlations found in this study between the 12 target species and fishing technique variables for expectancy, instrumentality, valence, and actual participation suggest that the specialization concept is more complex and multidimensional than indicated by earlier researchers. For example, some anglers on Lake Ontario may be more specialized on fishing techniques than species and more opportunistic in that they will target

whatever species of trout and salmon that is susceptible to the fishing techniques they are more competent with in that area and season. Such possibilities do not fit easily within the current fishing specialization concept as presented by Bryan (1977) and will require the development of more complex models of angler behavior, decision-making, and motivation, and the use of multivariate statistical analysis for empirical testing of such theories and hypotheses.

This exploratory study has shown the difficulties inherent in operationalizing a model of angler behavior using the expectancy theory. Determining an appropriate valence variable (i.e., the relative value that anglers place on the expected outcome of successfully catching the target species) was problematic and the one employed in this study (i.e., number of years of fishing with the techniques for the target species) was highly correlated with actual days of fishing participation in 1991 on Lake Ontario. Conversely, the motivational scale score derived from this expectancy model was not highly correlated with actual fishing participation in 1991 on Lake Ontario for salmon/trout boat-based anglers.

Table 8. Mean expectancy scale scores (score = expectancy x instrumentality x valence) and standard deviations and scale score correlations with participation and valence variables (2-tailed significance test, and $p < .001$ for all correlations greater than .30) for each technique and species.

	Mean Expectancy Scale Score	Standard Deviation of the Expectancy Scale Score	Scale Score Correlation with Actual Participation	Valence Correlation with Actual Participation
Downriggers				
Salmon	.81	.98	.44	.66
Steelhead	.52	.92	.60	.74
Brown Trout	.54	.83	.35	.70
Lake Trout	.71	1.00	.38	.77
Planer Boards				
Salmon	.30	.49	.32	.43
Steelhead	.38	.81	.69	.60
Brown Trout	.41	.80	.35	.61
Lake Trout	.26	.60	.70	.51
Flatlining				
Salmon	.43	.67	.21	.51
Steelhead	.40	.78	.27	.68
Brown Trout	.52	.89	.40	.69
Lake Trout	.36	.73	.38	.60

Some of the concepts reported in the literature on angler progression through sequential and hierarchical stages of fishing specialization appear intuitively pleasing and are part of the current concepts in fisheries management; however, empirical evidence to support or alter such concepts is more difficult to obtain. At present, research on models of angler or any recreational behavior and decision-making is fragmented and not integrated or comprehensive. The challenge for the future is to develop empirically based models of angling behavior and decision-making that can describe angler behavior patterns, predict angler behavior under varying circumstances, and suggest how fishery managers can influence angler behavior.

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EFFECT OF EXPERIENCE, EXPECTATION AND RESOURCE AVAILABILITY ON PERCEPTIONS OF CROWDING AMONG TROUT ANGLERS IN PENNSYLVANIA.

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Crowding research has suggested expectancy theory as one explanation to perceptions of crowding expressed by participants in outdoor recreation activities. Expectancy theory states that an individual enters into an activity with a preconceived set of expectations for the outcome of the experience. In this study, anglers fishing on the opening day of Pennsylvania's trout season were surveyed in an effort to determine if level of expected contacts influenced perceptions of crowding. Anglers were assigned to one of two groups, those with prior experience fishing the site on opening day and those new to the site for opening day. Mann-Whitney tests for two independent samples suggests prior experience does not play a role in explaining anglers' perceptions of crowding. A discussion of the importance of the temporal and situational dimensions of crowding research is also provided.

Introduction

Crowding has been one of the most frequently studied phenomena in outdoor recreation research (Manning 1985; Shelby et al. 1989). The psychological dimensions of crowding have been examined from the theoretical perspectives of expectancy (Shelby et al. 1983), discrepancy (Schreyer and Roggenbuck 1978) and normative behaviors (Gramann 1982). Schreyer and Roggenbuck (1978) proposed crowding research be conducted under the psychological domain of expectancy theory. Expectancy theory, as related to outdoor recreation by Schreyer and Roggenbuck, states that the recreationist has a predetermined set of expectations for an outdoor experience. Included in this set of expectations is the expected level of encounters with others while participating in the chosen activity. Crowding is then perceived to occur if the level of contacts experienced exceeds that which was expected.

The application of expectancy theory has been instrumental in separating crowding from reflections of density. Schreyer and Roggenbuck (1978) found expectations to be a significant factor in the subjective assessment of crowding by river floaters. In their study, expectations for the outcomes of the experience were examined concurrently with expectations for contact with others. Where the actual contacts exceed those expected, crowding was stated to occur. The level of perceived crowding differed by motivations and experience outcomes. Absher and Lee (1981) found experience motives to be a stronger predictor of crowding perceptions than actual density levels. Those backcountry users desiring solitude and shared experience with others in their group expressed the highest perceptions of crowding when contacts with others exceeded their level of expectation.

High levels of density may occur in an outdoor recreation setting, but the conditions may not necessarily be perceived as crowded by the participants due to their expectations for contacts. Graefe et al. (1986) found expectations for contact to be an indicator of perceived crowding than encounters with other visitors in backcountry settings, even when expectations for contacts were higher than the participant desired. This acceptance of higher density may be due to past experience with the site, thus providing the visitor with a reference from which to establish a

level of expected encounters with others (Vaske et al. 1980; Ditton et al. 1983).

Crowding perceptions may also be influenced by the preferences for the experience expressed by the recreationist. Shelby et al. (1983) reviewed six different studies related to crowding perceptions. While the studies were conducted with different activities, their analysis showed preference variables to be related to crowding perceptions for some activities, although preferences were not as strongly related to crowding perceptions as expectation variables. In some outdoor recreation activities (e.g., deer hunting), preferences may actually be for a higher density than for other activities. In these situations, preference may not be an adequate predictor of crowding.

The influence of social behavior has been effectively associated with perceptions of crowding (Gramann 1982; Manning 1985; Vaske et al. 1986; Williams et al. 1991). Under the theoretical domain of normative behavior, the social psychological aspect of crowding is related not so much to how many people are encountered as to the behavior of those encountered. Normative behavior theory implies that encounters with other recreationists are evaluated on the basis of the behavior exhibited by those encountered. These behaviors are evaluated and compared to a set of standard behaviors by the participant, and if the behaviors expressed by others is found in contrast to those deemed appropriate by the participant the situation may be determined as crowded.

An extensive review of thirty-six studies relating to crowding research was conducted by Shelby et al. (1989). Five hypotheses were proposed for this composite analysis. First, it was proposed that crowding perceptions would vary in a temporal dimension, either by time of use or by season. Second, crowding would be dependent on resource abundance or availability, with different perceptions of crowding expressed by consumptive vs. non-consumptive recreationists. Third, the researchers proposed crowding would differ by the level of access the recreationist felt was provided to the resources. Fourth, crowding was hypothesized to differ by type of use (i.e. consumptive versus nonconsumptive). Fifth, crowding was stated to be related to different management actions for the site.

Results of the review of the research studies by Shelby and others (1989) supported four of the five hypotheses. Only the fourth hypothesis, crowding differed by type of use was rejected as not significant. This review has several suggestions for the current study. First, crowding perceptions may differ by time or season of use. In the present study reported here, anglers fishing on the opening day of the season may report different levels of crowding than those surveyed at another point in the season. Second, the notion that crowding may differ by resource availability is an important point if anglers feel there are more fish available early in the season when stocking has recently occurred. Another aspect related to the present study is the role played by management actions in crowding perceptions. Stocking trout prior to an during the early portion of the trout fishing season is a management action that may influence the crowding perceptions expressed by the anglers involved.

Hypotheses

The present study deals with perceptions of crowding among trout anglers on the opening day of trout season in Pennsylvania. In order to examine the possible perceptions of crowding expressed by the participants in this study, four hypotheses are proposed.

- H₁: Perceptions of crowding are not related to past experience at site.
- H₂: Perceptions of crowding are not related to environmental conditions.
- H₃: Perceptions of crowding are independent of resource availability.

The first hypothesis addresses the application of expectancy theory in crowding research. The second hypothesis seeks to investigate possible interactions between perceptions of resource availability and crowding. The third hypothesis concerns the possible influence group membership may have on perceived crowding, while the fourth hypothesis addresses the theory of normative behavior and perceived crowding.

Methods

This study was originally intended to include three streams: Spring Creek (a no harvest stream), Logan Branch (a limited stocking, wild trout stream) and Bald Eagle Creek (high stocking stream). Heavy rains and flooding prior to the opening day of trout season prevented the use of these streams as study locations. As an alternative to the use of the streams for this study, a local lake was selected under the assumption that the weather would displace anglers from the streams and those wishing to fish on the opening day would seek out local lakes.

Description of Study Site

This study was conducted in Poe Valley State Park in Centre County, Pennsylvania. Located approximately 35 miles east of the town of State College, Poe Valley State Park offers boating and fishing on a thirty-five acre impoundment situated in a small valley on the top of Broad Mountain.

Sample Population

Data for this study were obtained through on-site interviews with anglers fishing at Poe Valley State Park on Pennsylvania's opening day of trout season (April 17, 1993). The opening day is typically one of high angler densities, and suitable for examining the relationship between expectations toward crowding and the realized experience. Each angler participating in the study was approached by the researcher and asked to complete a questionnaire. The survey instrument consisted of eighteen questions. Fourteen of the questions were of an ordinal, Likert-type of response, and four questions were continuous in nature as interval responses. Follow-up studies were attempted for two subsequent weekends, but were unsuccessful due to a low turn out of anglers on the following weekends. As a result of the low angler participation on the weekends following the opening day, data for this study were limited to the responses obtained from the opening day sample.

The purpose of this study was to measure the perception of crowding experienced by the anglers participating in opening day fishing activities. Two measures of crowding were used. The first measure asked the angler if there were more or less people than he or she had expected and used a five-point Likert scale ranging from much less than expected to much more than expected.

The second measure of perceptions of crowding involved the use of the nine-point Likert scale suggested by Vaske et al. (1980). This scale denotes positions one and two as "not crowded" and three through nine as "slightly crowded" to "very crowded," respectively. Anglers were also asked if the number of people present on this day different as "more," "same" or "less" from past years.

In addition to perception of crowding, questions examining the angler's resource orientation, fishing experience and level of participation were also asked. The final question asked for the number of fish that angler had caught thus far.

Results

Data Analysis

A total of 31 completed questionnaires were obtained through the opening day sample. The mean response for expectations of crowding was 3.0 or "about the same as expected," indicating the respondents evaluated the level of contact to meet with their expectations. The mean response for the nine-point crowding scale was 5.5, indicating the mean response to be interpreted as "crowded." Table 1 provides a summary of the means for selected variables in the questionnaire.

Table 1. Means and standard deviations for crowding variables by angler type.

New Anglers (N = 13)		
	Mean	St.Dev.
Expected Level of Contacts	3.7	0.78
Perceptions of Conditions	2.7	0.48
Perceptions of Crowding	5.7	2.06
Number of Fish Caught	1.0	0.92
Past Anglers (N = 18)		
	Mean	St.Dev.
Expected Level of Contacts	3.5	1.2
Perceptions of Conditions	2.5	0.7
Perceptions of Crowding	5.3	2.33
Number of Fish Caught	4	2.71

The responses were classified by those who had prior experience fishing the lake on opening day of trout season and those who were new visitors to the lake for the opening day. A Mann-Whitney test for two independent samples was conducted to determine if a difference in perceptions of crowding existed between the two groups (Table 2). Based on the results of the Mann-Whitney test, it was determined that no difference in perceptions of crowding exists between the two groups ($\alpha = .05$), thus hypothesis H1 is not rejected.

Table 2. Mann-Whitney confidence interval and test for perceptions of crowding.

New Anglers	N = 13	Median = 6.000
Past Anglers	N = 18	Median = 5.000
Point estimate for ETA1-ETA2 is -0.000		
95.2 pct c.i. for ETA1-ETA2 is (-1.000,2.000)		
W = 216.0		
Test of ETA1 = ETA2 vs. ETA1 n.e. ETA2 is significant at 0.7640		
The test is significant at 0.7615 (adjusted for ties)		
Cannot reject at alpha = 0.05		

Past experience was used as an independent variable in comparison to perceptions of fishing conditions. A index of fishing conditions was derived from items asking about the quality of the fishing on that day, water conditions, and weather. Past users did not indicate a difference in perceptions of fishing conditions when compared with new anglers. Hypothesis H2, no difference in perceptions of fishing conditions exist between anglers with past experience and anglers with no site experience, cannot be rejected at $\alpha = .05$. The Mann-Whitney test for independence for perceptions of fishing conditions is presented in Table 3.

Table 3. Mann-Whitney confidence interval and test for perceptions of fishing conditions.

New Anglers	N = 13	Median = 3.0000
Past Anglers	N = 18	Median = 2.0000
Point estimate for ETA1-ETA2 is -0.0000		
95.2 pct c.i. for ETA1-ETA2 is (-0.0001,1.0000)		
W = 234.5		
Test of ETA1 = ETA2 vs. ETA1 n.e. ETA2 is significant at 0.2980		
The test is significant at 0.2431 (adjusted for ties)		
Cannot reject at alpha = 0.05		

The number of fish caught and competition from other anglers were used as indicators of the availability of the resource. New anglers caught significantly less fish than anglers with prior experience at the lake and were no as adept at locating prime locations for fishing. New anglers thus showed a significant difference from anglers with prior experience at the lake on opening day (Table 4). Hypothesis H3 states that perceptions of resource availability do not differ between new and past anglers, and cannot be rejected at a = .05.

Table 4. Mann-Whitney confidence interval and test for resource availability.

New Anglers	N = 13	Median = 1.000
Past Anglers	N = 18	Median = 4.000

Point estimate for ETA1-ETA2 is 3.000

95.2 pct c.i. for ETA1-ETA2 is (-4.001,-1.000)

W = 135.0

Test of ETA1 = ETA2 vs. ETA1 n.e. ETA2 is significant at 0.0037

The test is significant at 0.0032 (adjusted for ties)

Discussion

The results of this study lend support for the relationship between expected level of contacts and perceptions of crowding. The failure to reject hypothesis H1, that no difference exists between new and past anglers in perceptions of crowding, indicates that expectations of crowding conditions were no different for anglers who have fished the lake on opening day than for anglers new to the lake on opening day. It can be interpreted that the expectations for fishing conditions in terms of angler density was anticipated by both groups, and thus neither group showed a tendency to indicate that the lake was crowded.

The second hypothesis, perceptions of crowding are not related to environmental conditions, was not rejected. In this case the anglers present did not view the presence of other anglers as a negative influence on the fishing conditions of the lake. It may be argued that expectations for weather and water conditions were also a factor in determining the anglers' subjective evaluations of the fishing conditions, and thus the anglers did not view the conditions negatively.

The third hypothesis, that crowding is related to resource availability, was supported and the null hypothesis H3 was rejected. In this study the respondents did not feel crowded conditions contributed to competition for the trout available. Crowding was expressed evenly by those who had caught trout and those who had not. Perhaps the access to the lake shore had an effect on the relationship between perceptions of crowding and resource availability. The anglers in this study had ample room in terms of access to the lake shore for fishing. Had conditions been such that this access was denied, perhaps a possible relationship between the variables for resource availability and perceptions of crowding would have been more apparent.

Conclusions

The results of this study support the application of expectancy theory in crowding research. More attention is needed to the factors which contribute to the development of expectations for level of encounters. Further studies are needed to examine the importance of the temporal dimension in crowding research. Consumptive activities (i.e. hunting and fishing) are regulated by law to have specific starting and ending dates. By having such starting and ending periods, expectations and level of participation may be influenced by the seasonal aspect of these activities. As this study attempted to investigate crowding perceptions on the opening day of trout season, so might further research examine the possible changes in expectation from the opening day of the fishing season across other user days throughout the fishing season.

Further research could also investigate perceived crowding following periods of high resource availability, for example following the stocking of trout in certain streams. The dimension of competition for available resources could effect the perceptions of crowding on the part of the participants. Those participants harvesting game or fish may view crowding conditions differently from those not filling their bags or creels.

In conclusion, it must be stated that the results of this study must be viewed with some degree of caution. Larger sample sizes should be employed. The study presented here used a small sample from only one location at one particular period of time. Further research could expand on this study to note perceptions of crowding at similar sites on the opening day of fishing season, as well as differences between lakes and streams. Comparisons between lakes and streams would allow for the examination of the possible influence of environmental conditions on perceived crowding.

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HUMAN RELATIONSHIPS WITH WILDLIFE

IN VERMONT

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Although fish and wildlife are common property resources owned by the public as a whole, agencies charged with decision-making about them often respond to pressure from special interest groups. While we have substantial information about the characteristics and motivations of special interest group members, we have far less knowledge about the attitudes of the general public. This study reports the results of a November, 1993 survey of the general public in Vermont regarding their attitudes about wildlife. Results indicate that Vermonters as a whole are extremely interested in wildlife, and are generally supportive of hunting and fishing. Attitudes about individual animals are highly species specific. Vermonters see man and his development as a manifestation of the natural world, but are apprehensive about our ability to interfere with natural processes. Knowledge of the general public's attitudes may point the way towards resolving many natural resource conflicts.

Introduction

With few exceptions, fish and wildlife are common property resources until they are legally captured. Ownership rights are usually vested to individual states, and fish and wildlife basically belong to residents of a state. Yet, when it comes to decision-making, policy formation is generally driven by highly vocal, special interest groups such as organized sportsmen, animal rightists, or others who oppose them. Fish and wildlife management agencies have often formulated policy around the needs of these groups on the premise that they are the most interested and affected parties. However, evidence is mounting that concern for fish and wildlife resources extends well beyond these interest groups (Kellert 1980; Glass et al 1990; Stevens et al. 1991; Boyle and Bishop 1987). Indeed, much of the success of the conservation movement as a whole can be attributed to broad public support in addition to the contributions of specific groups such as hunters and anglers. Unfortunately, while we have information on the characteristics, motivations, and perceptions of specific interest groups, we have far less knowledge of these factors for the public at large. Information on the values that the public as a whole places upon fish and wildlife, the underlying motivations for their involvement and concern, and, most especially, how the public wants its common property resources managed could help place the demands of specific interest groups in proper perspective.

In Vermont, there are diverse attitudes about fish and wildlife. Although Vermont is a rural state with a strong tradition of hunting, fishing, and trapping, recent years have seen growing polarization around these activities. Hunting and trapping in particular have a highly vocal opposition and a 1993 proposal to permit moose hunting was widely debated throughout the state.

Methods

To gain a better understanding of the views and perceptions of Vermont residents regarding fish and wildlife, a questionnaire was developed and mailed to 2,000 randomly selected Vermont households in November, 1993, following techniques described by Dillman (1978). The adult having the next birthday was asked to complete the questionnaire to reduce the chance of sex bias. After the questionnaire and two reminders were sent, a follow-up telephone survey was conducted with a randomly selected subsample of nonrespondents. Results from mail and telephone surveys were tested to determine if any differences were statistically significant. Data from the questionnaires were tabulated and frequencies run.

Results

The initial mail survey generated 669 completed questionnaires (41% response rate, after adjusting for undeliverables). There were no significant differences between mail questionnaire respondents and telephone survey of nonrespondents.

Results indicate that Vermont residents are interested in wildlife and wildlife-related issues. In fact, 98 percent of the respondents were either "somewhat interested" (40.3%) or "very interested" (57.7%) in wildlife. Even when asked how important are wildlife-related issues in context of Vermont's other current problems, 91 percent indicated that wildlife was either "very important" (41.9%) or "important" (49%).

With respect to people's relationships with wildlife, 81 percent agreed that "people are dominant, but have an obligation to minimize suffering that they may cause." By contrast, 18 percent indicated that "people and animals are equals" and only one percent felt that "people are dominant and can treat animals as they want." There was substantial support for consumptive uses of wildlife among the general public: two-thirds of the respondents disagreed with the statement that "trapping is never acceptable," and 95 percent of the respondents agreed that hunting was acceptable, at least under some circumstances.

When asked what best describes their sense of the relationship between people and nature, 64 percent of the sample agreed that "people and their developments are entirely natural and should be considered part of nature". The remainder were equally divided between those who thought "people and their developments are separate from nature" and those who were not sure since they usually didn't think in those terms.

Not all members of the animal kingdom are equally popular with the general public. To determine the species-specific effects of popularity, we constructed a hypothetical situation in which a vegetable garden was being destroyed. Assuming that various controls such as repellents, fencing, and live trapping had failed, we asked respondents if they would destroy animals from a list of selected species. The results demonstrate that the highest proportion would destroy small invertebrates (slugs and insects) and the smallest proportion would destroy large mammals (Table 1). More than 9 out of 10 respondents would eliminate Japanese beetles and slugs, while 87 percent would destroy corn borers. Mice were the only other species that more than one-half of the respondents indicated they would destroy. Less than one-half of the respondents would kill the remaining species destroying their garden. White-tailed deer and dogs were the animals that fewest of the respondents would destroy.

A question was also asked concerning the acceptability of taking animals from the wild and keeping them in captivity (Table 2). Only in two cases--rehabilitation after injury and for scientific research--did more than one-half of the respondents agree that keeping a wild animal in captivity is acceptable. However, the respondents were ambivalent with respect to confining wild animals for classroom education and public education displays. Keeping wild animals in captivity for pets, for commercial entertainment, and as breeding stock for commercial purposes were soundly rejected.

Table 1. Reaction of Vermont residents toward destruction of vegetable garden pests after other control measures failed.

Species	<u>Would destroy</u>		<u>Would not destroy</u>		<u>Not sure</u>	
	Number	Percent	Number	Percent	Number	Percent
Japanese beetles	584	91.7	20	3.3	32	5.0
Slugs	578	91.2	22	3.4	34	5.3
Corn borers	549	87.0	23	3.6	59	9.4
Mice	455	72.5	119	19.0	54	8.5
Woodchucks	301	47.8	243	38.1	88	14.1
Crows	269	42.9	278	44.1	80	13.0
Blackbirds	232	36.8	293	46.4	104	16.9
Skunks	225	35.8	288	45.4	116	18.8
Raccoons	195	30.9	327	51.7	107	17.4
Cottontail rabbits	151	24.2	353	56.4	118	19.3
Dogs	110	17.3	406	64.4	114	18.3
White-tailed deer	88	14.1	441	70.3	96	15.5

Table 2. Public acceptance of taking animals from the wild and keeping them in captivity for specific purposes.

Purpose	<u>Acceptable</u>		<u>Unacceptable</u>		<u>Not sure</u>	
	Number	Percent	Number	Percent	Number	Percent
Scientific research	326	53.6	191	31.2	93	15.2
Classroom education	249	41.5	256	42.0	100	16.5
Public education displays	242	40.2	255	42.1	106	17.7
Commercial entertainment	55	9.1	495	81.3	57	9.6
Keep as a pet	60	10.1	483	79.4	63	10.4
Rehabilitation after injury	588	93.2	14	2.2	27	4.6
Breeding stock for commercial purposes	84	14.0	403	66.0	121	20.0

Despite the fact that only 24 percent of Vermonters are active hunters and 40 percent are active anglers, most Vermonters did not object to harvesting fish and wildlife providing certain conditions were met (Table 3). In fact, 81 percent of the respondents disagreed with the statement that "It's wrong to kill

wildlife for any reason." More than four out of five agreed that harvesting of fish and wildlife was acceptable if it was not wasted or populations were not seriously reduced. Surprisingly, the respondents were more ambivalent relative to the acceptability of collecting insects for pleasure.

Table 3. Public acceptance of the harvesting of fish and wildlife.

Statement	<u>Agree</u>		<u>Disagree</u>		<u>Neutral</u>	
	Number	Percent	Number	Percent	Number	Percent
Wildlife and fish can be harvested if they are not wasted	538	84.1	39	6.1	63	9.8
Wildlife and fish can be harvested if their populations are not seriously reduced	559	87.5	27	4.3	53	8.3
It's wrong to kill wildlife for any reason	45	7.0	521	81.3	75	11.7
It's wrong to collect insects for pleasure	198	30.5	243	37.4	209	32.2

Vermont residents gave considerable support to wildlife even when conflicts were perceived with human development (Table 4). In fact, over 90 percent of the respondents disagreed with the statement that "wildlife is worth nothing if a dollar value cannot be put on it." A majority of respondents also rejected statements that "economic development is more important than wildlife," and "fish and wildlife protection is over-emphasized while ignoring human needs." Slightly more than one-half of the respondents agreed that mankind has dominion over all animals, but there was some ambivalence with respect to public safety being more important than wildlife.

There was disagreement about man's ability to manage wildlife and the sensitivity of professionals to public wants (Table 5). Nearly one-half of those responding thought wildlife biologists were the people best qualified to make decisions about wildlife populations and programs. However, the statement that "fish and wildlife professionals only care about sportsmen" was soundly rejected. By the same token, only 18 percent felt wildlife professionals were out of touch with the public, but another 29 percent were not sure. On the other hand, 60 percent of the respondents agreed that "interfering with nature is usually a mistake."

Table 4. Public views toward human-wildlife conflicts.

Statement	<u>Agree</u>		<u>Disagree</u>		<u>Not sure</u>	
	Number	Percent	Number	Percent	Number	Percent
Economic development is more important than wildlife	36	5.6	488	75.8	119	18.5
If a dollar value cannot be put on wildlife, it is worth nothing	33	5.1	587	91.2	23	3.6
We overemphasize protecting fish and wildlife while ignoring human needs	97	15.1	430	67.0	115	17.9
Only economically important wildlife should be protected	43	6.6	530	82.3	71	11.0
Mankind has dominion over all animals	202	31.6	325	50.8	113	17.6
Public safety is more important than wildlife	240	37.6	194	30.4	205	32.1

Table 5. Public perceptions of wildlife managerial capabilities and responsiveness.

Statement	<u>Agree</u>		<u>Disagree</u>		<u>Not sure</u>	
	Number	Percent	Number	Percent	Number	Percent
Wildlife biologists are the people best qualified to make decisions about wildlife populations and programs	317	49.3	180	27.9	147	22.8
Interfering with nature is usually a mistake	386	60.0	126	19.6	131	20.4
Wildlife professionals are out of touch with the public	119	18.4	306	47.4	220	34.1
People really don't know enough to manage wildlife populations effectively	196	30.5	268	41.7	179	27.8
Fish and wildlife professionals only care about providing fish & wildlife for sportsmen	59	9.2	468	72.8	116	18.0

Discussion

Human relationships with wildlife are complex and may be analyzed at different levels. At the highest level, relationships exist in the abstract and are primarily intellectual. Clearly, the public as a whole has an immense interest in wildlife. For example, 91 percent of the respondents in this general population survey believed that wildlife was important to them. They believed that people and their developments are entirely natural, but they felt apprehensive about human interference with nature. They indicated quite clearly their belief that the appropriate role for people was as stewards; it is all right to use the natural environment to satisfy human needs so long as it is done responsibly and does not endanger natural populations.

At a more specific level, however, attitudes can be much more varied, and the emotions can exert a stronger pull. As our garden example indicated, reactions may be quite species specific: these Vermonters were much more willing to tolerate garden damage from large mammals than from insects or mice. Although people may understand the ecological importance of a species such as the timber rattlesnake, it is quite another thing to encounter one along a trail. These preferences may be the result of anthropomorphism, which is generally greater for mammals and birds than for other classes of animals. For example, stories about mammals and birds are targeted to reach much younger children than are stories about insects or crustaceans (More 1979). The preferences we form at an early age may have policy implications for the restoration of rare and endangered species.

Fish and wildlife harvesting also received strong support among the general public in Vermont, with the proviso that the harvested fish and wildlife be utilized and that the harvesting be kept within sustainable limits. Still, there are subpopulations with strongly divergent views. Considerably more research is needed to understand the underlying meanings of attitudes toward wildlife and the intensity of people's commitments to these attitudes. A person may, for example, be opposed to hunting in general, but may tolerate hunters under specific circumstances or by specific individuals.

Alternative methods may be necessary. Mail questionnaires may not lend themselves well to determining the level of commitment respondents have regarding their attitudes toward wildlife. Responses may be based upon misunderstanding, limited knowledge, or transient emotions, or they may reflect deeply held values that are unlikely to change under any circumstances. Follow-up studies are needed to determine the tolerance of opponents to specific wildlife uses, underlying values, and sensitivity to new information. Clearly, the deeper examinations of public acceptability of people-wildlife interrelationships will require more costly personal interviews rather than mailed survey instruments.

In sum, interest in wildlife and wildlife-related issues extends well beyond the narrow focus of specific interest groups to the public as a whole. The problems of incorporating divergent values into the decisionmaking process clearly present a hurdle to wildlife management agencies. Yet, the public as a whole often represents the middle ground between conflicting groups, and although more emphasis on broad public involvement may not reduce conflicting viewpoints, it can point the way towards this resolution.

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