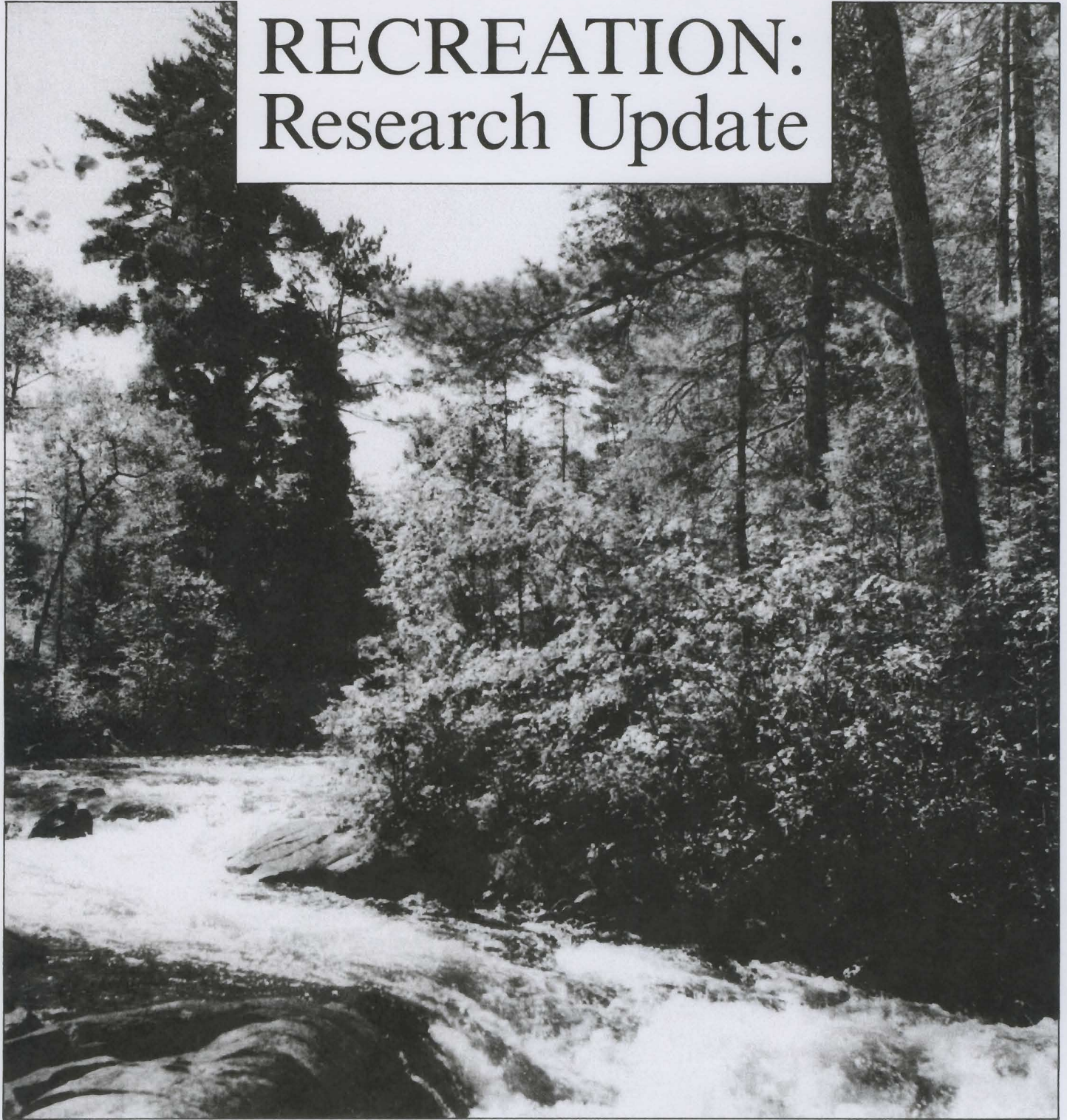


FOREST & RIVER

RECREATION: Research Update



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FOREST AND RIVER RECREATION:

RESEARCH UPDATE

Selected papers presented in the Forests and Rivers
Content Area at the Symposium on Leisure Research,
sponsored by the National Recreation and Park Association,
October 25-27, 1981, Minneapolis, Minnesota.

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FOREWORD

The symposium on Leisure Research was held October 25-27, in conjunction with the 1981 National Recreation and Park Association Congress for Recreation and Parks in Minneapolis, Minnesota. More than 300 scientists, educators, planners, and managers attended representing a variety of local, state, and federal organizations.

The symposium was represented by about a dozen research content areas, including over 125 papers dealing with a spectrum of recreation issues. The 31 papers in this volume were presented in four General Sessions and one Poster Session under the content area Forest and Rivers. Some papers presented in these sessions are not included.

The papers presented herein are arranged under four themes or issues: (1) visitor satisfaction, (2) choosing activities and places, (3) human dimensions in fish and wildlife management, and (4) visitor management. These four themes served as the focus for a General Session and papers were presented orally followed by discussion. The Poster Session included presentations from each of the four themes. Consequently, these papers appear under the theme most representative of their content. Further, the session coordinators for each of the four sections have an introductory paper about the theme.

David W. Lime, Project Leader for the River Recreation Management Research Project of the North Central Forest Experiment Station was the coordinator for the content area Forests and Rivers. Dennis B. Probst, Shepardstown College, West Virginia and David W. Lime coordinated the session on Visitor Satisfaction; Timothy Knopp, University of Minnesota, St. Paul, Minnesota and Earl C. Leatherberry, North Central Forest Experiment Station, St. Paul, Minnesota coordinated the session on Choosing Activities and Places. Dorothy H. Anderson, North Central Forest Experiment Station, St. Paul, Minnesota and Michael Manfredo, Oregon State University, Corvallis, Oregon coordinated the session on Human Dimensions in Fish and Wildlife Management. The fourth session, Visitor Management, was coordinated by John H. Schomaker, North Central Forest Experiment Station, St. Paul, Minnesota and Joseph Roggenbuck, Virginia Polytechnic Institute, Blacksburg, Virginia.

We wish to thank the National Recreation and Park Association for supporting our participation in the Symposium on Leisure Research. Special appreciation is extended to Chrystos D. Siderelis, North Carolina University, Raleigh, North Carolina, the overall Symposium Coordinator.

The papers are printed here essentially as submitted by the authors except for some minor copy editing to insure uniformity of style. It should be noted, however, that all papers herein were subjected to considerable technical review by peers after their initial submission to the Forests and Rivers coordinators.

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three Recreational segments of the river receive substantial day use. One possible explanation is that the Scenic and Recreational segments are easily accessible by gravel or paved roads whereas the Wild segments are accessible only by plane, horse, or foot. Another explanation could be that some segments have better campsites than others. However, at present overnight use occurs on all six river segments. It ranges from 3 percent of the total floaters on the Middle Fork Recreational to 100 percent on the Middle Fork Wild. This variation is difficult to explain using number, distribution, and setting quality (natural vs. man-dominated) of potential river campsites because they are similar among most of the river segments. The only exception to this would be on the South Fork Wild segment where there are far more sites and a greater proportion of heavily overused sites. The greater number of available sites may encourage more overnight camping, on the other hand the degraded quality of the sites may discourage use. An alternative explanation might be that 87 percent of the floaters of this river segment fish. This is a much larger portion than on any other segment. It is perhaps this activity that lengthens the trip.

As shown in the following tabulation, overall party sizes on the Flathead were small in 1980:

River segment	Median party size (People)
Middle Fork Recreational	9.5
Middle Fork Wild	6.7
South Fork Wild	5.8
North Fork Recreational	5.8
North Fork Scenic	4.1
South Fork Recreational	4.0

A Kruskal Wallis one-way analysis of variance (Siegel 1956) indicated that significant differences ($p = <0.01$) in numbers of people per party existed among segments.

The reason for the Middle Fork Recreational Segment having the largest group size is most likely due to the high percentage of half-day outfitted trips that are popular among visitors entering Glacier National Park. The maximum party size of these trips is 20. The variation among segments in party size is far less when the Middle Fork Recreational Segment is removed.

The distribution between the outfitted and non outfitted use in 1980 is shown in the following tabulation:

River segment	Outfitted - - - (Percent) - - - -	Non Outfitted
South Fork Wild	44	56
Middle Fork Wild	24	76
North Fork Scenic	2	98
North Fork Recreational	12	88
Middle Fork Recreational	76	24
South Fork Recreational	26	74

The river segment having the largest proportion of outfitter use (76 percent) is the Middle Fork Recreational. This is not surprising because the greatest number of outfitter launches (from 12 to 15 per day with 20 people or 4 boats) and the greatest number of outfitters (5) are authorized on this segment.

Use on all other segments is predominately non outfitted. This is especially true in the case of the North Fork where use on the Scenic and Recreational segments is almost entirely non outfitted (98 percent and 88 percent, respectively). This is true in spite of the fact that four outfitter launches per day (15 people per launch) are authorized on the North Fork Scenic and nine outfitter launches per day (20 people per launch) are authorized on the North Fork Recreational. Fewer launches (3 per week with 10 people per launch) are available on the South Fork Wild, yet 44 percent of the use on that segment is outfitted. These data suggest it is important not to automatically assume a relation between the portion of use that is outfitted and the numbers of available outfitter launches. On the Flathead this situation is perhaps accentuated because outfitter launch allocations have not yet been filled.

The Flathead River System serves as a recreation resource for local residents (Kalispell area), Montana residents, and the entire Nation (table 2). In addition to U.S. citizens, 8 percent of all visitors come from Canada and 2 percent travel here from other foreign countries.

Of the U.S. citizens floating the Flathead River System during the 1980 season, 64 percent came from outside the State of Montana. This aggregate figure is somewhat misleading because four of the river segments (South and Middle Fork Wild, North and South Fork Recreational) are used mostly by people residing in Montana (Kalispell area and other Montana categories). Local use (Kalispell area) is the greatest proportion on three of the river segments (Middle Fork Wild, North Fork Recreational, and South

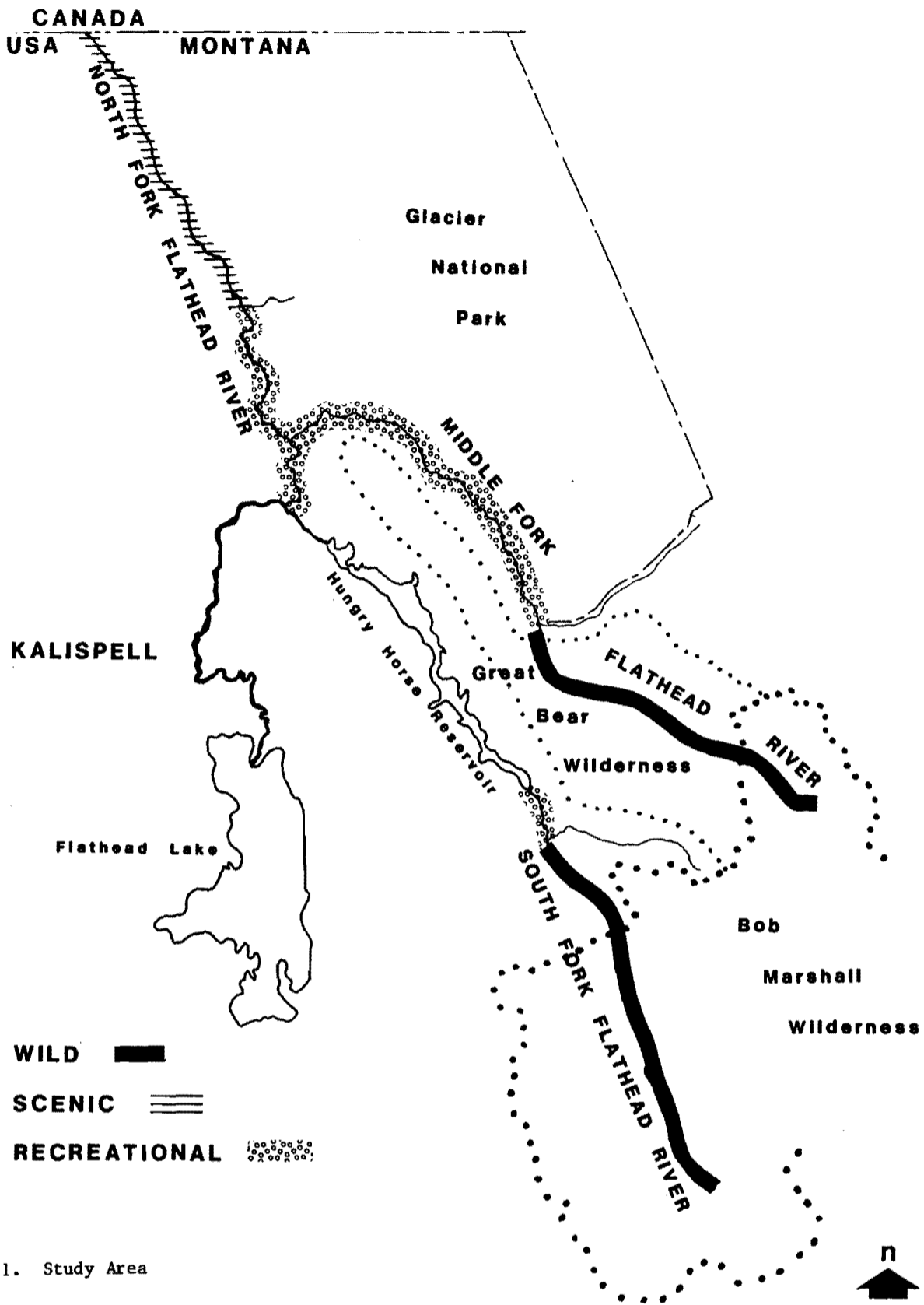


Figure 1. Study Area

Table 2.--Residence of U.S. users of the six classified Flathead River segments--1980.

(In percent of U.S. respondents)

Residents ^{1/}	River segments					
	South	Middle	North	North	Middle	South
	Fork Wild	Fork Wild	Fork Scenic	Fork Rec.	Fork Rec.	Fork Rec.
Kalispell Area	16	32	25	58	15	49
Other Montana	44	29	14	12	12	17
Western U.S.	27	29	24	24	34	4
Other U.S.	13	10	37	6	39	30

^{1/}Residence was determined by zip code of floater's permanent address.

Fork Recreational). We see no obvious explanation for these findings.

Perception of Physical and Social Attributes

Floaters were asked to categorize the segment of river they had floated according to the class descriptions (Wild, Scenic, Recreational) contained in the Wild and Scenic Rivers Act of 1968 and reproduced on the questionnaire. Most (88 percent) of those people who floated on a designated Wild segment categorized it as Wild, and well over the majority (75 percent) of the individuals who floated the Scenic segment of river categorized it as Scenic. However, people floating on the Recreational segments of river were split between calling them Scenic (46 percent) and Recreational (47 percent).

These results indicate that floaters on Wild and Scenic segments agreed with the official designation category, but that floaters on Recreational segments did not. This suggests that classification is not clearcut among the floating public, especially for the recreational classification. It is likely that managers and planners also do not see these classifications as being exact. Because both groups cannot easily distinguish between classes, the development of different regulations for Scenic versus Recreational river segments is likely to be difficult for managers (i.e., what is an appropriate management action) and floaters may be confused and unwilling to accept what they may see as arbitrary regulations.

Floaters who received the mail questionnaire were asked to give the maximum number of people they would allow in outfitted and non-outfitted groups. Responses indicate a willingness among floaters to tolerate larger party sizes for outfitted groups than non-outfitted groups on all segments (table 3). Floaters of the different river segments perceived different outfitted

party sizes acceptable ($p < 0.01$). For non outfitted parties, however, they perceived no difference in acceptable party size.

We also found that it made no difference whether people floated with an outfitter or by themselves--an acceptable party size for outfitted parties was 12. Non outfitted floaters, however, felt that non outfitted party size could be 10.2, whereas outfitted floaters felt these parties should be 8.4, which is significantly smaller. These data indicate that non-outfitted floaters are more liberal in their tolerance of group size. The outfitted public, on the other hand, is more restrictive in its acceptance of party size of non outfitted groups.

Floaters were asked to rank from a given list of 17 facilities (water faucet, appropriate toilet facilities, information displays, picnic tables, garbage containers, launching ramps, nature trails, parking lots, picnic shelters, permanent fire rings, graded roads, signs, corrals for pack horses, campsites visible from river, campsites not visible from river, provide no facilities, and other) the three most important for put-in/take-out points on the segment of river they floated. Presently, at the 19 put-in/take-out points a wide range of facilities similar to those listed in the questionnaire exists. On all but the South Fork Wild segment the three most important facilities were the same--toilet facilities, garbage containers, and no facilities--however, the order varied. On the South Fork Wild, corrals were included among the top three. The surprising finding is that even though a river segment's official designation (i.e., Recreational) may allow extensive facility development at put-in/take-out points, floaters do not feel such development is important. In fact, the high importance given to no facilities should caution managers against overdevelopment.

EVALUATION OF MANAGEMENT ACTIONS

Two hypothetical management actions--a permit system and facility development--will now be evaluated in terms of their probable impact on present river floaters' experiences. This evaluation will be based on the data presented in preceding sections.

Hypothetical Permit System

For the first example, a permit system is hypothesized for all segments of the Flathead that would limit party size to eight, require all potential overnight floaters to enter a lottery to obtain a launch date, and divide the number of launches equally between outfitted and non outfitted publics.

The median length of stay on the Scenic and Recreational segments of the Flathead is approximately 1 day. This suggests that day users (approximately 50 percent of the floaters on the North Fork Scenic and Recreational, and Middle and South Fork Recreational) would avoid the additional burden of obtaining a launch date through the lottery.

First, the party size restriction of the proposed permit system would eliminate more than 50 percent of the parties on the Middle Fork Recreation segment because the current median party size is 9.5. Current party sizes on the other five segments are less than eight. The proposal also could unnecessarily encourage a larger party size because floaters who obtain a permit may have a tendency to invite others to fill the maximum number allowed. In addition, setting an arbitrary maximum party size of eight does not coincide with floaters' current perceptions of acceptable party size. On five of the six river segments, floaters perceive that outfitted parties could be larger. In fact, the data suggest that floaters would be amenable to different party size limits on different segments, even on those having the same classification.

Second, overnight floaters would risk being denied the opportunity to float if not selected in the lottery. This proposal would primarily affect floaters on the two Wild river segments because 87 percent and 100 percent, respectively, of the floaters on those segments take overnight trips. A small percentage would be affected on the other four segments.

Third, the proposal to divide launches equally between outfitted and non-outfitted publics would redistribute outfitted and non-outfitted use on five of the six river segments. Non outfitted floaters of the North Fork Scenic and Recreational segments would be affected the most because only 2 percent and 12 percent,

respectively, of the current use is outfitted. An opposite effect would occur on the Middle Fork Recreational where 76 percent depend on outfitters. Thus, segments of river that fall under the same Recreational designation would be affected differently by applying the same management action.

Hypothetical Facility Development

For our second example of a hypothetical management action we propose to provide for progressively more facility development along the continuum of Wild, Scenic, and Recreational classifications. In other words, only the most primitive facilities would be allowed on Wild segments but substantial improvements (e.g., paved access, developed campgrounds, toilet facilities, picnic shelters) would be provided on Recreational segments. As previously discussed, floaters of the Recreational segments did not perceive the segment they floated to be substantially different from the legal descriptions of the Scenic classification. In addition, data on facility development suggest that this action would not be acceptable to the present population of floaters. The three most important facilities for floaters of the Scenic and Recreational segments were the same primitive facilities (i.e., toilet facilities, garbage containers, no facilities) listed as important by floaters of the Wild segments. Therefore, this management action would potentially have a greater impact on the floaters of the three Recreational river segments.

IMPLICATIONS

We have attempted to demonstrate that baseline data collected from recreationists can be useful in evaluating alternative management actions if we desire to accommodate the existing user population. In the process of doing this we have shown that floaters of two different segments of river both having the same designation could be affected very differently by the same management action. Therefore, developing a standard list of management actions for each of the three classifications of Wild, Scenic, and Recreational designations is unlikely to adequately consider potential impacts to existing floaters. Using the baseline data to evaluate proposed management actions prior to their implementations should help avoid unnecessary conflicts between the agency and existing users and also demonstrate managers' sensitivity to visitors' needs.

Funding for this project was provided in part by the University of Idaho Forest, Wildlife and Range Experiment Station McIntire-Stennis Program ID 00028. Glacier National Park, Flathead National Forest, University of Idaho Cooperative Park Studies Unit and the University of Idaho Wilderness Research Center.

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MANAGEMENT PREFERENCES OF BOATERS AND LANDOWNERS
ALONG THE UPPER DELAWARE SCENIC AND RECREATIONAL RIVER

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Like most of the Nation's rivers, the Upper Delaware River has experienced a dramatic increase in recreational boating use, especially over the last 10 years, and there are many indications that this trend will continue (Leatherberry *et al.* 1980, Dawson *et al.* 1981a). Increased recreation on rivers in the eastern United States has typically resulted in conflicts between river users and riparian landowners (Countess *et al.* 1977), and the situation on the Upper Delaware River is no exception to that trend (Decker *et al.* 1981a). The four problems often reported by riparian landowners on both eastern and western rivers with private land holdings include littering, trespassing, vandalism, and invasion of personal privacy (Bassett *et al.* 1972, Christophersen 1972, Cox and Argow 1979, Roggenbuck and Kushman 1980).

Comparisons between the recreation-related problems experienced by riparian landowners and boaters and comparisons between their management preferences are currently available for only a few river areas in the United States (Bassett *et al.* 1972). Such comparisons have important implications for river recreation management. Schreyer (1980) notes that where management decisions promise to be controversial, surveys of the various constituent groups will shed light on the implications of alternative management options in the decisionmaking process. The potential for controversy was recognized in the Upper Delaware River situation. Therefore, the objective of our study was to survey river users and landowners along the river to determine their preferences for a variety of management alternatives. This type of research helps ensure that the concerns and needs of both these constituent groups are integrated into river recreation management plans and programs.

UPPER DELAWARE RIVER STUDY AREA

The Upper Delaware Scenic and Recreational River is a 2-mile wide and 75-mile long corridor situated on the border between Pennsylvania and New York, extending from Hancock to Sparrowbush, New York. The Upper Delaware River is one of the few river corridors in the National River System that is owned predominately by many private landowners having relatively small parcels of land (Dawson *et al.* 1981b). The master plan for a land use and recreation management program

is being developed in a cooperative effort between Federal, State, Interstate, and local agencies; private interest groups; and a Citizen's Advisory Council. The National Park Service has the primary responsibility for developing the master plan and implementing the subsequent management programs.

Summer boaters on the Upper Delaware River can be characterized as primarily small groups (6 persons) of friends or family members between 14 and 30 years old who rent canoes from a commercial boat livery for a day trip. Most users live within 150 miles of the Upper Delaware River and half of them have boated there in the past (Dawson *et al.* 1981a). Boating use in 1980 on the highest use spring weekends reached an estimated 3,000 watercraft per day (Dawson *et al.* 1981b).

In 1980, 10 publicly owned boat access sites were available on the Upper Delaware River. Thirteen commercial boat rental businesses were operating at these publicly owned access sites and at 24 privately owned access sites. The boat rental businesses had 3,560 watercraft available and more than 90 percent of these watercraft were canoes. Ten camping facilities were available from 10 commercial campground businesses operating at 11 sites along the river in 1980 with 920 camping sites available for use by campers arriving via vehicles or boats (Dawson *et al.* 1981a, Decker *et al.* 1981b). No publicly owned campgrounds existed along the Upper Delaware River in 1980.

SURVEY METHODS

Boaters' problems and management preferences were assessed via a mail survey that sampled boaters who were interviewed while using the Upper Delaware River in 1979. Of the 342 boaters receiving mail questionnaires, 230 (67 percent) returned them. The boater interviews and mail survey were conducted by the North Central Forest Experiment Station's Backcountry River Recreation Project as part of its National River Recreation Study (Dawson *et al.* 1981a).

The landowner data were obtained from a mail survey of riparian (i.e., lands contiguous to the river) and nonriparian landowners owning

lands within the 2-mile wide and 75-mile long river corridor. The sample of landowners was selected from 1980 county tax records. Of the 1,298 landowners receiving questionnaires, 963 (74 percent) returned them. The mail survey was conducted by the Outdoor Recreation Research Unit at Cornell University as part of a cooperative research project with the National Park Service (Decker *et al.* 1981a).

The survey data were analyzed to compare: (1) the river recreation-related problems identified by boaters and riparian and nonriparian landowners, and (2) the preferences of boaters and riparian and nonriparian landowners for river recreation management actions. The management preferences of resident and absentee landowners were also analyzed for statistically significant differences. All statistically significant differences reported herein were the result of Chi square tests ($p < 0.05$).

OPINIONS ABOUT RIVER RECREATION-RELATED PROBLEMS

Only 7 percent of the boaters surveyed on the Upper Delaware River in 1979 reported the existence of conflicts between boaters and landowners. However, landowners' perceptions of problems caused by boaters were so pervasive in 1980 that three-fourths of the landowners thought that more regulations were needed on the

Upper Delaware River to prevent such problems. This may be partially related to increased boater use during 1980 (Dawson *et al.* 1981a).

Boaters were asked to evaluate their 1979 experience on the Upper Delaware River in relation to a diverse list of 51 potential problems. On a scale ranging from "not a problem" to a "very serious problem," only 13 items were identified as being problems by 50 percent or more of the boaters (table 1). Those items related to littering and inadequate refuse facilities topped the list. Difficulties of navigation due to low water came next, followed by inadequacies of public toilets, sources of drinking water, and camping facilities; information about campsite locations, river hazards, and access points; and the presence of unskilled boaters.

The remaining 38 items were identified by less than 50 percent of the boaters as being problems. Those problems between boaters relating to a sense of crowding; inconsiderate, loud, and rowdy behavior; and drinking of alcoholic beverages topped this second list.

Landowners were asked to report the problems they perceived boaters as causing along the Upper Delaware River. Littering and trespassing led the list of problems reported by landowners

Table 1.--Problems encountered by 50 percent or more of the boaters during their Upper Delaware River trip in 1979.

Problems encountered ^{1/}	Seriousness of problem			Total No.
	Not a problem	Slight to moderate problem	Serious to very serious problem	
	Percent			
Litter on banks	25	52	23	228
Navigation problems due to low water levels	24	57	19	229
Litter in river	29	49	22	230
Too few toilet facilities between put-in and take-out points	32	45	23	228
Too few garbage cans	34	45	21	228
Inadequate toilet facilities at put-in and take-out points	41	41	18	229
Too few drinking water sources	40	45	15	228
Poor quality campsites	45	39	16	128 ^{2/}
Campsites not clearly identified	46	40	14	126 ^{2/}
Unskilled people using the river	50	38	12	229
Inadequate brochures showing river hazards, access points, etc.	49	39	12	229
Inadequate information at put-in points	50	39	11	229
Insufficient information about things to do and see	49	42	9	229

^{1/} Responses are ordered by mean score, from most serious to least serious reported problem.
^{2/} Includes only boaters who camped.

(48 and 45 percent, respectively). Invasion of privacy was reported as a problem by fewer landowners (16 percent), as were vandalism (11 percent), noise (10 percent), theft (6 percent), liability and safety (4 percent), and drinking or drug-related problems (3 percent). Significantly more riparian landowners, compared to nonriparian landowners, reported that trespass and noise were problems caused by boaters. Similar percentages of both groups of landowners reported the other problems.

Landowners reported that litter, human wastes, and tree cutting were environmental concerns related to boaters' behavior along the Upper Delaware River (56, 20, and 14 percent, respectively). Other environmental concerns reported by landowners were forest and grass fires (8 percent), vegetation damage (5 percent), and wildlife habitat damage (5 percent). Tree cutting and human wastes were environmental problems reported by significantly more riparian landowners.

POSSIBLE RIVER MANAGEMENT ACTIONS

Given the conditions and problems that they experienced on the Upper Delaware River during their 1979 trips, boaters were asked if they opposed or supported a variety of potential river recreation management actions. Of the 26 potential management actions suggested in the boater study, 18 were supported by a plurality of boaters and 8 were opposed (table 2). Except for an opposition to providing more public river access, boaters generally supported the development of more facilities, as well as the expansion of visitor services and information programs. About two-thirds of the law enforcement and use restrictions were supported by boaters but the remaining one-third of the potential management actions that related to use restrictions were opposed.

Landowners along the Upper Delaware River were asked if they supported or opposed 19 potential river recreation management actions. Eighteen of the management actions listed in the boater study were also used for the landowner survey plus an additional item on the development of more commercial campgrounds. Of these 19 potential management actions, 15 were supported by a plurality of landowners and 4 were opposed (table 2). Landowners generally supported information programs for boaters and increased law enforcement efforts, as well as boat and boater use restrictions. Landowners opposed further facility development for river recreation except at existing public access points where they believed public campsite development, expanded parking lots, and improved roadways would be acceptable.

A plurality of both boaters and landowners supported 10 potential river recreation management actions; 7 of these 10 actions had statistically significant differences between level of support by boaters and landowners (table 2). These 10 actions included three types of facility improvements at existing public river access points, information programs warning of river hazards, increased law enforcement efforts, and four types of user restrictions. The user restrictions partially addressed the issues of littering, fire danger, trespass, and conflicts with motorboaters.

Only one potential river recreation management action was opposed by a plurality of both boaters and landowners (table 2); that action was the development of more points of public river access.

Two management actions were opposed by a plurality of landowners but supported by a plurality of boaters (table 2). These actions included the development of short hiking trails at points along the river and more public campsites between the access points. Both actions were probably viewed by landowners as potentially opening up an area with predominately private lands to further trespassing problems.

Five management actions restricting user behavior were supported by a plurality of landowners but opposed by a plurality of boaters (table 2). These management actions addressed the issues of littering, trespassing, and restricting the number of boaters via direct controls on boater behavior.

MANAGEMENT PREFERENCES OF VARIOUS TYPES OF LANDOWNERS

Few statistically significant differences were found between the management preferences of different types of landowners (riparian vs. nonriparian, resident vs. absentee). These differences did not exceed a 15 percent variation in the level of support by the various types of landowners (e.g., support for prohibition on camping along the river: riparian landowners, 56 percent; nonriparian landowners, 48 percent). Such small differences may not be individually and directly useful to the decisionmaking process for river recreation management. However, looking at the issues where differences existed between the groups may help to explain some of the variation in overall response.

Riparian landowners reported support significantly more often than nonriparian landowners for management actions to prohibit camping along the river and to restrict the number of boaters on the river at any one time. Within the cate-

Table 2.--Landowners (1980) and boaters (1979) who supported or opposed 27 potential Upper Delaware River recreation management actions

Management actions	Percent who support or strongly support management actions		Plurality opinion to support (+) or oppose (-) management actions	
	Landowners	Boaters	Landowners	Boaters
Facility development and visitor services				
Provide more parking at access points	42	38	+	+
Improve existing roads to access points	46	47	+	+
Provide public campsites at access points ^{1/}	43	64	+	+
Improve the boat launching areas at access points	N.A.	48	N.A.	+
Provide firewood at campsites and picnic areas	N.A.	58	N.A.	+
Develop short hiking trails at points along the river ^{1/}	36	78	-	+
Provide more public campsites between access points ^{1/}	27	54	-	+
Encourage commercial campground development	18	N.A.	-	N.A.
Provide more points of public river access	27	30	-	-
Information programs				
Post signs warning and advising of hazards	74	73	+	+
Provide more information indentifying facilities	N.A.	75	N.A.	+
Provide more distance markers along the river	N.A.	72	N.A.	+
Law enforcement and use restrictions				
Require people to carry out their own trash ^{1/}	94	83	+	+
Allow wood fires only at designated locations ^{1/}	81	59	+	+
Prohibit motorized watercraft on the river ^{1/}	50	57	+	+
Provide more patrols to assist and enforce regulations ^{1/}	78	55	+	+
Allow camping only at designated locations ^{1/}	89	45	+	+
Be more aggressive in enforcement of safety rules and regulations ^{1/}	85	47	+	+
Prohibit off-road vehicles in the vicinity of the river	N.A.	53	N.A.	+
Require each group to have approved first-aid equipment	N.A.	48	N.A.	+
Prohibit the use of nonburnable disposable containers like bottles and cans ^{1/}	74	27	+	-
Prohibit camping along the river ^{1/}	51	4	+	-
Assign launch times to achieve better spacing between groups ^{1/}	47	22	+	-
Restrict the number of boaters on the river at any one time ^{1/}	47	26	+	-
Limit the number of people per group allowed on the river ^{1/}	45	15	+	-
Assign camping sites to each interested group	N.A.	13	N.A.	-
Prohibit wood fires altogether	N.A.	4	N.A.	-

^{1/}Statistically significant differences between the percent of boaters and landowners supporting the management action (Chi square test with p<0.05).

gory of riparian landowners, these same two management actions were significantly more often supported by resident-riparian landowners as compared to absentee-riparian landowners. Similarly, resident-riparian landowners significantly more often supported actions to prohibit the use of nonburnable disposable containers, to provide more parking at existing access points, and to be more aggressive in law enforcement.

Nonriparian landowners reported support significantly more often than riparian landowners for management actions to encourage more commercial campgrounds, to develop hiking trails at points along the river, and to provide more points of public river access. Within the category of nonriparian landowners, the latter two actions were supported by significantly more absentee-nonriparian landowners than resident-nonriparian landowners.

IMPLICATIONS FOR PLANNERS AND MANAGERS

The problems experienced by boaters and landowners along the Upper Delaware River and their preferences for management actions suggest several considerations for river recreation planning and management. For example, littering was identified as a major problem by boaters and landowners and could be managed using successively more restrictive approaches. The least restrictive approach would include the adoption of an education objective to inform boaters of the need for a "carry-in and carry-out" litter program, the distribution of net-type litter bags at canoe liveries and launch areas, and the development of designated sites along the river for garbage disposal. At the more restrictive end of the management spectrum would be a prohibition on the use of nonburnable disposable containers such as cans and bottles combined with a strong enforcement effort for maximum effectiveness. Both approaches were acceptable to landowners, and although the first approach mentioned was acceptable to boaters, the second was not. Thus, it would seem reasonable to try the first approach and evaluate its effectiveness before attempting the second, less acceptable approach. This strategy of using less restrictive measures first has been suggested by Lime (1979) for most river recreation management decisions: "The indirect, more subtle types of controls should be tried and evaluated before the more authoritarian, heavy-handed kinds of actions are pressed into service. In particular, do not apply heavyhanded use restrictions because they appear cheapest or administratively convenient". (p. 40).

The 10 management actions supported by a plurality of boaters and landowners represent some less restrictive management actions that

will help alleviate the problems experienced by both groups. For example, because visitors rent boats from commercial liveries or use public river-access areas, these sites could serve as distribution points for maps, brochures, or other materials that identify facilities enroute, advise of river conditions, and warn of hazards on the river. Additionally, information on the fundamentals of safe boating and respect for private property along the river could be emphasized to alleviate conflicts between boaters and landowners. An effective information/education program combined with the provisions of some public rest rooms, drinking water, and garbage disposal facilities along the river would not only minimize the littering problem but also other conflicts with private landowners.

The management action to develop more points of public river access was opposed by boaters and landowners and probably should not be implemented. The 10 publicly owned access sites combined with the 24 commercially operated sites apparently are considered adequate by both groups, given the levels of use in 1979 and 1980 (Dawson *et al.* 1981a, Decker *et al.* 1981b).

The five management actions restricting boater activities, numbers, and behavior that were supported by a plurality of landowners but opposed by a plurality of boaters probably should not be considered for use until the more acceptable and less restrictive approaches have been implemented and evaluated. Although limitations on the numbers and distribution of users will become necessary at some level of use to protect the values of the Upper Delaware River, such a determination can only be made when all of the components of carrying capacity (e.g., environmental-ecological, social, and physical-facility carrying capacities) have been formulated, given the management objectives for the area.

The intent of this paper was to show how the preferences of landowners and boaters can be incorporated into the river recreation planning and management process. Although the data from the Upper Delaware are not directly applicable to other U.S. rivers, the value of this approach to the decisionmaking process has been illustrated. Incorporating these data into the planning and management process helps ensure that effective and efficient river recreation management plans and programs are developed. Thus, this approach integrates the concerns and needs of all the constituent groups--such as landowners and boaters--with the overall principle of maintaining and preserving the wild, scenic, and recreational qualities of our Nation's rivers.

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MANAGEMENT TECHNIQUES PREFERRED BY USERS AND LANDOWNERS ALONG A STATE RIVER

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Linear river recreation systems are growing in popularity as managing agencies move to secure scarce, high-quality, expensive land and as they attempt to link recreation spaces. Such systems are often owned and/or managed by a governmental agency and may border or include private land. Through their use as public recreation areas, these narrow linear resources may have more impact on the adjoining land than do "block" resources. Conversely, the use of surrounding private land may have a significant impact on the public space within the linear system and on those who use the public space for recreation.

Previous research on river recreation systems has focused mainly on those federal Wild and Scenic Rivers having wilderness characteristics. Yet, there are more than 6,000 miles of designated State river recreation systems, some of which have a non-wilderness character (USDI 1979). Much of the land along these State rivers is held by private owners, not by governmental agencies as is common on federal rivers. Management policies that were derived from research on publicly owned river areas may be inappropriate as well as politically ill-advised on a privately owned river area.

The significant political power of local private landowners on a State river can be detrimental to the management of the resource. Therefore, the success of management techniques on such rivers depends on integrating agency objectives with the attitudes of landowners and users towards the techniques employed to attain those objectives.

Agencies charged with managing State rivers are generally expected to develop management objectives and to implement management techniques that will accomplish three goals: 1) preserve the resource, 2) maintain a high-quality recreation experience opportunity for the user, and 3) minimize landowner-recreationist conflicts (USDI 1979). Some research results are available to assist the manager in the physical preservation of the resource (Aitchison *et al.* 1977).

The maintenance of a high-quality recreation experience on a river system has received extensive attention in the literature. Studies have focused on use trends (Lime and Knopf 1980), recreation demand (Peterson *et al.* 1980), user

satisfaction and crowding (Heberlein and Vaske 1977), and user displacement (Becker *et al.* 1979b). In other studies, Becker *et al.* (1979a), Roggenbuck and Schreyer (1977), and Knopp *et al.* (1979) related many of these user concepts to management alternatives.

A review of literature on recreationist/landowner conflicts finds few studies that concentrate on this problem along privately owned river recreation areas. The studies found usually identify types of conflict (i.e., trespass, litter, theft, etc.) without giving management techniques to alleviate these conflicts. Countess *et al.* (1977) explored the cause of conflict on Eastern rivers. Roggenbuck and Kushman (1980) studied riparian landowner attitudes toward State river programs in Wisconsin. Their study gives the most recent analysis of landowner opinions as well as an updated bibliography of landowner-related issues.

The purpose of our study was to determine the management techniques preferred by recreational watercraft users and landowners on a State river recreation system adjacent to private land. The preferred alternatives were analyzed to determine: user-landowner differences, differences according to land ownership types, and differences according to river user types.

The linear resource in the study was Minnesota's Rum River, designated as a State Wild, Scenic, and Recreational River in January 1978 by the Minnesota Department of Natural Resources. On the fringe of a large metropolitan area (Minneapolis-St. Paul), the Rum Valley has agricultural land, permanent homes, seasonal homes and cabins, and small rural communities. Portions of the Rum River receive heavy seasonal recreational use presumably because of their many access points and their environmental and recreational qualities. According to county tax records, 94 percent of the land adjacent to the river is privately owned. The portion of the river designated as Wild, Scenic, and Recreational is 148 miles long.

METHODS

Data sets for the study were obtained through two surveys. A list of all riparian landowners was compiled from county tax records. Survey forms were mailed to all private riparian owners in the spring of 1978. The survey

yielded 176 completed survey forms (55 percent return rate). A check of county records indicated that the sample thus obtained was representative of the residence patterns (absentee, seasonal, full-time) and land use patterns (agricultural vs. residential) of the entire river owner population. Data from the recreational watercraft users were collected by researchers stationed at selected access points along the river. The researchers observed and contacted users during the boating season of April-July 1978 and 1979. Sampling days and times were systematically selected according to use patterns of the river. Eight access points were sampled each for 13 days. Data were collected by researchers on the site and by mail-back questionnaires. A total of 485 (67 percent return rate) completed questionnaires were received from users.

Landowners and users were asked on a 5-point response format (strongly disagree to strongly agree) their level of preference for 11 different alternatives for the management of the Rum River. Identical alternatives and scales were given to landowners and users. In addition, users were asked to indicate their preference for seven other management alternatives that pertained to visitor management; landowners were asked to identify problems they were encountering with the recreational use of the river. The responses to the management alternatives were analyzed for frequency distributions and statistical differences. A t-statistic was used to analyze mean scores for significant differences and a chi-square statistic was used to determine independence of specified variables. The level of significance used for each statistic was p 0.05. The user responses to visitor management items and the landowner responses to problems were recorded only as percentages.

RESULTS

User-Landowner Comparison

The mean preference ratings for each of the 11 management alternatives for both the recreational watercraft users and the landowners are shown in table 1.

Three main themes of resource preservation, regulation of recreational use, and preservation of property owner rights (i.e. development possibilities) emerged in the landowner responses to the management alternatives and in the open-ended comments attached to the end of the questionnaire. Owners favored the following alternatives: preserving water quality, restricting watercraft use, reserving certain areas of the river for certain uses, adopting a carry-in/carry-out litter policy, and increasing law enforcement. They generally opposed publicizing the river as a recreational resource; developing commercial campgrounds and outfitters, developing additional accesses and campgrounds on the river, and restricting future residential development.

The river users also favored preserving the resource, and to some extent regulating recreational use, but in different ways than did the landowners. The users favored: preserving water quality, adopting a carry-in/carry-out litter policy, developing additional campsites and accesses on the river, restricting watercraft, and zoning river area use. They opposed future residential development, the development of commercial outfitters and campgrounds, increased law enforcement, and river publicity.

Table 1.--Responses of river users and landowners to management alternatives

Management alternatives	Mean preference rating ^{1/}	
	River user (S.D.)	Landowner (S.D.)
1. preserve water quality	4.53 (.6)	3.88 (1.5)
2. carry-in, carry-out regulation of litter	4.38 (.8)	3.94 (1.5)
3. development of commercial campgrounds/outfitters	1.99 (1.1)	1.67 (1.0)
4. restrict type of watercraft if area overused	4.10 (.9)	3.47 (1.6)
5. publicize river as a recreation resource	2.52 (1.1)	1.86 (1.2)
6. zone river areas for specific recreation use	3.71 (1.0)	3.01 (1.6)
7. limit number of users during peak periods	2.89 (1.2)	2.93 (1.6)
8. increase law enforcement along the river	2.72 (1.0)	3.17 (1.6)
9. provide additional accesses on river	3.20 (1.1)	2.14 (1.3)
10. provide additional campsites on river	3.18 (1.1)	2.30 (1.4)
11. restrict future residential development	4.22 (1.0)	2.97 (1.6)
	N=485	N=176

S.D.=Standard Deviation

^{1/}Means were derived from assigning values of 1-5 to a preference scale:

1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree.

A t-statistic indicated a significant difference between the mean ratings of the users and landowners on all of the alternatives. This difference indicates that these two groups have different opinions on how a river like the Rum should be managed. A managing agency cannot assume that management techniques favored by one group will be accepted by the other. This difference has implications for how a managing agency formulates policies and may be a cause of conflict between these two groups as the river is used for recreation.

The high standard deviations for many of the management alternatives indicate a wide range of responses within the two groups of subjects. However, by using the mid-point of 3.00 as a neutral rating, the mean preference data can be used to indicate management techniques where users and owners are in general agreement or disagreement, and in which direction this rating is tending.

The management techniques preferred by both landowners and users included: preserving water quality; establishing a carry-in/carry-out litter policy; limiting commercial campground and outfitter development; restricting watercraft types when overuse occurs; zoning areas for specific recreation uses; and limiting publicity about the river (table 1). Neither group favored actually limiting the number of users during peak use periods, indicating a reluctance to use heavy-handed control methods that may limit river use of either group.

The landowners and users differed in their preferences for increased law enforcement (favored more by landowners); increased recreational access and campground development (favored more by users); and restricted future residential development (favored more by users).

The wide range of responses for many of the management techniques makes it somewhat difficult for a manager to assess the real preferences of landowners and users (table 1). Perhaps it is impractical to expect consensus. The more realistic approach may be to identify management techniques preferred by specific groups of users and owners. Then, management objectives and the resulting management techniques can be formulated relative to the specific groups of users and owners that an agency is aiming to satisfy. The agency can also identify those groups it can afford to not completely satisfy (perhaps they can be directed to a more appropriate resource) and those groups who are likely to be the most dissatisfied by management techniques.

Comparison of Landowner Types

To identify relevant subgroups among landowners, we tested their responses to management options by using the chi-square statistic according to the variables of: length of ownership (in years); amount of land owned (in acres); area of the river where land was located (by river segment); and type of residence on river land (full-time, seasonal, absentee). Significant differences did occur in owner responses according to the variables of length of ownership and type of residence but not according to amount of land or area of the river.

The newer river owners, 1-5 years, were significantly more in favor of increasing law enforcement and restricting further residential development along the river than were those who had owned river land for a longer time. These new owners probably established a residence on the river seeking the aesthetic amenities there and wanted to preserve those amenities. These owners indicated an attitude of "I have mine, now no more development or increase in usage."

The seasonal residents (primarily summer) indicated a significantly greater tendency to favor restricting future residential development than did full-time or absentee owners. Absentee owners, those who did not reside on their land at all, indicated a greater tendency to oppose restricting residential development than did full-time or seasonal owners.

These findings have implications for planning other linear recreation spaces. If a river similar to the Rum has a majority of seasonal owners, opposition to future residential development may be expected to prevail. Owners who have not established a residence on their land don't want to have that option taken away from them, so they will tend to oppose building restrictions. Long-time owners who reside full-time on their land appear (from this study) to be the most flexible in their attitudes towards residential development and regulations.

Comparison of Recreation Watercraft User Types

The responses to the management alternatives were analyzed to determine if significant differences occurred according to the type of craft (canoe, motorboat); area of the river used (in river area segments); and residence area of the users (on the river, within 5 miles of river, in another Minnesota county, in Minneapolis-St. Paul metro area). The watercraft used by respondents were: canoes 79 percent, motorboats

16 percent, innertubes 3 percent, and other 2 percent. Significant differences were observed only with the variables of craft type and residence area.

More motorboaters favored increased law enforcement than canoeists. More canoeists favored restricting types of watercraft allowed on the river when overuse occurs. The sample size for innertubes was considered too small for analysis.

Although we found relatively little difference by craft type, other studies (Becker et al. 1979b) have found that canoeists and motorboaters often compete for the same resource and disagree markedly on how the resource should be managed. The lack of differences in our study may be explained by the fact that the Run is a narrow, shallow river suitable for canoes and small boats with small motors. But, managers trying to determine the preferred management alternatives of users on a similar river may be able to assume that canoeists and motorboaters will prefer similar management actions, except for the significant differences noted above.

There were no significant differences in responses between rural and urban users, nor between those who live close to the river (within 5 miles) and those who live farther from the resource. A significant difference according to resident area was observed only with those users who also own land on the river. These landowner/recreationists tended to respond like the other landowners rather than like the other users. The lack of differences on preferred alternatives across residence areas of the users in this study indicates that managers may not have to be too concerned with this variable in their planning process for a State river similar to the Run. Indeed, local recreational users of the river (who do not also own land on the river) may be able to serve as a surrogate for all recreational users in determining some preferred management alternatives, somewhat simplifying the public participation portion of the planning process for the managing agency.

Visitor Management Action Preferred by User

Users were asked also to indicate their willingness to accept further management actions that may be necessary to preserve the river recreational experience (table 2).

A majority of users would accept limits to craft size, surface speed, and the number and use of access points. Most users were not willing to

Table 2.--Recreational user willingness to accept alternative management actions

(In percent)

Management Actions			No
	Yes	No	response
1. surface speed limits	72	24	4
2. impose craft size restrictions	73	23	4
3. limit number and use of access points	57	37	6
4. pay a user fee for access	27	68	5
5. limit use to certain areas	23	72	5
6. Limit use to certain days	20	76	4
7. limit use to certain times	11	85	4

limit their times or areas of use or to pay for the access to the river. However, 27 percent of respondents would be willing to pay for access to the river. Access is now free of charge in all but one place--a State park.

Landowner Perceptions of River-Related Problems

The landowners favored increased law enforcement because of their concern about the possible degradation of the river environment and their own land as a result of inappropriate and increasing recreational use of the river. Landowners were asked in the study to assess the severity of 12 river use-related problems on a 3-point scale (serious problems, some problem, no problem). The five most important problems (assessed as being at least of some problem) were: trespassing (reported by 51 percent of landowners), littering (47 percent), invasion of personal privacy (41 percent), vandalism (36 percent), and theft (36 percent). Two of the problems, trespassing and littering, were each assessed as being serious problems by 20 percent of the landowners, indicating that recreational use of the river was having significant negative social impacts on some landowners.

IMPLICATIONS

The results of our study suggest that on a State river recreation resource adjacent to private land, both the riparian landowners and the recreational watercraft users will be concerned about preserving the river as an aesthetically pleasing resource. Also, both the users and the landowners realize the potential for overuse of

the river and the resulting detrimental effects this overuse could have on the river environment and experience.

The study also suggests that although both users and landowners favor using more subtle controls such as establishing a carry-in/carry-out litter policy and limiting publicity about the river, these two groups disagree significantly on how the river should be managed. It would be important for a managing agency to assess the potential conflicts between various constituent groups (landowners and users) before a draft management plan is developed for public review.

Assessing potential conflicts among groups must, however, go beyond the mere stating of preferences for management alternatives. For example, the users in this study indicated only a moderate preference for additional access points and campsites, and the landowners were against both of these alternatives. But, in another section of the survey, the owners indicated problems with users trespassing and littering on private land. These problems may be alleviated by providing a limited number of restrooms, picnic tables, and litter containers at popular existing access points to encourage use at these public sites instead of on private land. Also, a limited number of primitive water access-only campsites could be provided at reasonable distances (perhaps 10-15 miles) along the river to relieve pressure on private land.

We found that there were significant differences between types of riparian landowners regarding their attitudes towards management alternatives. Identifying these differences can aid a manager/planner in developing management strategies for particular river segments based on land ownership patterns. These results imply that agencies must be innovative and flexible in their management plans for a river adjacent to private land. Managers should be willing to establish management policies according to ownership patterns, in addition to the conventional method of using environmental conditions (wild, scenic, and recreational designations).

In this study, the relatively small differences between types of rivercraft users regarding their preferred management alternatives suggest that surrogates may be used to obtain total user attitudes about managing a

river similar to the Rum. However, political necessity and policy directives may mandate planning input from all groups.

A managing agency should involve both local landowners as well as current and potential recreation users early in the planning process. The agency should provide landowners with realistic information about the actual impacts they can expect from the public recreational use of the river. This may require research on the proposed linear space. Often the lack of realistic impact data leads to "doomsday" rumors among landowners and results in unfounded resistance to the managing agency. The managing agency also should assure the landowners and users that it is willing and able to take appropriate measures to preserve the property rights of the owners and the experiences of the users. Such measures may include providing adequate public use sites to alleviate trespassing, educating users through interpretive programs, enforcing laws and regulations, and limiting the number of users and types of use.

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TEMPORAL DISTRIBUTION OF FOREST RECREATION: PROBLEMS AND POTENTIAL

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One of the most pervasive problems in outdoor recreation is highly skewed visitor distribution patterns over time. In the classic case, outdoor recreation areas open for "the season" on Memorial Day and close on Labor Day. The result is nearly a full year's use condensed into little more than 3 months. Even within this "season," use is skewed toward weekends and holidays. The result may often be 50 percent or more of annual use occurring on 10 percent or less of available days. Such visitor distribution patterns have been documented by Manning and Cormier (1980) and Stynes and Rottman (1979).

This peaking phenomenon, as it is often called, results in a number of significant management problems. First, to satisfy demand, outdoor recreation facilities and services must be provided to meet peak loads. These facilities and services must be provided to meet peak loads. These facilities and services may go largely unused at other times, resulting in considerable inefficiency in resource use. Second, the social carrying capacity of recreation areas may be unduly exceeded by peak loads through crowding and increased potential for conflicting uses. Third, there is preliminary evidence that even ecological carrying capacity may be unnecessarily taxed by excessively concentrated visitor use (Lime 1972). Finally, periodic peaking of recreation use presents substantial administrative problems, particularly with respect to personnel scheduling.

Although this peaking problem in outdoor recreation has been recognized for some time (Clawson and Knetsch 1966), few efforts have been aimed at its systematic study. This is apparently due to the prevailing attitude among recreation planners, managers, and researchers that the temporal patterns of outdoor recreation use are determined by factors that are viewed as largely uncontrollable. Such factors include weather, traditional schedules of educational institutions, and societal work and leisure patterns. The objective of the study described here was to explore the extent to which temporal patterns of outdoor recreation might be altered through a variety of planning and management actions. The ultimate purpose of the study is to suggest methods by which the use

of park and recreation areas may be more evenly distributed over time.

STUDY METHODS

Camping within the Vermont State Park System was chosen as the focus for the study. This choice was based on previous work by Manning and Cormier (1980) that analyzed temporal use patterns of Vermont State Park campgrounds. This previous study identified four distinct patterns of temporal use distribution; and based on these findings, eight parks were selected for further study, two from each of the four categories. These eight parks were also selected on the basis of their wide geographic distribution around the State.

A standard self-administered questionnaire was prepared and distributed to campers as they registered for campsites at the eight study parks. Questionnaires were distributed on randomly selected days from May 15 through September 30, 1980. Completed questionnaires were returned to park rangers when respondents left the park. A total of 874 questionnaires were distributed with 617 returned for a response rate of 70.6 percent.

FINDINGS

Redistribution Potential

The study focused on the reaction of respondents to the series of statements shown in table 1. Respondents were asked to indicate on a five-point scale from strongly agree to strongly disagree how well each of these statements described how they would react in deciding when to go camping. Each planning/management action was tested, as deemed appropriate, for its potential to shift peak period camping to the off-peak periods of weekdays, spring and/or fall, and winter.

Results indicate that there is considerable potential for influencing visitor use patterns and that certain planning/management strategies are potentially more effective than others. The percent of respondents indicating a willingness and ability to shift camping activity from peak to off-peak periods (those who responded "agree" or "strongly agree") ranged from 3.9 percent to

41.9 percent. Strategies that demonstrated the greatest potential for shifting use were altering opening and closing dates to lengthen the recreation season, locating parks closer to residential areas, and using positive and negative pricing schemes. Camping vacation packages and positive and negative information on crowding demonstrated slightly less potential for shifting camping activity to off-peak periods. Special recreation/cultural events, more developed campsites, and more remote locations of parks showed relatively little potential to influence visitor use patterns.

Responses differed substantially among the various off-peak periods included in the study. Summer weekdays appear to hold the greatest potential of any of the off-peak periods for shifting use away from peak periods, followed by fall, spring, fall and spring combined, and winter in decreasing order of potential.

Positive versus negative approaches.

As noted in the above discussion, the general strategies of fees and information on crowding were approached from both a positive and negative perspective. That is, respondents were presented one case--the positive--in which fees were lowered during off-peak periods to entice shifts in camping patterns. In the other case--the negative--respondents were presented the case of higher fees during peak periods to force shifts in camping patterns. For information on crowding, respondents were told in one case--the negative--how crowded the parks were during peak periods in an effort to discourage camping activity during these periods, while in the other case--the positive--respondents were told how uncrowded the parks were during nonpeak periods in an effort to encourage camping activity during these periods. Response to these two approaches differed little (table 1).

To further explore this issue, a small sample of respondents received only the questions posed in the positive format, while another small sample of respondents received only the questions in the negative format. The results again indicate no difference in the way campers respond to positive and negative management approaches (table 2).

Redistribution Potential Index

To further analyze the study data, an overall redistribution potential index was created. The index summed the responses to each of the 23 statements in table 1 for each respondent. Responses were coded so that "strongly agree" equaled five, "agree" equaled four, and so on. The theoretical range for the index was from 23 to 115. The actual range was from 23 to 101, with a mean of 61.9. The index was used to determine if there were relations between the willingness and ability of respondents to shift camping activity to off-peak periods and other study variables (table 3). This was done to define appropriate target markets for redistribution efforts.

Camping participation

Several variables describing present camping patterns were significantly related to respondents' redistribution potential index. Index value and number of days spent in the park were inversely related, meaning campers with longer stays are more inclined to shift use to off-peak periods. Significant relations were also found between index value and the percent of camping done during the seasons of the year. The relation is inverse for the peak summer period (June 16 to Labor Day), meaning respondents doing a relatively large percentage of their camping during this period are less inclined to shift use to off-peak periods. The relation was direct for index value and the

Table 1.--Response to questionnaire statements

Statement	Response					N
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	
	Percent					
If this park were open earlier in the year, I would camp more often in the <u>spring</u> .	9	16	47	20	7	583
If this park were open later in the year, I would camp more often in the <u>fall</u> .	13	25	40	16	6	587
If this park were open year-round, I would camp more often in the <u>winter</u> .	4	8	28	28	32	580
If camping fees were raised substantially on weekends and holidays, I would do more of my camping on <u>weekdays</u> when fees were lower.	18	23	21	22	17	523
If camping fees were raised substantially during the high-use months of July and August, I would do more of my camping on <u>before July or after August</u> when fees were lower.	19	23	22	22	15	518

(Table 1 continued next page)

If this park had more highly developed campsites (e.g. electric and water hookups), I would camp more often during the week.	6	7	26	28	33	585
If this park had more highly developed campsites (e.g. electric and water hookups), I would camp more often during the spring and fall.	5	10	26	29	31	586
If this park had more highly developed campsites (e.g. electric and water hookups), I would camp more often during the winter.	3	3	22	27	46	583
If I knew how crowded the park is on weekends and holidays, I would do more of my camping on weekdays.	12	23	32	23	11	523
If I knew how crowded the park is during the months of July and August, I would do more of my camping before July or after August.	11	20	29	28	12	524
If special activities (e.g. organized recreation activities and cultural events) were held at this park on weekdays, I would do more of my camping of weekdays.	3	10	36	30	21	584
If special activities (e.g. organized recreation activities and cultural events) were held at this park in the spring and fall, I would do more of my camping in the spring and fall.	3	11	37	28	20	578
If special activities (e.g. organized recreation activities and cultural events) were held at this park in the winter, I would do more of my camping in the winter.	2	4	29	31	35	581
If I knew how uncrowded the parks are weekdays, I would do more of my camping on weekdays.	8	20	40	22	10	521
If I knew how uncrowded the parks are before July and after August, I would do more of my camping before July or after August.	9	20	35	26	10	525
If this park were located closer to my home, I would do more of my camping on weekdays.	13	27	30	22	9	577
If this park were located closer to my home, I would do more of my camping during the spring and fall.	11	27	30	23	9	579
If there were a discount on camping fees during the week, I would do more of my camping on weekdays.	11	25	35	21	9	525
If there were a discount on camping fees in the spring and fall, I would do more of my camping during the spring and fall.	11	21	35	24	10	528
If this park were located farther from my home, I would do more of my camping of weekdays.	1	3	37	40	19	579
If this park were located farther from my home, I would do more of my camping during the spring and fall.	1	9	38	39	19	579
If Vermont offered camping vacation "packages" (e.g. a week of camping with a few nights at each of several parks), I would sign up for one in the summer.	12	27	27	22	12	579
If Vermont offered camping vacation "packages" (e.g. a week of camping with a few nights at each of several parks), I would sign up for one in the spring or fall.	7	19	30	27	15	582

other three time periods. While these results are what might have been expected intuitively, they have practical significance. Even those respondents who do a relatively large percent of their camping during the three off peak periods also camp during peak periods and thus present

attractive target markets for redistribution efforts. Group size was inversely related to index value; and respondents who did not obtain an advance reservation for a campsite were more inclined to shift to off-peak periods.

Table 2.--Comparison between positive and negative approaches to fees and information on crowding

Statement	Mean response	T value	Significance	N
If camping fees were raised substantially on weekends and holidays, I would do more of my camping on <u>weekdays</u> when fees were lower.	2.76	0.22	0.823	51
If there were a discount on camping fees during the week, I would do more of my camping on <u>weekdays</u> .	2.71			45

If camping fees were raised substantially during the high-use months of July and August, I would do more of my camping <u>before July or after August</u> when fees were lower.	2.82	1.18	0.242	51
If there were a discount on camping fees in the spring and fall, I would do more of my camping during the <u>spring and fall</u> .	2.54			44

If I knew how crowded the park is on weekends and holidays, I would do more of my camping on <u>weekdays</u> .	2.74	1.36	0.178	50
If I knew how uncrowded the parks are weekdays, I would do more of my camping on <u>weekdays</u> .	2.42			45

If I knew how crowded the park is during the months of July and August, I would do more of my camping <u>before July or after August</u> .	2.94	0.31	0.757	51
If I knew how uncrowded the parks are before July and after August, I would do more of my camping <u>before July or after August</u> .	2.87			45

Demographics

Several demographic characteristics of respondents were significantly related to index value, thus helping to define target markets for redistribution efforts. As might generally be expected, unmarried persons, those without children, and younger persons were more inclined to shift use to off-peak periods. Respondents with lower incomes also showed a greater redistribution potential as did female respondents and those from out of state.

Park activities

Participation in three park activities was negatively related to redistribution potential. These findings seem to indicate that persons tied closely to highly weather-dependent activities such as swimming, boating, and fishing are relatively unwilling to shift their camping activity to off-peak periods.

Employment

Two employment-related factors were significantly correlated with index value. As might have been expected, unemployed persons (including students and retired persons) were more inclined to shift camping activity to nonpeak periods as were persons who worked a nontraditional work week; that is, any weekly work schedule other than Monday through Friday.

Motivations for camping

Respondents were asked to rate the importance of a selected list of 22 motivational factors potentially involved in camping. This part of the questionnaire followed the work of Driver and associates (Driver 1977, Driver and Tocher 1970, Brown and Haas 1980). Seven factors were found to be significantly related to the redistribution potential index. (table 3). All but physical rest were positively correlated.

Table 3.--Relations between redistribution potential index and selected study variables

Relations between redistribution potential index and:	Statistical test	Significance	N
Camping participation variables			
Number of days spent in park	$r^{1/} = -0.155$	0.002	400
Percent of camping done between April 1 and June 15	$r = 0.148$	0.006	337
Percent of camping done between June 16 and Labor Day	$r = -0.276$	0.000	391
Percent of camping done between Labor Day and October 30	$r = 0.225$	0.000	337
Percent of camping done between November and March	$r = 0.148$	0.012	286
Group size	$\tau^{2/} = 0.084$	0.030	404
Campsite reservation	$\tau = 0.137$	0.002	397
Demographic variables			
Age	$\tau = -0.117$	0.023	385
Sex	$\tau = 0.099$	0.020	381
Marital status	$\tau = 0.156$	0.001	388
Children	$\tau = 0.203$	0.000	388
Income	$\tau = -0.139$	0.001	380
Residence (in-state, out-of-state)	$\tau = 0.138$	0.002	379
Park activities			
Swimming	$\tau = -0.196$	0.000	398
Boating	$\tau = -0.143$	0.001	396
Fishing	$\tau = -0.087$	0.033	398
Employment variables			
Employment status	$\tau = 0.107$	0.012	400
Type of workweek	$\tau = 0.089$	0.034	370
Motivation for camping			
Gain confidence	$\tau = 0.126$	0.003	385
Enjoy scenery	$\tau = 0.081$	0.042	392
Keep fit	$\tau = 0.100$	0.014	387
Learn about nature	$\tau = 0.112$	0.007	389
Learn about parks	$\tau = 0.098$	0.015	387
Be away from home	$\tau = 0.085$	0.033	388
Physical rest	$\tau = -0.079$	0.042	389
Importance of selected factors in determining when to go camping			
School schedule	$= -0.086$	0.031	374
Avoid crowds	$= 0.142$	0.001	393
Getting a reservation	$= -0.114$	0.006	386
Park activities	$= 0.093$	0.026	389

^{1/}Pearson Product-Moment Correlation Coefficient.

^{2/}Kendall Rank-Order Correlation Coefficient.

These factors might be incorporated into marketing efforts by stressing (or de-emphasizing, as appropriate) these camping-related values in information/education and promotional campaigns.

Factors Determining When to Go Camping

Finally, respondents were asked to rate the importance of selected factors in determining when to go camping. Respondents who placed a relatively high degree of importance on school schedules and the ability to obtain an advance campsite reservation were significantly less inclined to shift their camping to off-peak periods. There was a positive correlation between redistribution potential and the importance placed on avoiding crowds and timing camping activities to coincide with other park activities.

SUMMARY AND CONCLUSIONS

Uneven temporal distribution of use has been a traditional problem in recreation management. The findings from this study indicate that recreation planners and managers may have substantial potential for influencing such temporal visitor use patterns. This potential varies, however, with the type of planning/management strategy used, the time period upon which such efforts are focused, and the target markets selected. With regard to the latter, the correlations noted in table 3 vary in strength; those variables showing the highest correlation with the redistribution potential index should be considered the most promising for target marketing. Study findings indicate the following general approaches are most likely to be effective in redistribution efforts:

1. The most effective planning/management actions are:
 - a. Alter opening and closing dates
 - b. Locate parks closer to market areas
 - c. Manipulate pricing
 - d. Package camping vacations
 - e. Provide information on crowding
2. The easiest off-peak periods for visitors to shift to are, in decreasing order:
 - a. Summer weekdays
 - b. Fall
 - c. Spring
 - d. Spring/Fall combined
 - e. Winter
3. The most appropriate target markets to select for redistribution efforts can be defined by the following characteristics:
 - a. Small camping parties with relatively long stays
 - b. Campers who presently do some of their camping during off-peak periods
 - c. Camping parties that do not obtain advance reservations

- d. Campers whose position in the family life-cycle (i.e., young, unmarried, without children) allows a relatively high degree of personal freedom
- e. Female campers
- f. Campers from out-of-state
- g. Campers who focus on park activities that are not highly seasonally-dependent
- h. Campers who are retired, students, or unemployed
- i. Campers who are employed but are not tied to a Monday-through-Friday workweek
- j. Campers who are motivated by the desire to keep active and fit, to learn about the park and nature, to enjoy attractive scenery, and to gain self-confidence
- k. Campers not closely tied to school schedules
- l. Campers who are sensitive to crowding

Finally it should be noted that table 1 shows respondents' reactions to hypothetical conditions only. The response of campers to these management strategies may differ under actual field conditions. Nevertheless, these findings indicate a substantial potential, perhaps more than might have been thought, for managers to deal with this important problem. It is suggested that the more promising approaches identified in this study be implemented experimentally by recreation managers. Evaluation of these actions under field conditions should constitute the next phase of research in this area.

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EVALUATION OF AN OFF-ROAD VEHICLE INFORMATION
AND EDUCATION PROGRAM

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Use of National Forests for off-road vehicles (ORV) has been popular during the last few years, and evolving with the popularity of the sport has been an increasing number of social and ecological problems. From the managers and other users' perspective, a selected few ORV users can create user group conflicts and environmental damage (Dorman 1981, Watson et al. 1980, Propst et al. 1977, Emataz 1978, Bury et al. 1976).

In some cases, the image and perceptions associated with ORV activity are unfounded, but management concerns have generated attempts to inventory use and establish use policies. In 1976, the managers of the Huron-Manistee National Forests (H-M) in Michigan developed guidelines and ORV regulations that defined the conditions under which an ORV could be operated (USDA Forest Service 1976). The plan is temporary and permits ORV use on all USDA Forest Service roads, limits ORV trail use to designated trails, and allows cross country travel only in designated areas.

This ORV plan was drafted in an attempt to minimize conflicts with other users, to protect the Forest resources, and to provide for the safety and welfare of all users. Like other dispersed recreation activities, ORV use makes visitor management difficult. Users tend to be widely dispersed over a broad land base, highly mobile, and able to quickly leave trails. This mobility and dispersed activity not only makes it difficult to inventory use, but also makes it extremely difficult to communicate new policies and guidelines to the users, especially on site.

The White Cloud District on the Huron-Manistee Forests receives heavy ORV use and, in the view of the Forest managers, much of the ORV activity violates the 1976 ORV order. To counteract this ongoing problem, a two-stage program was established in 1979 that included an information and education (I&E) program and a follow-up extensive law enforcement effort. The goal of the I&E program was to facilitate and enhance public acceptance and compliance with the H-M ORV order.

By the summer of 1980, managers were concerned about the effectiveness of the I&E program. Although communication literature pro-

vides a basis for analyzing the I&E program without a field study, the USDA Forest Service management was concerned about determining specific strengths and weaknesses of the program in relation to the noncompliance problem. Illegal use continued and awareness of regulations appeared to be minimal. The goal of this study was to investigate the effectiveness of the I&E program through a case study, addressing the following set of objectives: (1) determine the success of the information and education program; (2) assess ORV users' knowledge of the ORV rules and regulations transmitted through the I&E program; and (3) develop guidelines and techniques for increasing effectiveness of future I&E programs.

METHODS

The White Cloud District of the H-M National Forests was selected for the case study. It is located between Ludington and Muskegon on the western side of the Lower Peninsula, near Lake Michigan.

Through the summer of 1980, interviews were carried out at six locations on nine randomly selected interviewing days. The target population included drivers of ORV equipment (motorcycle, 4 wheel drive vehicle, dune buggy, etc.) old enough to understand the questions (at least 8 to 9 years old).

Sites were chosen to represent a cross section of use including: legal trails and USDA Forest Service roads; an illegal site (remote hillside); enduro race site; and a USDA Forest Service campground. Respondents were interviewed at randomly selected times at the road intersection of trails and in campgrounds and before a randomly selected enduro race. Those interviewed were asked about ORV regulations, rule violations, frequency of use, site preferences, general media use, club membership, and social demographic background.

RESULTS

Through the course of the study, 144 ORV users were sampled, including 84 on three trail sites. (Nonresponse rate ranged from 7 to 40 percent across the trail sites.) This represents a random sample of 7 percent

of the users who frequent the trail sites. Sixteen interviews were obtained in 3 campgrounds, sampling 89 percent of the ORV users who camped in the campgrounds. Forty-four riders were interviewed at an enduro race--6 percent of the total number of enduro riders. The sample can be characterized as predominantly male (94 percent), young (median=29 years old), with someone while on site (97 percent), and residing within 150 miles of the site (92 percent). Approximately 59 percent of the riders were repeat users and have ridden their ORV on the Forests for more than 2 years. Eighteen percent of the site visitors were repeat users during the sampling period.

I&E Activities

The activities planned under the I&E program including developing and installing information posters, publishing brochures on the ORV regulations, arranging media stories, developing and distributing press releases, contacting groups and individuals associated with ORV activity, disseminating ORV materials at local public events, and uniformly enforcing ORV regulations.

At the time of the study, the district had completed a majority of the planned I&E activities. However, the Forest was unable to purchase advertising space, disseminate information at local public events, supplement the Michigan Department of Natural Resources education program, or field an intensive enforcement campaign.

Regulation Awareness and Knowledge

To determine whether the majority of ORV users on the White Cloud District knew the ORV regulations, the subjects were asked two different questions. The first was a general question asking them if they knew of ORV regulations. The responses to this indicated that 64 percent of the respondents knew of regulations. This percentage may be high because social norms encourage most to respond yes. However, when they were asked to recall any specifics about a regulation, only 20 percent gave a correct response, 9 percent gave an incorrect response, and 71 percent did not reply. The actual percentage of riders having specific knowledge of regulations may be slightly higher. In a second set of questions asking respondents to list the regulations that were broken most often 39 percent provided specific regulation information. The majority of ORV riders on the White Cloud District are aware that regulations exist but possess limited specific knowledge about the regulations.

Knowledge of the rules and regulations was not related to sex, age, the number of riding years, or ORV club membership; although, general

awareness did increase with increasing years of riding on the Forests.

Information Sources

Information about ORV sites and ORV regulations came through various channels; 39 percent received ORV information through word of mouth, 15 percent through ORV clubs, 27 percent from USDA Forest Service outlets, 15 percent through the mass media, and 4 percent through miscellaneous outlets. Subjects were asked to list the mass media channels they utilized. A comparative analysis of the distribution channels used by the USDA Forest Service during the 1979 information and education program illustrates a major problem in developing an effective dissemination plan. As shown in the following tabulation, the media that the USDA Forest Service used to disseminate their messages and the media that the target audience usually used shows some overlap, but, presumably, not enough to effectively reach the ORV audience.

Media	Mention of Source by ORV Users	ORV-Related Stories Used by Source (No.)
1. Newspaper		
Muskegon Chronical	25	1
Grand Rapids Press	24	0
Detroit Free Press	20	0
Detroit News	12	0
Holland Sentinel	7	0
Pioneer	0	3
Newaygo County Sun	0	3
Freemont Times Indep.	1	1
Saginaw News	1	1
2. Radio		
WLAV	27	0
WJRD	11	0
WRIF	5	0
WCXI	4	0
WCUZ	4	0
WWAM	0	1
3. Television		
WZZM	61	0
WOTV	6	0
WXYZ	4	0
WILX	4	0
WNEM	3	0
WWTW	1	1
4. Magazine		
Dirt Bike	26	0
Cycle News	16	0
Cycle	16	0
Michigan Motorcycle	13	0
Cycle World	7	0

Factors in Noncompliance

Perceptions of compliance were investigated during this study. When ORV users were asked if they thought most ORV riders complied with regulations, 73 percent indicated that others were complying. Reasons for noncompliance ranged from ignorance and indifference to the confining nature of the regulations.

Another approach to determining what factors influence noncompliance is examining why ORV riders chose the ORV area, what they disliked about it, how they rated it, and what improvements they would like made. The results indicated convenience was a primary factor in choosing the ORV site (table 1). The aesthetics of the land was not a primary concern in choosing an ORV site--only two respondents mentioned aesthetics. However, experiencing nature through sightseeing, camping, or being out-of-doors, was an important dimension for 22 percent of the riders when they were asked to list reasons why they enjoyed the ORV sport.

ORV riders, in general, disliked attributes related to man-made features. Comments frequently mentioned included felled trees, closure signs, trail markings, flat terrain, mud holes, and bumps. However, some of the features that riders liked were partly manipulated by man such as the variety of terrain, woods, single lane, and well-marked and numerous trails. Although there were complaints, overall the ORV riders rated the areas positively. On a scale of 1 to 10, 10 being the best, the average score for all ORV areas was 7.8.

Finally, on-site observations reveal that congestion is not a problem. On only 2 occasions were more than 10 ORV users on one site at one time. If ORV users avoid legal sites because they are concerned about crowding, such perceptions could be changed and possibly reduce noncompliance.

DISCUSSION

Information and education programs assume that ORV riders are aware or can be made aware

Table 1.--Most frequently mentioned factors in ORV site selection, sport enjoyment, and site dissatisfaction

FACTOR

Site selection ^{1/}			Sport enjoyment			Site dissatisfaction		
Item	Mentioned by ORV Rider		Item	Mentioned by ORV Rider		Item	Mentioned by ORV Rider	
	Percent ^{2/}	No		Percent ^{2/}	No		Percent ^{2/}	No
Near home	24	26	Woods/vistas	12	23	Flat	12	11
Expert trails	8	9	Out-of-doors	7	14	Bumps	7	6
Marked trails	6	6	Entertainment	17	33	Felled trees	7	6
Many trails	6	6	Challenge	7	13	Closed trails	4	4
Hills	6	6	Remote	9	17	Other riders	4	4
Variety	5	5	Relax	4	7	Miscellaneous	31	28
With family/friends	4	4	Tension release	6	11			
Isolation	3	3	Exercise	7	14			
Other recreation	5	5	Miscellaneous & other	31	59			
Other	35	38						
TOTAL	100	108	TOTAL	100	108	TOTAL	100	91
Respondents	85	73		89	128		65	94

^{1/}Campers and enduro riders were not included in this analysis.

^{2/}The percentages are based on multiple responses rather than the total number of respondents.

of rules and regulations. Management practices assure that new policy and guidelines can be transmitted in some form to the intended audience. However, if people were aware of regulations and chose not to follow them, it would indicate some type of behavioral problem and communication strategies would have to be structured to try to change this audience's behavior or attitude toward regulations. If ignorance is the primary reason for regulation violations, then the first step is to inform people about the regulations. The results from this study indicate that roughly two-thirds of ORV users are aware that some form of ORV regulations exist. However, it did not appear that users knew the specific regulations. The problem this presents is illustrated by the fact that land managers perceive a large amount of illegal use occurring, yet most of the ORV riders felt that the majority of riders obey the regulations.

An education program may help bridge this gap (Christensen and Clark 1978, McElwain and Hronek 1969, and Ross and Moeller 1974). A large percentage of riders received their ORV information through informal channels. Yet the majority of them do not know specific regulation information. Information transmitted through informal channels is often less accurate than information transmitted through formal channels. However, if more accurate information could be generated through the formal channels (i.e., ORV clubs, USDA Forest Service outlets, or through the use of mass media), it follows that more specific information about ORV regulations would be available to riders through their primary information source--word of mouth. Personal contact with ORV riders by USDA Forest Service officers should be educational, stressing details and facts about proper and legal ORV activity. Officers could hand out maps and information at enduros or work with enduro officials and the State to provide the State ORV training program to the young riders at the race.

Review of the characteristics of the "average" ORV user; selected demographic information, and the media results suggests that mass media activity was probably ineffective with respect to White Cloud District ORV users because the past I&E program mismatched the audience and the channel used to reach them. In addition the District did not initiate contact during local public events and did not fully utilize links with the informal communication networks. County fairs and urban fairs provide the opportunity for personal contact and dissemination of brochures by the USDA Forest Service. The mass media is best utilized as a complement to a concentrated effort at the local level with adequate signing, brochure dissemination, and personal contact with USDA Forest

Service officials at ORV clubs, dealers, and enduro events.

Understanding the perceptions and motivations of the ORV user can contribute to an effective education campaign for the USDA Forest Service. Appeals connecting the regulations to a perception to which the ORV riders can relate may be effective. Because experiencing nature was part of 22 percent of the riders' enjoyment of the sport, environmental appeals to preserving the area might appear to be a logical solution. Land managers might think that riders came to the Forests primarily to enjoy the woods. This study, however, suggests the primary reason riders visited the Forests was because the sites were conveniently located.

The type, variety, and marking of trails were an important part of site selection and satisfaction. Overall, riders appeared to be satisfied with the trails available. However, they also indicated that they liked a variety of trails and desired more trails. Old illegal ORV trails crisscross the District. To keep ORV riders from using illegal trails without utilizing expensive barriers, managers need to inform riders of the legal opportunities available and make them aware that only marked ORV trails are legal. More than 40 percent of the riders thought advertisement of ORV areas was poor.

RECOMMENDATIONS

It is pertinent to raise the following questions: "What is the best way to contact dispersed recreationists?". "How can I raise the knowledge levels of recreationists so they will support necessary management policies and regulations?"

Based on the results of this study, it should be possible to plan an effective I&E program. Regulation awareness is moderate, but accurate knowledge of the rules is lacking. This lack of details suggests that information may have been difficult to obtain or was not received through the avenues used by ORV riders. To remedy this, future I&E programs should: a) inform ORV users in such a way that perceptions of the regulations result in a more positive view, and b) promote better public understanding of why ORV regulations exist.

Using a communications framework, a sound I&E plan should focus attention on the three traditional communication components of channel, message, and audience in the following ways. Under channel, consider the following:

1. Redirect media information in line with the more popular mass media used by ORV riders. Saturate the local (50 to 100 mile radius) media outlets to facilitate recognition and recall.

2. Utilize public air time on local radio and television.

3. Make use of local outlets and events for information/dissemination, such as endurance races, ORV dealers, fairs, licensing centers, and general civic and tourist outlets.

4. Use ORV, sportsman, and youth clubs as outlets for education and information materials.

Several findings support the above recommendations.

First, the majority of ORV riders sampled reside within 100 miles of White Cloud District.

Second, although the majority live within a 100-mile radius of the District, they read, watch, or listen to large urban newspapers, television stations, or radio channels, respectively.

Audience characteristics are important, and the results of the study revealed useful information about who is an ORV user and how to contact them. Under audience, consider the following:

1. Appeal to a predominantly male, young audience (late 20's to early 30's).
2. Design the message for an audience that uses various forms of mass media, is educated (12 grade or above), and is employed in a cross section of occupations.
3. Note that the ORV user makes little use of USDA Forest Service campgrounds and, yet, often uses the Forest area.

With respect to the message, the program should focus on message content that ORV users find important, such as: 1) contact and appreciation of the out-of-doors; 2) alternative, convenient, legal ORV sites; 3) sites with good signing and information present; and 4) the costs and conflict involved with other activities in which users participate on the Forest.

In summary, ORV use has evolved into a controversial topic. On the White Cloud District, ORV riding has developed into a highly regulated recreation, in comparison to other outdoor recreation activities such as hiking or bird watching. This is because the nature of the sport makes it more intrusive into other recreationists' space through noise or visual impact of the treads left upon the landscape. It remains, however, a very valid, exciting, and dynamic form of recreation. The types of riders

who come to the White Cloud District require a large land base. Overall, this study indicates that the present ORV areas have the potential to satisfy the vast majority of riders on the White Cloud District. But, there is a need to let people know that the potential exists. An expanded information and education program is warranted on the White Cloud District and should be appropriate for any forest areas where ORV use is significant. It should inform the public of ORV areas and motivate them to comply with ORV regulations.

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Public input has become a necessary part of public land management planning (Bettwy 1978). In recreation resource planning, information on user's preferences can be an important input (Driver and Brown 1978). This paper reports on 1977 and 1978 studies of the preferences of Oak Creek Canyon users. Those studies were requested by USDA Forest Service managers to assist them in developing a management plan for the Canyon. Of particular concern to management, was information on user preferences for recreation experiences and management actions.

Oak Creek Canyon is a scenic corridor that extends for 12 miles through the Mogollon Rim in north-central Arizona near Flagstaff. Because Oak Creek is a perennial stream and the Canyon crosscuts five vegetative zones, the area is a popular spot for swimming, fishing, hiking, camping, and picnicking in the summer and for sightseeing year-round. For example, an estimated 1 million people travelled through the canyon, primarily for recreation-related purposes, in 1977 and 1978. Similar to most public recreation areas, use in the Canyon has grown but the Canyon's narrow confines makes increasing number of visitors difficult to manage.

METHODS

Using a combination of roadside and on-site interviews and mail questionnaires, we collected information on the recreation and management preferences of area users during 1977 and 1978. Interviews were conducted on randomly selected days during the study period. Thirty-five interview days were selected from Memorial Day to Labor Day for the 1977 study, and 1,707 interviews were conducted. Forty-two interview days were selected from the middle of April to the middle of October for the 1978 study—20 days of interviewing occurred during the summer months, corresponding to the interviewing period for the 1977 study. A total of 1,218 interviews

were conducted for the 1978 study. Results of the 1977 study were used to improve the 1978 study.

Mail questionnaires were sent to interviewees who indicated that recreation was their primary purpose for visiting the Canyon. Three mailings were employed to increase response rates. Questionnaires were sent to 1,129 users in 1977, resulting in a 55 percent response rate (N=554) omitting incorrect addresses (N=103). In 1978, 908 questionnaires were mailed, resulting in a 61 percent response rate (N=551), omitting incorrect addresses (N=90). The mailback questionnaire asked respondents for demographic information, opinions of proposed management actions, and preferences for recreation experiences.

SELECTED RESULTS

The results of the 1977 and 1978 studies were generally in accord, in terms of what Oak Creek recreationists wanted from management and what they wanted from their recreation experiences. A few of these results are discussed below.

Land acquisition is important to the efficient management of recreation sites in the Canyon because of the checkerboard pattern of privately and publicly owned land. For example access to some of the more popular recreation sites is privately owned making it difficult to manage the sites. Managers were interested in users' opinions of different methods of acquiring land in the Canyon.

The mailback questionnaire asked users how much they favored or opposed different methods of land acquisition by the USDA Forest Service (table 1). Users of the Canyon do not oppose the USDA Forest Service acquiring land, however, they are not interested in a "land grab" either. Canyon users indicated that the most acceptable

Table 1.--1977 user opinions concerning possible ways for USDA Forest Service to purchase land in Oak Creek Canyon^{1/2/}

Possible action - land acquisition	Favor		Oppose		Neutral	
	Percent	N	Percent	N	Percent	N
Purchase as much private land in the Canyon as possible	63	320	21	100	16	82
Purchase only that land necessary to maintain facilities and operations	51	252	28	134	21	100
Purchase private land ^{3/} as it comes on the market ^{3/}	84	372	11	59	14	67
Acquire land through condemnation ^{4/}	23	111	56	265	22	104

^{1/}Row percentages may not equal 100 due to nonrespondents and roundings error.

^{2/}Question was asked differently in 1978. Respondents had to choose one of the options.

^{3/}Most preferred method in 1978 study.

^{4/}Least popular method in 1978 study.

was to acquire land is to purchase it as it comes on the market (84 percent favored this approach). Another acceptable method of acquiring land is purchasing only that land necessary for efficient USDA Forest Service operations (51 percent favored). Acquiring land through condemnation is not supported by users of the canyon (56 percent opposed this method).

Most Oak Creek Canyon users favor management actions that will increase their opportunities in the Canyon and oppose any actions that will limit these opportunities. This is apparent in user preferences for management alternatives for solving the traffic problem in the Canyon and maintaining the water quality in the creek (tables 2 and 3). Oak Creek Canyon's primary use by recreationists is as a scenic corridor. Most users are sightseers and spend only enough time in the Canyon to drive through it and make a couple of stops. Its popularity as a scenic drive may contribute to the strong opposition to any limitations on access to the Canyon. Measures limiting use are opposed by at least two-thirds of the users (table 2). However, expanding the facilities to accommodate more users is favored by about 60 percent of all respondents.

This pattern of opposing restrictions and favoring more opportunities is repeated to some extent in user responses to possible management alternatives for improving the water quality in Oak Creek (table 3). Users oppose the management alternative of doing nothing about the water quality (89 percent oppose), but they also oppose eliminating swimming (56 percent oppose) and moving the campgrounds away from the banks of the creek (47 percent oppose). Providing

additional swimming areas to disperse use from the already crowded swimming sites was strongly favored by users (71 percent favor). Limitations are not automatically opposed by users. Temporary restrictions on using the creek (occasional creek) closures and limitations on the number of people were favored by users as a means of improving water quality.

Users responded to a series of scales that have been developed to assess users' preferred types of recreation experiences. Information from these recreation experiences preference scales can help managers decide how a recreation area should be managed (Driver and Brown 1978, Haas *et al.* 1980).

The results of the recreation preference scales administered to Oak Creek Canyon users shows that several different types of experiences are highly valued by the area user (table 4). Enjoyment of scenery is the most important aspect of a trip to Oak Creek Canyon.

CONCLUSIONS

Information on user preferences for management actions is useful to the managers of Oak Creek Canyon because the narrow confines of the Canyon and land ownership patterns limit alternatives. The results of the Oak Creek Canyon studies show that area users want more opportunities to enjoy the Canyon, not fewer. This is evident in their opposition to use restrictions and their support for more facilities in the Canyon. Users are willing to accept temporary restrictions on use, if the purpose is to improve water quality.

Table 2.--1977 user opinions concerning possible ways to solve traffic problems in
in Oak Creek Canyon^{1/2/}

Possible action	Favor ^{3/}		Oppose ^{3/}		Neutral	
	Percent	N	Percent	N	Percent	N
Expand present parking facilities in the Canyon	67	359	26	101	8	43
Move camping outside of the Canyon and allow day use only	22	117	66	352	13	69
Make the Canyon a scenic drive with only limited parking in the Canyon	27	141	66	351	8	43
Maintain parking lots outside the Canyon with access to the Canyon being by bus. Bus fare would not exceed \$2.00 per person	24	124	70	370	8	44
Expand camping facilities in the campgrounds	58	307	28	147	15	77

^{1/}Row percentages might not equal 100 due to rounding.

^{2/}This question was not asked on the 1978 mailback questionnaire.

^{3/}Responses were made to a 7-point format on whether the alternatives were strongly favored, moderately favored, slightly favored, neither favor or oppose, slightly oppose, moderately oppose, strongly oppose.

Table 3.--1978 Oak Creek Canyon user preferences for alternative ways to maintain water quality in Oak Creek^{1/}

Possible action - land acquisition	Favor		Oppose		Neutral	
	Percent	N	Percent	N	Percent	N
Close the creek to swimming when water quality is low enough to be a health hazard ^{2/}	85	439	12	60	3	14
Allow fishing only (no swimming) in the creek ^{3/}	34	168	56	276	9	45
Limit the number of people who can use Grasshopper Point and Slide Rock swimming areas at any one time	59	310	27	134	14	68
Move campgrounds away from the banks of the creek	43	213	47	234	9	45
Do nothing to improve or maintain the water quality	6	26	89	428	5	24
Provide additional swimming areas to disperse use	71	346	18	86	10	50

^{1/}Percentages may not equal 100 due to rounding.

^{2/}Most favored alternative in 1977 pilot study.

^{3/}Second most opposed alternative in 1977 pilot study. The most opposed alternative in 1977 was "Reduce number of campgrounds," which was not an alternative offered in the 1978 study.

^{4/}Responses were made to a 7-point response format on whether the alternatives were strongly favored, moderately favored, slightly favored, neither favor or oppose, slightly oppose, moderately oppose, strongly oppose.

Table 4.—Means and standard deviations for the 10 most desired types of recreation experiences in the 1977 and 1978 Oak Creek Canyon studies^{1/}

Desired outcome scale	1977		1978	
	Mean	Std. Dev.	Mean	Std. Dev.
Scenery	8.6	1.7	8.4	1.1
Tranquility	8.1	1.2	8.3	1.3
Escape	8.1	1.1	7.5	1.7
General nature experience	8.0	1.0	8.0	1.2
Seek open space	8.0	1.3	8.1	1.7
Family togetherness	7.9	1.4	7.6	2.0
Tension release	7.8	1.1	---	---
Exploration	7.5	1.2	7.5	1.6
Physical rest	7.5	1.2	---	---
Exercise	7.1	1.3	7.4	1.7
Learn about nature	---	---	7.6	1.5
Temperature climate	---	---	7.8	1.6

^{1/}Mean scores based on a 9-point response format that indicated whether each recreation experience preference scale "most strongly adds" (9) or "most strongly detracts" (1) the recreation satisfaction realized with "neither adds or detracts" coded 5.

The results of the Oak Creek Canyon study are not surprising. The Canyon contains a perennial stream in a desert environment. The variety of vegetation zones and the red rock canyon walls make it a very scenic environment. It is also one of the few places in the region where people can drive through the bottom of a canyon. Because the highway through Oak Creek Canyon parallels a major interstate highway, Oak Creek becomes an alternative scenic route.

Overall, it seems that the most important feature of Oak Creek Canyon is its scenery. Therefore, developments considered by management should be made only if they do not diminish the physical beauty of the area.

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A NEW RECREATION INVENTORY SYSTEM TO AID LAND MANAGEMENT DECISION-MAKING:

AN APPLICATION AT LAKE TAHOE

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Recent concerns about management of dispersed recreation on large wildland areas have created interest in recreation inventories (Shafer and Lucas 1978). Avery (1975) in a widely used natural resources measurement text reminds us that "quality of the (recreation) experience may be as important as (or more so than) the total number of persons utilizing a recreational site. Unfortunately, we have not yet devised operational inventory systems that will provide reliable definitions and measurements of such products." Recent advances have been made for measuring quality of experience in field situations (Driver and Brown 1978, Brown et al. 1978, Haas et al. 1980, Rosenthal et al. 1980), but no system has been devised for applying these measurements to large-scale and diverse wildland areas.

Lake Tahoe is nationally recognized for its environmental quality and attraction for recreationists. National Forests constitute approximately two-thirds of the 300 mi² land area within the drainage basin around Lake Tahoe. Dispersed recreation use of this land has become a special concern because of its potential for environmental disturbances and because of the large number of recreationists who visit the Lake Tahoe Basin Management Unit (LTBMU). Therefore, a dispersed recreation management plan became necessary and systematic recreation resource inventory procedures were sought. Reported here is the inventory system we developed for the LTBMU for (1) identifying land units within a large area so that recreation inventory data could be compared by units for management purposes, and (2) gathering "quality of experience" data on a recreation land unit at low cost.

SYSTEMATIC IDENTIFICATION OF INVENTORY UNITS

First we used the Recreation Opportunity Spectrum (ROS) land classification system, which is designed to map the amount and location of six general recreation land classes (Driver and Brown 1978, Brown et al. 1978, USDA Forest Service 1980) to establish a conceptual framework for learning more about the various diverse land areas. However, ROS classifications often cover large areas--5,000 acres minimum for one of the classes--and smaller land unit designations are

often necessary for management actions. Therefore, we then used the RADS (recreation area division and subdivision) system to divide the total management units into zones and then to further subdivide these zones into specific management subunits. RADS has precedents in other resource management fields, e.g., timber management and watershed management, where large land areas are subdivided for management purposes on the basis of distinctive physical or biological characteristics, access and land use patterns, or management workloads (Davis 1966). Some resource management fields (range management, wildlife management, watershed management) subdivide management areas by vegetative or soil types. Recreation management adds road considerations to subdivisions as does timber management, because road access is as important for many recreation opportunities as it is for removing timber products. Using the RADS system we divided LTBMU into seven management zones.

In the RADS system travel pattern concentration (TPC) subunits within each management zone are identified and used to establish priorities for inventory measurements. A TPC is usually identified by a noticeable concentration of recreation use at particular places within zones, but the delineation of a TPC as a subunit includes the pattern of visitor movements from parking areas or other area entry points to recreation activity sites and return to entry point. Site impacts or visitor conflicts can be better managed with information about the total use pattern rather than by focusing strictly on "problem" areas. TPCS can usually be readily identified by recreation management field personnel, and priorities for measurements and management attention can be based on criteria of highest density user concentrations, site impacts, or rapid changes in the TPC recreation situation.

Initially, we identified and closely examined only one or two high density use TPCs for each of the seven management zones. This enabled us to systematically compare TPCs between zones and to establish priorities for acquiring inventory data. Additional TPCs can be identified and management data acquired as needs develop and funding becomes available.

INVENTORYING "QUALITY OF EXPERIENCE" ON A TPC

After a TPC is identified, field reconnaissance is necessary to map the travel patterns involved, determine TPC boundaries, and identify site impact areas (either at activity sites or on accessways leading to them). Preliminary reconnaissance and discussions with field management personnel about the TPC area is used to locate appropriate locations for survey sampling visitors.

The Marlette Area, which is a high use area of undeveloped shoreline on the east side of Lake Tahoe, was identified as a high management priority TPC and was selected to test field data collection methods. Although the Marlette TPC is only a small part of Tahoe Basin land, it encompasses some 3 square miles of land stretched along 4 miles of shoreline. Lane (1979) reported estimates of "300-people-at-one-time" at some locations along the shoreline.

Mapping the travel patterns and site impact areas was done during 2 days of hiking the area. At the same time, areas of user concentrations within the TPC were noted as locations for systematic survey sampling, borrowing the concept of "key areas" from range allotment sampling theory (Stoddart and Smith 1955). Four small beach sites were identified as key areas for survey sampling visitors. It makes sense to concentrate on these areas because problems of visitor conflicts or site impacts are usually most common on highly used areas.

We then designed a visitor survey questionnaire that we feel is unique for several reasons. First we limited the number of questions to 10 to reduce the time needed to administer and analyze the interviews because we wanted to develop an inexpensive inventory method that could be readily used by field personnel. A key concept here is to think of this interview as part of a series of studies to be continued at the same location by managers to monitor changes and gather additional information (Chilman 1976).

Second, we asked visitors to identify the most important aspect affecting their choice of the particular recreation setting to make their initial "quality of experience" assessment. Then visitors were asked whether they used other areas for the same purpose and, if so, why they selected this area rather than one of the others. This developed comparative data so managers can better understand the spectrum of recreation opportunities existing on a large land area. Finally, visitors were asked whether they had used the area before and, if so, whether they had noted changes affecting what they had identified as the most important aspects of their recreation setting choice.

Management decisions usually deal with changes occurring in a situation, and visitors' perceptions of changes (and rate of change) can be useful information.

Forty-two persons were interviewed. Although the interviews were conducted in September, observations by management personnel accompanying the interviewer and by repeat visitors indicated visitor populations appeared to be representative of those normally encountered in the Marlette Area. Predominant user types were sunbathers and boaters who came to picnic. Both types indicated that the opportunity to use undeveloped natural shoreline was most important to their choice of the area for recreation, and they expressed concern for maintaining the natural attractiveness of the beaches and shoreline. Visitors were concerned about the increasing frequency of undesirable behavior, e.g., motorcyclists riding into the area and said that more patrols of the area would be welcomed. This offered a management option intermediate to site development or limitation of user numbers, and patrol activities were successfully implemented the following year.

DISCUSSION

Wildland recreation managers work to maintain and improve recreation opportunities, often for large and diverse areas. Managers need to be able to show other persons, budget analysts and citizen groups, for example, the basis of their assessment of management needs. An inventory of users provides information that can help managers make decisions on what should or shouldn't be done in these areas.

The Tahoe inventory studies offer a systematic framework for relating an overview of recreation opportunities for a large area (ROS) to assessment of management needs for specific sites (RADS). Visitors' perceptions of most important aspects of choice of recreation setting, and changes that might be affecting those important aspects, were used as basic descriptive indicators of "quality of experience". Its low cost effectiveness is indicated by the short time needed (1) to establish the initial ROS-RADS system for a 300-square-mile area (approximately 10 days, with close consultation with knowledgeable field management personnel), (2) to administer and analyze the short interview format, and (3) to collect the relatively small survey sample size, within the context of management knowledge of visitor use patterns and conceiving the initial survey as part of a series of studies.

The Tahoe inventory procedures have been successfully replicated in Missouri and Illinois (Tertell 1981, Kao and Chilman 1981) and have been enthusiastically received by area managers

because they are practical to apply, easy to understand, and provide useful information for decision-making. More replications will help to refine the inventory techniques, but the system appears to offer a useful tool for improved management of wildlife recreation opportunities.

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CONFLICT PERCEPTION AND VISITOR SUPPORT FOR MANAGEMENT CONTROLS

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Several forest recreation researchers have documented the importance of visitor management in forest recreation areas and have provided various techniques and strategies for managing visitors (Gilbert *et al.* 1972, Stankey and Lime 1973, Lime 1975, Hendee *et al.* 1978, Peterson and Lime 1979, Lime 1979). The proposed techniques or combinations of techniques for managing visitors have emphasized four major management objectives: (1) reduce conflicts among competitive users, (2) reduce the destructiveness of some users, (3) increase the durability of the physical resource, and (4) increase the opportunity for visitor enjoyment (Lime 1979). Most of the visitor management strategies have emphasized indirect means of influencing or modifying user behavior rather than direct methods which aim at regulation and overt control of users.

The success of various visitor management strategies depends, in part, on the degree to which visitors perceive that management controls are needed and their feeling of the appropriateness of specific management strategies. This paper reports a study to determine the degree to which river recreationists feel that management is needed to control user conflicts, use density, and environmental impacts, and their corresponding support for various management strategies. It is hypothesized that visitors who perceive more problems and more need for controls will be more supportive of management actions, particularly direct controls.

METHODS

Perceptions of problems, need for controls, and support for management actions were obtained through a mail survey of innertube/raft floaters on three southern Appalachian rivers—Hiwassee River, located on the Cherokee National Forest in southeastern Tennessee; Deep Creek, located within the Great Smoky Mountains National Park in western North Carolina; and the Chattahoochee River in the Chattahoochee River National Recreation Area near Atlanta, Georgia. Respondent names were obtained from an on-site systematic sample of floaters at these three rivers during a 2 week period in August 1979. A

15-page questionnaire was mailed to 1,102 floaters from the on-site sample during September and October of 1979 (McDonald and Hammitt 1981) and we received 561 usable questionnaires (51 percent return rate). Although the return rate was low, an analysis of nonrespondents revealed little evidence of a nonrespondent bias (Hammitt and McDonald 1982).

Questionnaire items relevant to this analysis pertained to three visitor management problem areas: user conflicts, use densities, and environmental impacts. These three problem areas had similar formats in the questionnaire. Floaters were first asked if they perceived a need for controls in each problem area (i.e., (1) controls needed to correct an existing problem; (2) although no problem now, controls needed to prevent a future problem; (3) controls not needed, but should be imposed in the future if problem occurs; (4) no controls now or in the future). Secondly, respondents indicated support for various indirect and direct management strategies using a 5-point Likert scale (1=strongly oppose, 2=oppose, 3=undecided, 4=support, 5=strongly support).

Data analysis consisted of computing mean values for support of the management strategies within the four categories of perceived need for controls. Mean differences in level of support among the four categories of perceived need for control were tested by analysis of variance and Duncan's Multiple Range Test was used to separate means.

RESULTS AND DISCUSSION

Floater perceptions of river use problems and the need for management actions were significantly related to floater support for various river use management strategies (tables 1, 2, and 3). In all three problem areas, the least amount of support for the management strategies was indicated by floaters who did not perceive a problem. The results also indicate that the greater the perceived need for management action, the greater the support for the management strategies. This is particularly true for management strategies that directly regulate or control floater behavior.

Table 1.--Mean level of support for user conflict management strategies by perceived need for management controls^{1/}

Strategy	Grand mean ^{2/}	Mean level of support by control category ^{3/}				ANOVA F value
		Controls for existing problem (N=60)	Controls to prevent problem (N=121)	Controls only if problem occurs (N=284)	No controls (N=92)	
Activity zoning	2.8a	3.5a	3.2a	2.8a	1.9c	29.60* ^{4/}
Temporal zoning	2.5b	2.9a	2.8a	2.7a	1.8b	21.13*
Limit numbers	2.5b	2.6ab	2.9b	2.5a	1.7c	19.10*
No controls	2.3c	2.0a	2.0a	2.2a	3.1b	35.03*

^{1/}Means are calculated for a 5-point Likert scale from 1=strongly oppose to 5=strongly support.

^{2/}Grand means are separated within the grand mean column by a series of paired t-tests, $p \leq 0.05$. Means with the same subscript are not significantly different.

^{3/}Means for the four management control categories are separated within rows by Duncan's multiple range test, $p \leq 0.05$. Means with the same subscript are not significantly different.

^{4/}* $p \leq 0.001$.

Table 2.--Mean level of support for use density management strategies by perceived need for management controls^{1/}

Strategy	Grand mean ^{2/}	Mean level of support by control category ^{3/}				ANOVA F value
		Controls for existing problem (N=40)	Controls to prevent problem (N=94)	Controls only if problem occurs (N=253)	No controls (N=172)	
Allow unlimited use to continue	2.8a	1.9a	1.9a	2.6b	3.8c	118.61* ^{4/}
Permits: first come, first served	2.6ab	3.4a	3.2a	2.9b	1.7c	52.07*
Limit number of users by time of day	2.6b	3.6a	3.4a	2.8b	1.7c	81.96*
Permits: mail reservation	2.2c	2.8a	2.9a	2.3b	1.5c	36.37*
Entrance fee	1.8d	2.5a	2.0b	1.9b	1.6c	11.54*
Permits: lottery system	1.7e	2.0a	2.0a	1.8a	1.3b	22.34*

^{1/}Means are calculated for a 5-point Likert scale from 1=strongly oppose to 5=strongly support.

^{2/}Grand means are separated within the grand mean column by a series of paired t-tests, $p \leq 0.05$. Means with the same subscript are not significantly different.

^{3/}Means for the four management control categories are separated within rows by Duncan's multiple range test, $p < 0.05$. Means with the same subscript are not significantly different.

^{4/}* $p \leq 0.001$.

Unfortunately, too few indirect management strategies were included in the questionnaire to establish any relation with perceived need for controls. Support for site management strategies did not vary by level of perceived need for management action (table 3). Apparently, the relation between perceived need for management and support for specific management controls is stronger when the controls directly influence user behavior.

Closer inspection of the data in which strategies are restricted to controlling floater behavior, reveals that floaters perceiving no need for management controls were consistent in their lack of support for any of the strategy alternatives (tables 1 and 2). In contrast, support is more varied for the different controls. Thus, recreation resource managers have more flexibility in attempting to implement appropriate management strategies this group is likely to support.

Table 3.--Mean level of support for environmental impact management strategies by perceived need for management controls^{1/}

Strategy	Mean level of support by control category ^{3/}					ANOVA F value
	Grand ^{2/} mean ^{2/}	Controls for existing problem (N=166)	Controls to prevent problem (N=148)	Controls only if problem occurs (N=212)	No controls (N=32)	
Enforce fines for littering	4.3a	4.6a	4.4b	4.2c	3.6d	17.37* ^{4/}
Provide more garbage containers	4.1b	4.3a	4.0b	4.0b	4.0b	7.72*
Require carrying out litter	4.1b	4.3a	4.0b	4.0b	3.7b	4.34**
Provide toilet facilities	3.8c	3.8	3.9	3.8	3.8	0.30
Provide access parking	3.7c	3.8	3.8	3.7	3.8	1.13
Aggressively enforce existing rules	3.5d	3.9a	3.6b	3.3c	2.5d	28.15*
Establish more access points	3.2e	3.2	3.3	3.2	3.3	0.30
Prohibit cans, bottles, and other nonreturnables	3.1e	3.3a	3.2a	3.0a	2.3b	5.06**

^{1/}Means are calculated for a 5-point Likert scale from 1=strongly oppose to 5=strongly support.

^{2/}Grand means are separated within the grand mean column by a series of paired t-tests, $p < 0.05$. Means with the same subscript are not significantly different.

^{3/}Means for the four management control categories are separated within rows by Duncan's multiple range test, $p < 0.05$. Means with the same subscript are not significantly different.

^{4/}* $p < 0.001$; ** $p < 0.005$.

Although the primary purpose of this study was to examine the relation between degree of perceived need for management controls and degree of floater support for different management strategies, the data also provided insight into overall floater perception of some river recreation management problems and management strategies. For example, the magnitude of the means within each level of perceived need category and the grand means for each strategy within the three problem areas indicate the following: (1) stream environmental impact problems were perceived as most needing management action, user conflicts second most, and use levels third; and (2) even though the degree varied to which floaters perceived a need and would support management action, few respondents thought problems existed in the areas of user conflict and use density.

IMPLICATIONS

The success of any visitor management strategy depends, partially, on the degree to which visitors perceive a need for the strategy and judge it to be appropriate for the specific problem. With this in mind, before recreation

resource managers determine which indirect or direct visitor management strategy to implement, they should first identify the degree to which users perceive the existence of river use problems and the need for controls. We suggest that in using this approach a comprehensive list of possible strategies should be developed so that indirect, direct, and site management strategies, if applicable to the problem, are all adequately represented. The framework developed by the USDA Forest Service could serve as a guideline (Lime 1979). Also because support for specific strategies apparently varies with support for direct control on user behavior, future studies might aim at ordering and evaluating the many visitor management strategies available on a continuum ranging from indirect to direct. Such a scheme, and visitor perception of it, would be helpful to both managers and researchers.

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VISITOR KNOWLEDGE AFFECTS VISITOR BEHAVIOR

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Given the demands for wilderness recreation and the deteriorating condition of many backcountry areas in the United States, wilderness visitor behavior research has become increasingly relevant. An understanding of the various factors influencing visitor behavior is essential in making management decisions. This study is a test of the contention that it is possible and practical to improve wilderness behavior by education. This contention rests on the assumption that knowledge is related to behavior. A number of wilderness recreation researchers, including Lucas (1974), Lime and Stankey (1971), and Hendee *et al.* (1978) agree with the theoretical assumption that visitor knowledge and appropriate wilderness behavior are positively related. Therefore, my intent was to empirically test the validity of this assumption. This study was conceptualized within the framework developed by social psychologists Fishbein and Ajzen (1975) and Iso-Ahola (1980) regarding the relation between antecedents, beliefs, attitudes, intentions, and behavior.

PURPOSES AND PROCEDURES

The purpose of this study was to determine the relation between visitor behavior in wilderness areas and visitor knowledge (beliefs or informational base), attitudes, and selected characteristics (antecedents). These characteristics included socio-economic status, sex, age, previous primitive camping experience, and conservation organization membership. A variety of independent variables were investigated to determine the importance of visitor knowledge as it relates to visitor behavior.

The sample included 678 backcountry visitors, comprising 216 parties, in the Three Sisters Wilderness Area in the Willamette National Forest of Central Oregon. The survey took place during the summer of 1980. I utilized the roaming technique, contacting parties at their campsites each evening between 5:30 and 9:00 p.m. Day-use visitors were not included in the sample. A primary limitation of the roaming technique is that of an undefinable probability sample (Lucas and Oldman 1971). I minimized this problem by carefully choosing sampling locations in the backcountry. I cooperated with

the USDA Forest Service Wilderness Guards and the "Code-A-Site" system (see Hendee *et al.* 1978) to gain insight into location of travellers. This information reduced the limitation of not reaching those who hike off the main routes.

I was able to survey a great variety of site types and locations in the backcountry by hiking 10 to 12 miles daily within a 50 mile radius for more than 6 weeks. The Three Sisters Wilderness Area is heavily used in the Sunshine Meadow areas and near Obsidian Falls. This is a short distance (approximately 6 miles) from the trail head, which ensures a sample involving short-term visits. It is also located along the Pacific Crest Trail, which ensures longer-term visits. The area is a popular take-off point for persons climbing North and/or Middle Sister. Thus I was able to contact a diversity of visitor types. This area does not include visitors who are primarily horseback riding and fishing. Therefore, I spent several weeks in the southern and middle portion of the wilderness (Mink Lake Basin) to ensure representation of these individuals. For further details regarding the roaming techniques of survey sampling utilized in this study, refer to Robertson, 1981, p. 78-83.

Respondents were asked to complete a four-part questionnaire investigating their behavior, knowledge of appropriate behavior, attitudes toward the wilderness, and selected characteristics. Visitor behavior was conceptualized as human conduct that can either minimize or maximize impact on wilderness areas. For purposes of this study, behavior was operationalized as a respondent's self-reported behavior including campfire techniques, wood-gathering habits, waste and refuse disposal methods and wash water disposal procedures. Visitor attitude referred to a measurement of the extent to which a respondent's definition of wilderness conformed to that of the Wilderness Act of 1964. Visitor knowledge referred to a measurement of the extent of a visitor's awareness of recommended wilderness behavior as proposed by the USDA Forest Service (U.S. Forest Service, Backpacking, 1979a; Without-a-Trace, The Wilderness Challenge, 1979b). For a detailed account of the content of the questionnaire

utilized in this study, refer to Robertson, 1981, Appendix B.

RESULTS

Multiple regression analyses indicated that five variables -- visitor knowledge, visitor attitude, education, age, and primitive camping experience -- were significant in explaining 39 percent of the variance in behavior. The contribution of visitor knowledge ($r = 0.50$) was far greater than the contribution of the remaining predictor variables (table 1). Based on the regression analyses, knowledge alone explained 35 of the variance in visitor behavior.

Respondents were classified into groups based on their knowledge of USDA Forest Service recommendations for appropriate wilderness behavior. Scores were divided into three groups with approximately 33 of the respondents in each group. One-third of the visitors had scores of less than 58 out of a possible 72 points. A two-way (3 x 3) contingency table was constructed to study the relation between visitor knowledge and behavior (table 2). Those persons who scored high on the knowledge scale also tended to score high on the behavior scale, and in turn those persons who scored low on the knowledge scale also tended to score low on the behavior scale. Therefore, persons who were aware of recommended conduct also tended to act in congruence with the recommendations.

CONCLUSION

The findings of this study have direct implications for the future direction of wilderness recreation management. Management is a tool to

Table 2.--Wilderness visitor behavior scores by visitor knowledge score

Visitor knowledge scores	Visitor behavior scores (ranging from inappropriate (low) to appropriate (high) behavior)						N
	Low (0 - 32)		Moderate (33 - 36)		High (37 - 42)		
	No.	Percent	No.	Percent	No.	Percent	
Low (0-57)	93	53	52	30	29	17	174
Moderate (58-63)	47	23	97	47	61	30	205
High (64-76)	16	8	86	44	95	48	197
Total	156		235		185		576*

Chi-square = 108.926 with 4 d.f., $p < 0.0001$

* Missing responses = 102

minimize the impact of wilderness visitors and to keep use within the carrying capacity of the area (Hendee, et al. 1978). Heavy-handed management permits little individual choice. Rules, for example, determine the length of stay, group size, areas of use, types of use, campsite assignment, and travel route assignments. Regulations such as these often conflict with the inherent definition of wilderness recreation in which the visitor should be afforded opportunities for meeting the natural environment on its own terms. Light-handed management, on the other hand, stresses modification of behavior while maintaining individual choice. Based on the findings of this study, the need for regulatory management would be lessened if the users' knowledge of appropriate behavior and skills were increased.

Table 1.--Multiple regression analysis for visitor behavior

Variable	Pearson's correlation coefficient r	Cumulative r ²	Standardized regression coefficients β	Entering variable f-ratio
Knowledge	0.59	0.35	0.50	154.407 ^{1/}
Attitude	.38	.37	.13	10.864 ^{1/}
Education	.34	.38	.17	12.173 ^{1/}
Age	.17	.39	-.08	3.364 ^{1/}
Primitive camping experience	-.03	.39	-.06	2.797 ^{1/}
Conservation organization membership	.12	.39	.06	2.371
Occupation	.12	.39	-.05	1.769
Sex	-.05	.39	.02	0.429
Income	-.09	.39	-.01	0.022

^{1/}p < 0.01

Visitor education is an indirect or light-handed management technique. Ecological concepts and appropriate backcountry behavior as recommended by the USDA Forest Service should be the focus of the educational efforts. In light of the preceding discussion regarding management, education is a highly desirable visitor management and can serve the visitor's desires rather than restricting and regulating him or her. After collecting the completed questionnaires, I had informal discussions with the respondents. Many of them were enthusiastic to become aware of recommendations for appropriate backcountry behavior. They appeared eager to learn, when and if the information is available.

Respondents, after learning the nature of the research and understanding the purpose in terms of developing insight regarding user behavior with the goal of appropriate management techniques, were generally eager to cooperate in the survey. Based upon a subjective yet systematic coding system, I scored each individual regarding receptivity to the survey, ranging from (5) very receptive to (1) very unreceptive. This scale was based on my perceptions and was not intended as hard data, but rather as an indicator or the possible effectiveness of the roaming technique in survey research of wilderness users and their attitudes regarding efforts to improve management techniques as well as backcountry behavior. The majority of respondents (94) scored either four or five on the receptivity scale.

Education regarding the wilderness and appropriate backcountry behavior should not be limited to resource management agencies. Elementary, secondary, and postsecondary school systems should offer courses that include wilderness concepts and recommendations for appropriate skills and etiquette. Cooperation and communication among educational institutions, public agencies, and wilderness recreation managers will enhance efforts aimed at reducing depreciative visitor behavior. An example of where this type of cooperation is being implemented is the Eagle Cap Wilderness in Oregon.

The variety of subgroups using wilderness areas, such as backpackers, mountain climbers, horseback riders, and fishermen, indicates that wilderness areas are required to meet a broad spectrum of activity preferences. Educational efforts should be directed toward all subgroups. In addition, beyond efforts to provide information regarding appropriate conduct with reference to specific types of areas, resource managers should provide diversity in resource

areas to complement the spectrum of wilderness behaviors. Additional roadless primitive recreation areas are needed that are a bit more developed than wilderness. For example, the behaviors, and activity preferences of many backcountry visitors could very well be accommodated in less primitive areas where the recreational carrying capacity is more flexible. More effort should be directed at communicating with visitors regarding recreational opportunities afforded by semiwilderness areas.

The wilderness environment is fragile and visitor demands are many and varied. Based on this study, visitor education is a practical method of improving visitor behavior. To preserve wilderness and environments and provide wilderness-dependent experiences, further research efforts should aim at understanding educational techniques that enhance appropriate backcountry behavior.

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PREVENTION AND CONTROL OF DEPRECIATIVE BEHAVIOR IN RECREATION AREAS:
MANAGERIAL CONCERNS AND RESEARCH NEEDS

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THE PROBLEM

Littering, vandalism, and theft in recreation settings are a major concern to recreation managers. The problems of these depreciative behaviors have been repeatedly addressed in recreation literature during the past decade. Managers and researchers alike have noted the prevalence of depreciative and destructive acts in recreation areas; the maintenance, repair, and increased surveillance necessary in response to these problems are increasingly more expensive. Efficient and cost effective strategies to control such behavior and to reduce these impacts are an important and salient concern.

Conventional wisdom has offered many notions explaining these acts, and has suggested alternative strategies which are currently employed in attempting to reduce litter or destruction to recreation resources. Strategies such as public promotions and campaigns have met with limited success; sometimes compliance was achieved, but all too often it was not. There is no assurance that any one method will effectively or significantly reduce all depreciative behavior under all conditions.

The current state of knowledge about depreciative behavior is inadequate to furnish managers the information they need to effectively deal with these problems. There has been insufficient evaluation of alternative strategies of control to determine their effectiveness. The assumption that any strategy will be effective is based primarily upon conjecture and speculation; little empirical evidence exists to direct managerial response and action.

With reduced budgets and increased costs, recreation managers are being forced to respond in (often undesirable) ways including reduced maintenance, elimination of programs, or closing recreation areas. Although such solutions are often unpopular, they may be the only ways managers can maintain high quality recreation settings open to the public.

Managers cannot afford to spend time, money, and resources on solutions which prove to be ineffective. Such practices are not only costly, but the time that is wasted may allow irrever-

sible damage to occur to the natural resources at prime recreation locations. The danger of choosing an ineffective strategy is not only the risk of closing more recreation sites, but also the risk of permanently destroying the inherent recreational value of these lands. In addition, such inadequate responses may create unnecessary and adverse effects on the recreational experiences and activities of the users which can be as bad as the problems they were meant to control. Thus the need for an evaluation of managerial options has become crucial. The question managers are posing to researchers has simply become: "What works and what doesn't?"

THE ROLE OF RESEARCH

The goal for recreation researchers is to provide recreation managers with a better understanding of depreciative behaviors, ultimately leading to prevention and control of such acts. This is not an easy task, for by their very nature, the acts of littering, vandalism, and theft are hard to observe. Nonetheless, research has begun to systematically explore several issues relating to depreciative behavior in recreation areas.

For example, the magnitude of impacts caused by depreciative behavior has been addressed in research (Alfano and Magill 1976; Clark *et al.* 1971a; Matthews 1970; U.S. Department of the Interior 1977, 1978). Further, researchers have sought to determine characteristics of individuals who engage in such behavior (Campbell *et al.* 1968, Gladstone 1979, Ward 1973). This has led to an exploration of the motives for depreciative behavior, leading to an examination of social science disciplines in attempt to derive a theory of causation (Allen and Greenberger 1978, Christensen and Clark 1978). Varied perceptions of what is "proper" has been another important line of research, for disagreements about the acceptability of certain behaviors may be an important factor in the occurrence of depreciative acts (Boggs 1971; Clark *et al.* 1971b, Downing and Clark 1979).

Although the above research provides insight into the dynamics of depreciative behavior, it does not directly address the managerial concerns of effective and efficient

APPLICATIONS OF EVALUATIVE RESEARCH

mechanisms for its prevention and control; the current deficit of proven guidelines and strategies to direct managerial response is evidence of this fact. The emphasis of past research has been primarily on description. Descriptive research serves an important function by providing baseline data, but it is also necessary to provide evaluation of specific strategies in order to determine the effectiveness of alternative strategies for prevention and control. Evaluative research must address the managerial concerns for effective methods of reducing the problems of littering, vandalism, and theft. It must clearly document what works, where, when, and under what conditions.

The call for a shift to evaluative research after adequate baseline information is available has implications for research design and technique. Evaluative studies must be based on methodology that can isolate and assess correlational relationships. This means reduced dependence on surveys and interviews, and increased emphasis on experimental design, longitudinal studies, and other techniques. Through experimental manipulation and analysis, evaluative research will be able to more directly ascertain the effectiveness of alternative strategies for prevention and control, and the conditions under which maximum compliance can be attained. In this manner, answers can be provided to the questions and issues raised in the management of depreciative behavior (Clark 1977).

It may also be necessary for researchers to alter their orientation from values and attitudes to a more direct focus on behavior. Problems such as littering, vandalism, and theft are indeed problems of behavior; understanding attitudes may not be effective in controlling these actions. This has been found especially true in the study of litter, where attitudes about littering may not prevent an individual from littering (Clark et al. 1972b, Heberlein 1971).

Studies of behavior offer a wider selection of research techniques than do studies of attitudes and values. Although surveys and diaries are still useful, measurement of behavior may also be obtained through direct observation or indirect traces of behavior (such as identifying and assessing the nature and extent of facilities and resources impacted by vandalism). Indirect strategies which do not entail visitor contact can offer an inexpensive alternative to many research strategies presently in use. Thus, evaluative research is a feasible alternative when researchers themselves face budget constraints and regulations against field work and visitor contacts.

Applications of evaluative techniques are infrequent in the recreation literature. Depreciative behavior is one of the few areas where examples of such research can be found. The evaluative approach has been used in the study of littering behavior (Burgess et al. 1971; Clark et al. 1972a, 1972b; Clark 1976b; Heberlein 1971; Kohlenberg and Phillips 1973; Muth and Clark 1978; Powers et al. 1973), and public involvement in the management of depreciative behavior (Christensen, Unpubl.). Exploratory studies have been conducted on the effects of maintenance and the visibility of personnel on reducing vandalism (Samdahl and Christensen unpubl.). Few other studies have been undertaken to systematically explore the conditions under which managerial strategies for control will be effective.

There are suppositions about the effects of maintenance, the salience of authority, controlled access, fees, reservation systems, techniques to effectively communicate the rules, and so on, but few of these hypotheses have been adequately evaluated by either managers or researchers. All of these strategies may be effective within their own limitations, but it is important for a manager to know those limitations when selecting among options. Recreation research must provide that evaluation through structured experimental techniques in order for managers to make wise and informed decisions for controlling litter, vandalism, and theft in recreation areas.

CONCLUSIONS

The task of finding effective and efficient practices for the prevention of depreciative impacts is an important concern for managers and researchers alike. Managers are cautioned to read with care when reviewing the literature on vandalism and its control (Clark 1976a). Distinctions between conventional wisdom and scientific fact may become crucial when deciding how to invest the limited monies at hand. Many alternatives may be costly and risky. A long-term approach will incorporate several different strategies, and it is futile to expect too much from any one action.

Researchers are urged to initiate the evaluative studies necessary to identify effective prevention and control. Descriptive baseline data is essential for monitoring change, and managers can be asked to help provide this information. Field studies based on experimental design will require close cooperation between researchers, managers, and field personnel, but such techniques offer the the most promise in providing answers to the questions now posed.

There will be no easy solution to the problems of litter, vandalism, and theft. All solutions will have their limitations. But identification of effective strategies will allow a systems approach incorporating many methods, with each strategy doing its part for the final reduction of litter, vandalism, and theft at recreation areas.

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SOCIAL RESEARCH IN FISH AND WILDLIFE MANAGEMENT

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The pressures necessitating resource decisions, such as increased demands for limited resources, are increasing greatly in these times of economic austerity. As demands for resources increase, so do the complexities in the decisionmaking process, as witnessed in regulations pursuant to the National Environmental Policy Act of 1969, the Forest and Rangeland Renewable Resources Planning Act of 1974, and the National Forest Management Act of 1976. Though this complexity requires more thorough analysis of alternatives, agencies often are hard-pressed to assemble the information needed to fully understand these alternatives.

Information on the social aspects of fish and wildlife management is increasingly needed but is often scarce. In the half-century since Aldo Leopold (1930) observed that people represent the most important variable in wildlife conservation, wildlife professionals have grown increasingly aware that maintaining and restoring wildlife populations often depends as much on understanding people as on applying biological management techniques. However, two significant problems have been obtaining the necessary information and integrating it into fish and wildlife management decision processes.

IDENTIFYING RESEARCH NEEDS

Hendee and Potter (1971) underscored and emphasized the role social research can play in managing fish and wildlife. A decade ago these authors stated that the most pressing people-wildlife issues were "...hunting satisfaction, nonconsumptive use of wildlife, the hunter population, access and hunting opportunities, wildlife economics, and political-legal issues." Since then several authors have cited the importance not only of knowing who the users are and their needs, desires, expectations, and preferences, but also of writing legislation and management guidelines that successfully protect the wildlife resource (Hendee 1972, 1974; Potter et al. 1973; Clark 1974; Shafer and Moeller 1974; Scheffer 1976; Dahlgren et al. 1977; Hautaluoma and Brown 1978; Hendee and Bryan 1978; Warren 1978; and O'Leary and Weeks 1979).

Many of these same needs as well as new ones were restated at a recent state-of-the-art wildlife values workshop (Shaw and Zube 1980), and have been the impetus, to some extent, for the formation of a working group chaired by Steve Kellert of Yale University concerned with human dimensions in wildlife.

Conclusions drawn at the wildlife values workshop indicated socio-psychological information and its integration with economic and biological information were among our top research needs and priorities. Socio-psychological information needs cited at the workshop included user identification, preferences for management techniques, participation trends in consumptive and nonconsumptive wildlife, recreation behavior, motives for participation, and expectations (Shaw and Zube 1980).

INTEGRATING RESEARCH AND MANAGEMENT NEEDS

Federal and State fish and wildlife agencies have recognized the importance of social information to their current management problems. In the 1975 National Fish and Wildlife survey questions were included that concerned fish and wildlife information needs. Two of the more pressing information concerns were "how to keep ... clientele satisfied while conserving the resource" and "how to attract more paying customers" (Charbonneau and Hay 1979). As Witter (1980) suggests, we can provide clues about how to keep the customer satisfied through studies of the participants' motives, activity preferences, management preferences, and knowledge; through studies of the economic value of wildlife recreation; by examining wildlife protection and law enforcement actions; and through studies of landowner attitudes and participation trends. We can approach the problem of attracting more paying customers by addressing the willingness of non-traditional use groups and the general public to pay for fish and wildlife programs and by exploring potential coalitions between traditionally opposed user groups (e.g., nonconsumptive and consumptive wildlife enthusiasts).

Although this information is needed its mere existence will not help managers. We must continue to build ties and work with managers to show how social research can be used. In building this rapport with fish and wildlife expectation of how the social information will be used. Social researchers must remember that social information is only one of several types of information considered by managers. Biological information, agency policy, budgets and personnel, legislation, and the opinions and judgments of commissioners also must be considered. In this context, we suggest that some applications of social research are: a) to reject or confirm the views held by commissioners, b) to better acquaint professionals with clientele desires and use situations, c) to provide information that might help to solve future problems, and d) to provide managers with concepts and viewpoints with which to analyze decisions and conduct planning and management. We wish to emphasize that as researchers we see our role as more than one of introducing tools to managers and providing managers with descriptive information. Our most important role is one of developing and testing conceptual models that allow managers to generalize with structure and logic beyond existing data sets to solve planning and management problems. These kinds of conceptual models currently exist in the outdoor recreation literature and include models of recreational carrying capacity, experience-based management, allocation planning, and social displacement and substitution.

SOME RECENT RESEARCH RESULTS

The papers in this section reflect only a few of the research, management, and communication needs mentioned above. They do, however, illustrate the kinds of models and tools being developed that will benefit fish and wildlife managers and researchers alike.

A paper by Witter, Haverland, Belusz, and Hicks illustrates the obstacles and challenges managers must face on a daily basis. In spite of these challenges though, social researchers and wildlife managers at Missouri's Department of Conservation have instituted a unique program for assessing the fishing resource within Missouri and the preferences of the Missouri angler. The paper illustrates the use of descriptive social information as one input to the decisionmaking process. The framework outlined by Witter and his associates should be of interest especially to managers and researchers who are searching for creative ways to develop a people and wildlife package desirable to both the public and managing agency.

Work by Buchanan, Warder, and Collins, by Manfredo and Anderson, and by Hautaluoma, Brown, and Battle, provides information fundamental to notions of experience-based planning and provides clues about how managers might keep customers satisfied. These research efforts are grounded in the belief that it is important to provide an array of opportunities so that users can realize desired experiences. In addition various means are suggested of implementing and evaluating the experience-based planning approach.

The work by Buchanan *et al.* is based on the idea that providing benefits to people is one purpose of experience-based sport fisheries management. To provide benefits, managers must be able to identify the different segments of the user population and must know what constitutes a quality sport fishing experience for each segment. Buchanan and colleagues evaluated Wyoming's three-part classification scheme for river management by comparing the recreation opportunities planned for each area with the experiences people realized at each area. Their evaluation shows that two of the three planned opportunities actually resulted in experiences that the managers had anticipated users would realize. Evaluation studies such as this one can be used to alert resource administrators to management objectives that are not working--planned opportunities do not result in anticipated experiences--and can be used as support for management objectives that are working--planned opportunities result in anticipated experiences.

In a similar fashion Hautaluoma *et al.* point out that one rationale for market segmentation of users is that it provides managers with a better method to identify and prescribe management actions for all users. To illustrate the notion of market segmentation elk hunters were divided into groups based on the type of hunting license they had purchased (i.e., in-state rifle, out-state rifle, muzzle-loaded rifle, bow and arrow). Each license group was further segmented based on the kinds of hunting experiences desired. Differences between and within license groups were examined with a key point for resource administrators being the number and diversity of management opportunities that enable users to realize desired experiences.

Manfredo and Anderson examined data from a survey of fishermen in Oregon to illustrate a method of segmenting user groups in a way that would aid resource allocation and guide development of Statewide regulations. Their approach

emphasizes a classification scheme specific to trout fishing but which can be integrated with existing land management tools such as the Recreation Opportunity Spectrum (ROS). Their paper also indicates what managers can learn from secondary data analysis, a point that should not be lost in these times of diminishing research dollars.

The usefulness of social research is often gauged by our ability to predict future behavior from past and current behavior. From an applied standpoint this allows assessment of demand for recreation resources. Vaske and Donnelly have attempted to identify and quantify the variables necessary for predicting what recreation substitution choices users will make. The substitution notion, though an important variable in traditional demand models, has been elusive when dealing with nonmarketed resources such as fish, wildlife, and recreation opportunities.

Resource administrators increasingly are faced with the problem of allocating uses and users to a dwindling and changing resource. Scarce resources often lead to competition and conflict among user groups with different interests. In some situations the allocation strategies devised are neither equitable nor efficient in meeting user needs. Richards and King point to the growing problem faced by resource administrators of allocating opportunities for nonconsumptive as well as consumptive wildlife experiences. They attempt to develop a method for managers to improve their ability to weigh alternative resource uses.

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ASSESSING THE BENEFITS OF SPECIAL FISHERIES MANAGEMENT

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Traditionally, fisheries management has been biological in orientation and has assumed human benefits result from habitat management that maintains or increases available fish populations (Hendee 1974). Techniques such as creel censuses, counting the number of licenses sold, or estimating fishing pressures have commonly served as indices of management effectiveness. In the face of increasing demand and a relatively fixed resource base, however, additional techniques are needed to maximize the benefits provided by fisheries resources.

An alternate management method that has the effect of increasing the number or size of fisheries resources is to increase the efficiency of existing waters. This method involves understanding and manipulating the demand component of the supply/demand relation. It assumes that the ultimate purpose of sport fisheries management is to provide benefits to people and consequently focuses upon the perceived benefits attributed to recreation engagement. Before a manager can know what is meant by a quality sport fishing opportunity then, he must have some understanding of those values that define the types of opportunities desired by fishermen (Driver and Cooksey 1977).

Specifically, the objective of this research is to examine the effectiveness of a program that was established to provide different types of fishing experiences at different fishery sites. Areas being managed to produce "trophy," "wild," and "harvest" fishing opportunities were evaluated 5 years after their designation to see if the benefits being realized by fishermen were consistent with the original management goals.

RELATED RESEARCH

Early research efforts aimed at assessing the personal benefits of recreation experiences emphasized the identification of specific psychological outcomes desired by recreation participants (Knopf 1972). Although these studies were able to provide "motive profiles" of recreationists in a variety of different activities and/or environmental settings, there was a distinct lack of homogeneous results even within studies examining the same activity (Driver 1976).

In response to this diversity, recent research has segmented recreation populations on the basis of the satisfying experiences received from recreation participation. The basic premise of this segmentation is that individuals desiring different experiences react differently to particular environmental features, find different sources of satisfaction, and assign different priorities to alternate management activities (Knopf and Barnes 1980).

Market segmentation as a planning and management tool in recreation is not a new idea (Tatham and Dornoff 1971). Only recently, however, has the idea of market segmentation been applied to recreation research regarding the psychological outcomes of recreation behavior (Brown *et al.* 1977, Driver and Cooksey 1977). The research of Phillips and Ferguson (1977) illustrates this approach and represents the foundation upon which this study is based.

Using cluster analytic procedures, a Statewide sample of Wyoming fishermen was grouped into three "types" on the basis of the psychological benefits received from sport fishing. One group was identified as a "trophy" fishing group, a second group desired the opportunity to catch "wild" (nonstocked) fish, and the third and largest group consisted of "harvest" fishermen characterized by a strong desire to catch a limit of legal-size fish. Although this study documented a variety of psychological outcomes desired by fishermen, each of the three types tended to have a single dominant preoccupation with respect to the satisfying experiences necessary for quality fishing (Phillips and Ferguson 1977). Accordingly, three different management strategies were adopted by the Wyoming game and fish agency so that the dominant interest of each group could be provided at a single fishery site. Under the adopted plan, individual fishing areas were studied with regard to biological capacities, present and projected use, financial constraints, and existing fishermen preferences for different types of fishing experiences. The management concepts adopted included classifying all State fishing areas into wild, trophy, and harvest (basic yield) categories.

The wild category applied to fishing areas managed primarily to provide the fisherman with opportunities to catch fish from a fishery totally supported by natural reproduction. Fishing areas in this category had to have (1) high potential for game fish reproduction and (2) densities of game fish capable of sustaining a fishery with no stocking or regulation to produce a harvest in balance with the productive capacity of the fishery.

The trophy category included fishing areas managed to provide opportunities for catching a "larger than average" fish. This strategy required that the water have high productivity as well as management practices such as low stocking rates, restrictive size and creel limits, and fishing pressure limits.

The basic yield category included those management areas providing fishermen the opportunity to harvest fish. Basic yield fisheries are supported by stocking fingerlings or fry, but the yield to fishermen is generally a fish that has grown to catchable size in the wild (not in the hatchery). The opportunity to catch trophy or wild fish is not the intent of this management concept, even though many basic yield fisheries are partially supported by natural reproduction and "trophy" fish occasionally enter the catch.

The overall intent of the special fisheries management program, therefore, was to segment the fishing market by differentiating the experiences available at different sites as a means of maximizing the social benefits provided by sport fishing. Previous management strategies that defined the value of fisheries management in terms of numbers of fish caught were constrained by physical resource capacities. The special fisheries management program, however, that defines the value of fisheries management in terms of human experience, is only partially affected by habitat and physical constraints.

For example, individuals who value the opportunity to catch nonstocked or trophy fish might be redirected to fisheries managed specifically for these experiences. Not only would the quality of the fishing experience be increased for these persons, but also it might result in increased benefits for "harvest" fishermen desiring to catch their limit due to decreases in fishing pressure on areas managed for this type of experience.

Although the actual categorization of fisheries into "trophy," "harvest," and "wild" areas was based largely on an area's biological capacities, the intent of the categorization was to provide different opportunities/benefits to the three different types of fishermen iden-

tified by Phillips and Ferguson (1977). Five years after the program's original implementation, this study was undertaken to assess whether the specially designated fishing areas were indeed providing different experiences and therefore different perceived benefits to the fishermen visiting those areas. In addition, an attempt was made to evaluate the specific nature of those benefits and whether or not they were consistent with the types of management categories established by the Wyoming game and fish agency. Specific hypothesis used to test these programs included:

- (1) The overall profile of perceived benefits received by individuals at different management areas will be significantly different.
- (2) Fishermen at areas managed for "trophy," "wild," and "harvest" fishing will exhibit significantly higher perceived benefit scores for "trophy," "wild," and "harvest" fishing, respectively, than individuals at other management areas.
- (3) The mean perceived benefit scores for "trophy," "wild," and "harvest" type fishing will be significantly higher than the perceived benefit scores for "secondary" (other) benefits within each respective management category.

METHODOLOGY

Two sport fishing areas were selected representing each of the three management categories throughout Wyoming. The criteria by which the six areas were selected included recent fishing pressure estimates, geographical distribution and whether they were highly characteristic of their individual categories.

Interviewers contacted area fishermen on site during the summer of 1980 on randomly selected days and at randomly selected times by canvassing access points, boat ramps, and shoreline fishing areas. Where appropriate, river areas were floated by raft to contact additional fishermen. The initial on-site contact involved the completion of a short questionnaire that asked for preliminary information about each fisherman and solicited participation in a more comprehensive mail questionnaire.

One thousand three hundred and ninety-three individuals were initially contacted across the six sample areas. Of those contacted, 99 percent agreed to participate in the larger study and were mailed a questionnaire with a postage-paid return envelope within 21 days of the initial contact. A postcard follow-up and second questionnaire package were mailed at 12-day intervals to non-respondents. This procedure produced 1,104 usable questionnaires (a response rate of 82 percent).

The questionnaire contained 12 scales developed by Driver (1977) to measure the perceived benefits fishermen attribute to their outings. Three additional scales developed by Phillips and Ferguson (1977) to measure the perceived benefits associated with specific types of fishing opportunities were also used in the study. A five-point modified Likert response format was used to determine the magnitude of perceived benefits.

A stepwise discriminant analysis was used to identify the relation between individuals grouped by the type of management area at which they were contacted and their responses to the perceived benefit scales just described. Lawley's correction of Bartlett's chi-square approximation to Wilk's lambda was used to test for significant differences between group centroids. Interpretation of discriminant analysis is often difficult if multicollinearity exists between discriminating variables. This situation is analogous to interpreting beta weights in multiple regression when predictor variables are highly intercorrelated. For this reason, a structure matrix was formed by correlating each discriminating variable with the vector of the matrix representing the discriminant function. These results were then rotated to a varimax solution (Cooley and Lohnes 1971). To identify those variables that loaded on the rotated structure matrix, a cutoff of one-half of the absolute value of the largest weight was used (Tatsuoka 1970).

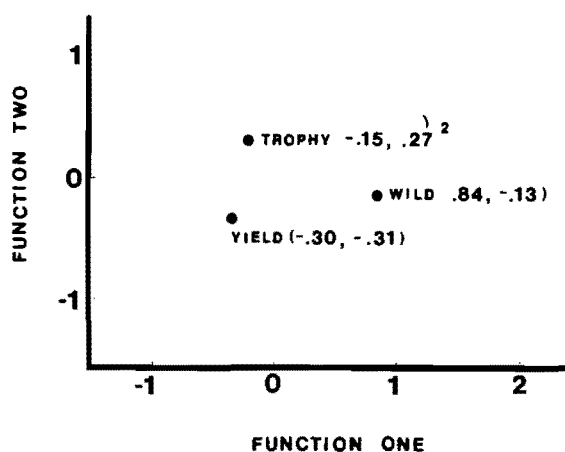
RESULTS

Results from the discriminant analysis led to the acceptance of the hypothesis that a significant difference existed in the "benefit profile" of fishermen at different management areas. The first and strongest discriminant function explained 16 percent of the variance in the dependent variable (management categories). The first discriminant function differentiated individuals at "wild" fishing areas from those at "harvest" or "trophy" fishing areas on the basis of perceived benefits (fig. 1). The second discriminant function accounted for 6 percent of the variance in the dependent variable and differentiated individuals at "trophy" fishing areas from those at "wild" or "harvest" fishing areas.

An examination of the perceived benefits that loaded on discriminant function one indicates that experiencing nature, catching wild fish, escaping the family, and escaping from physical pressure (e.g., noise, crowds) are positively related to wild fishing areas (table 1). Those benefits negatively related to wild fishing areas included family togetherness and harvesting fish. The trophy fishing areas differentiated by discriminant function two indicated that the opportunity to catch trophy fish, receive social recognition, and catch wild fish were positively related to these fishing areas.

Figure 1.--Summary table¹ and graphical presentation of discriminant functions one and two

Function	Canonical Correlation	Wilk's Lambda ³	Chi-Square	D.F.	P <
One	0.40	0.79	173.77	30	0.001
Two	.25	.94	48.70	14	.001



¹With a three group discriminant analysis, only two (K-1) discriminating functions are possible.

²Centroids for Function One and Function Two respectively.

³Lambda is an inverse function of the strength of the discriminating variables.

Table 1.--Structure matrix coefficients rotated to varimax solution with Kaiser normalization

Perceived benefit	Discriminant function one	Discriminant function two
Catch wild fish	0.383 ¹	0.463*
Catch trophy fish	0.168	0.765*
Harvest fish	-0.399*	0.291
Family togetherness	-0.489*	0.181
Social recognition	-0.036	0.493*
Use equipment	0.060	0.336
Experience nature	0.470*	-0.070
Observe new people	-0.012	0.315
Escape physical pressure	0.295*	0.183
Leadership/autonomy	0.211	0.093
Social contact	0.079	-0.075
Exercise/physical fitness	0.194	-0.024
Physical rest	0.068	-0.263
Change of temperature	-0.026	0.233
Escape family	0.308*	0.121

¹Denotes variables that loaded on the discriminant function using Tatsuoka's cutoff rule (Tatsuoka 1970).

Based on the mean scores for perceived benefits by type of fishing area (table 2), hypothesis 2--that fishermen at areas managed for trophy, wild, and harvest fishing would exhibit significantly higher perceived benefit

Table 2.--Mean scores for perceived benefits by type of fishing area

Perceived benefit	Wild \bar{X}	Trophy \bar{X}	Harvest \bar{X}
Catch wild fish	3.10	2.88	2.49
Catch trophy fish	3.04	3.22	2.63
Harvest fish	2.86	3.37	3.26
Family togetherness	1.96	2.45	2.42
Social recognition	1.84	2.02	1.80
Use equipment	2.61	2.70	2.46
Experience nature	4.01	3.49	3.45
Observe new people	1.45	1.55	1.41
Escape physical pressure	3.70	3.48	3.33
Leadership/autonomy	2.39	2.21	2.13
Social contact	3.23	3.13	3.16
Exercise/physical fitness	3.01	2.77	2.81
Physical rest	4.35	4.17	4.24
Change of temperature	1.46	1.57	1.48
Escape family	1.93	1.65	1.55
	N=214	N=532	N=358

scores for trophy, wild, and harvest fishing, respectively, than individuals at other management areas--was partially accepted. Although catching wild fish and catching trophy fish loaded positively on their respective discriminant functions, it is necessary to examine the mean scores of variables that loaded on the structure matrix within each group. It is possible that the importance of benefits that loaded on each discriminant function might vary considerably.

Despite the strong positive loadings of catching wild fish and catching trophy fish on discriminant function one and two, respectively, the difference in mean scores for these benefits as well as harvesting fish in no instance exceeded 0.65 when examined across management categories. Although these differences were statistically significant, the magnitude of the differences must be considered weak. In addition, it should be noted that although discriminant analysis produced a trophy function, individuals at trophy waters also exhibited higher mean scores for harvesting fish than did individuals at harvest waters.

Finally, it is important to note that although catching wild or trophy fish or harvesting fish appear to be important benefits differentiating fishermen at different management areas, in no instance were these benefits ranked as the most important associated with any fishing experience. Regardless of the way fisheries were managed, fishermen consistently perceived more important benefits resulting from experiencing nature, escaping physical pressure (e.g., noise, crowding) and experiencing physical rest than from catching fish.

DISCUSSION

The results of the discriminant analysis as well as the high rankings for trophy, wild, and harvest fishing experiences by individuals at those respective areas are encouraging signs for management. The similarity of mean scores for these benefits when viewed across fishing areas managed for different experiences, however, suggests that much progress might be made in further segmenting user groups.

The high rating given to catching wild fish by persons fishing at wild fishing areas suggests that the wild fishery program is succeeding in attracting and satisfying fishermen who value the opportunity to catch a fish that is not stocked. The wild fisherman has strongly indicated that he is not interested in harvesting or catching a great number of fish at the wild management sites. Instead, the preferred experience is the possibility of using special skills to catch a special type of fish.

An equally important finding is that important benefits are provided to the wild fishing group by highly aesthetic settings. Although all fishermen value this benefit, individuals at areas managed for wild fisheries value it most highly. In fact, wild fishermen value pristine surroundings above all other facets of the fishing experience. Managers should be aware that the quality of a wild fishery is highly dependent on the natural setting of the fishery. If wild fishery sites are to continue to provide unique benefits to fishermen, appropriate procedures should be followed to ensure that these areas retain their pristine quality. Additionally, it would seem essential to consider elements of the natural environment when reviewing potential sites for future inclusion in the wild fishery program.

The wild fishermen's need to escape both the family and physical pressures is an element of the fishing experience that also deserves management's attention. Given the importance of these benefits to wild fishermen, the adoption of management strategies capable of keeping fishing pressure at low levels at the wild areas may be necessary. A variety of options such as reducing creel limits or establishing catch and release policies might be considered, although conceivably the wild management policy of nonstocking may act as sufficient control.

Survey results regarding individuals at trophy fishing areas were somewhat less encouraging. Although catching trophy fish was perceived as more important by fishermen at these areas than elsewhere, the high mean score for harvesting fish indicated a lack of clearly segmented benefits for trophy fisheries. The market segmentation for trophy type fishermen appears somewhat less distinct than originally anticipated. Several reasons for this lack of segmentation are suggested:

1. Proximity to individual waters must be considered when studying the type of fisherman attracted to a particular site. Although it appears that some fishermen will seek to avoid "harvest" opportunities the reverse may not be true. It would seem logical to assume that individuals desiring the opportunity to simply catch fish would be unwilling to drive great distances to avoid catching wild or trophy type fish. If this is true, the effectiveness of management programs might be partially hidden by large numbers of "convenience" fishermen.
2. The high percentage of nonresident fishermen at these areas (53 percent at wild areas, 59 percent at trophy areas, 22 percent at harvest areas) may be more the product of an established reputation

for "good fishing" than the recognition of specific management policies.

3. Of the two study areas chosen to represent wild fisheries, one was extremely large and offered a wide diversity of recreational activities in addition to quality trophy fishing. The other trophy area was close to an extremely well-known National Park and tourist attraction. It is possible that sampling less accessible trophy areas might have segmented the trophy fishermen more clearly.

Finally survey results for individuals fishing at areas managed for harvest fishing show that although experiences other than catching fish were most important to fishermen, the desire to "catch their limit" was rated much more important than catching a particular type of fish. In fact, the segmentation of fishermen according to the specific type of fishing opportunity available appears to be more clearly delineated at harvest areas than at trophy or wild fisheries.

Although it is evident that some market segmentation has resulted since the special fisheries management was implemented, an argument can be made for additional segmentation. It is equally evident that regardless of management policy, the Wyoming State game and fish agency is providing many highly valued social benefits such as experiencing nature and reducing perceived stress through their fisheries resources. At the time of this report, extensive efforts have not been made to disseminate information either through informational brochures or media sources regarding the specific types of fishing opportunities available as a result of the special fisheries management program. It may be possible that many fishermen are unaware of the management policies at specific areas. If a media program were implemented, it would be possible to examine if this program enables increasing numbers of fishermen to satisfy their specific needs and interests.

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RECREATION PREFERENCES OF OREGON TROUT FISHERMEN

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ALLOCATING RESOURCES FOR RECREATION EXPERIENCES

A principle assumption in managing for recreation experiences is that resources can be allocated in such a way that makes them available for some types of experiences yet unavailable for others. Fisheries managers affect the desirability and availability of lakes and streams to different types of recreationists by regulating things such as method of fishing, size, species, and seasons. Frequently, these regulatory decisions are based on biological considerations alone and thus opportunities for experiences are provided without consideration of the amount, type and distribution of experiences desired by the public. To make allocation decisions responsive to users' desires managers need user preference information.

To aid managers in making recreation allocation decisions that are responsive to public desires researchers have emphasized the importance of identifying unique user groups and their preferred experiences and activities (Stankey 1974; Brown *et al.* 1973; Hendee 1974; Driver and Brown 1975, Witter 1980). Bryan (1980) has specifically pointed to the need for such an approach in making allocations in sport fisheries management.

Typologies of fisherman can be useful because they provide a parsimonious way to deal with the diversity of public preferences. To aid in the decision process these groupings should give managers an idea of the resources to allocate for each group's preferred activity and the management programs most amenable to these groups. It should also guide the allocation process by giving managers an idea of the value of fishing experiences so that managers might allocate resources to their most highly valued use. Guided by these concerns it was the purpose of this research to propose a method for grouping fishermen and to demonstrate its use for a sample of Oregon trout fishermen.

From the several ways that preferences of fishermen might be categorized we selected two approaches in the literature as the basis for

the typology used (see Bryan (1980), and Steinhoff (1980) for literature reviews). The first approach, which is prominent in the recreation literature, was the Recreation Opportunity Spectrum (ROS) currently used in USDA Forest Service and USDI Bureau of Land Management resource planning activities. The primary strength of this approach is that it guides development of relations between the psychological benefits people receive from an experience, the settings they desire, and the management programs that will provide them. With this approach users' preferred experiences are defined by psychological motives, and preferred settings are defined by resource, social, and managerial attributes of the resource. These, along with activity preferences, are used to identify the diverse types of opportunities managers might provide. Past studies of fishermen (Driver and Cooksey *in press*, Manfredro *et al.* 1978), skiers (Haas *et al.* 1980, McLaughlin and Paradise 1980), hunters (Brown *et al.* 1977), and wilderness users (Haas *et al.* 1979, Brown and Haas 1980) discuss the implications of applying this approach.

The second approach we used was Bryan's (1977, 1980) typology of fishing experiences because of its specific relevance to sport fishing. This typology is based on the degree of specialization reflected by the user's fishing gear and by the skills the user needs for both the activity and the setting in which the activity takes place. Bryan identified four types of fishermen--occasional, generalist, technique specialist, and technique setting specialist--and described the social setting and management preferences of these four groups empirically. Bryan contended that specialization reflects commitment to a sport and that commitment gives some indication of the value of the fishing experience to an individual.

In integrating these two approaches we proposed that groupings of fishermen should include consideration of a) the equipment used by and the skill level of the fishermen; b) the psychological motives for fishing; and c) the social, managerial, and biophysical resource preferences of the fishermen that are related to desired fishing experiences.

The specific intent of this study was to identify and empirically describe a typology of trout fishermen on these variables. To illustrate the approach, we used existing survey data for the State of Oregon. We identified user groups based on Bryan's typology and then examined them for differences on reasons for trout fishing, management preferences, and past participation rates.

METHODS

Data for this study were obtained from a 1978 survey conducted by Oregon Fish and Game and Oregon State University's Survey Research Center (Lowry 1978). A one percent sample was drawn of all holders of a 1977 Oregon fishing license. A total of 4,213 questionnaires were mailed, 3,590 were delivered, and 2,262 (63 percent) were completed and returned. Checks for nonresponse bias revealed that respondents had higher fishing participation rates than nonrespondents but respondents and nonrespondents did not differ on variables assessing method or location of fishing activities.

The first step in our analysis of these data was to group respondents as closely as possible to approximate Bryan's typology. Although we did not have all of the variables to model Bryan's approach, we constructed our typology using two variables on which Bryan's typology is highly correlated: most frequent method of fishing and preferred location of fishing activity. Together these two variables defined the activities most preferred by fishermen and formed the basis for six mutually exclusive fishermen groups--fly/stream, fly/lake, lure/stream, lure/lake, bait/stream, and bait/lake.

Three characteristics of these six groups were examined.

1. Reasons for trout fishing. Respondents were asked to examine a list of 10 possible reasons for fishing and rank their 3 most important reasons. From these data we formed 10 dichotomous variables (1 for each reason) with response categories indicating whether or not the variable had been cited and analyzed these data using the Chi-square.
2. Preferences for potential management actions. Respondents were asked about hatchery options,

3. Fishing participation. Past participation data, including time spent fishing for trout in lakes and streams and the ratio of trout-fishing trips to all other fishing trips, were used to define fishing avidity. Group differences were analyzed using analysis of variance and Student-Newman-Keuls tests for differences between means.

RESULTS

Trout fishermen comprised 72 percent of the Oregon State University Survey Research Center sample. Frequencies and percentages computed for our fishing typology indicated that among those activities most preferred by Oregon trout fishermen, 15 percent were fly/stream, 3 percent fly/lake, 15 percent lure/stream, 21 percent lure/lake, 26 percent bait/stream, and 20 percent bait/lake. Because the fly/lake percent was small, these users were grouped with the fly/stream users for further analysis.

REASONS FOR FISHING FOR TROUT

Across all fishermen groups, enjoyment of the outdoors and fishing for sport were the more prominently cited reasons for fishing (table 1).

Table 1.--Most important reasons for fishing by user group^{1/}

Reason	Type of fishermen				
	Fly	Lure/ stream	Bait/ stream	Lure/ lake	Bait lake
To enjoy the outdoors	67	72	77	72	66
Fishing as a sport	62	57	62	65	59
To fish for food ^{1/}	30	41	44	45	47
To get away from people ^{1/}	34	30	31	18	21
For family experience ^{1/}	22	23	20	29	31
Testing skills ^{1/}	38	25	21	19	21
To be with friends	15	14	16	20	18
To catch large fish	4	9	4	4	5
To catch wild fish ^{1/}	4	5	2	2	1
To catch lots of fish	2	3	2	3	2

^{1/}All tests were made at $p < 0.05$ using Chi square. The source of these data was the Preference Survey of Oregon Resident Anglers (Lowry 1978).

From 18 to 50 percent of all users cited fishing for food, getting away from people, family experience, and testing skills as important fishing reasons. Less important reasons included being with friends and catching wild, large, or many fish.

Differences between fishing groups were found on 6 of the 10 reasons. Fly anglers placed less emphasis than others on fishing for food and more emphasis on testing skills. Additionally, when fly, lure/stream and bait/stream anglers were compared to lure/lake and bait/lake anglers, these users placed more emphasis on getting away from people and less on being with friends and family. Other results showed that catching wild fish was more important to a slightly larger percentage of fly and lure/stream fishermen than to others and that enjoying the outdoors was cited less frequently by fly and bait/lake anglers than by other anglers.

PREFERENCES FOR MANAGEMENT ACTIONS

In most cases, anglers supported little change in current management regulations on size limits, lake and stream bag limits, and April as the season opener on streams and lakes (table 2). Users favored increased hatchery production with the expectation that this would increase current catch rates. Variability between user groups was found on actions involving an increased emphasis on management for wild trout, however, less than 5 percent of the users in each group favored a decrease in wild trout management. In addition, more than one-half of the members in each group felt restrictions on bag limits should be the method employed to protect wild trout.

Attitudes of fly fishermen and lure/stream fishermen toward selected management actions were distinguishable from other groups. Compared to others, fly and lure/stream anglers were less supportive of increased hatchery production and more interested in decreased bag limits for lakes and streams and in increased emphasis of wild trout. More fly, lure/stream, and bait stream fishermen supported increases in the legal size of trout than others. Also more fly anglers and lure/stream anglers supported restrictions on method of fishing as a preferred means of protecting wild trout. No statistical differences between groups were found on preferences for trout season opener on lakes.

PAST FISHING PARTICIPATION

As would be expected, fly and other stream anglers had higher average 1977 participation (12 days) at stream angling than did the lake anglers (4 days). Conversely lake anglers had higher average 1977 participation rates (10

days) at lake angling than did the stream anglers (5 days). The actual days) at lake angling than did the stream anglers (5 days). The actual percent of all fishing time spent in pursuit of trout was lower for lure stream anglers (50 percent) than others (60 percent). Apparently lure/stream anglers are more avid fishermen and less specialized with regard to their species preference.

IMPLICATIONS

Our data showed that user groups differed on most of the variables in our proposed typology; however, the typology did not attain the high degree of separation on users' reasons for fishing or management preferences that Bryan (1977) found. Probable causes of the low degree of separation may be the limited set of variables used for identifying unique user groups or the fact that our study used a questionnaire methodology while Bryan's used an observational methodology. We do, however, feel that managerially relevant differences were found between groups, and the typological method merits further refinement on that basis.

Although the data indicate that managers should continue to emphasize previously established programs and regulations (e.g., hatchery production, bag and size limits, open seasons), the preferences of users are diverse and should be considered in implementing allocation decisions. Our data suggest that activities desired by some users would be enhanced by one set of management actions whereas activities desired by other users would be better provided by a different set of management actions. Our data best illustrate this in the case of fly anglers. In contrast to other groups the fishing activities preferred by the fly group offer opportunities for users to test skills and to be away from other people. Areas more apt to provide the experiences these anglers seek are those managed for wild trout where greater restrictions are placed on bag and size limits and method of fishing.

Allocating resources among the activity preferences of different user groups poses tough decisions for fisheries managers. Managers and commissioners must decide about the number of special management areas and where they should be located. Although we make no claims about the relative value of different activities, we present data useful for evaluating allocation decisions against the criterion of equality (Shelby and Danley 1979). The equality criterion suggests that within the resource, political, and fiscal constraints, opportunities should be provided in proportion to their desirability by the public. An example of how we might evaluate current management against the criterion using data presented here is to com-

Table 2.--Preferences for fisheries management by user group^{1/}
(In percent)

Management Strategy	Type of fishermen				
	Fly	Lure/ Stream	Bait/ stream	Lure/ lake	Bait lake
Hatchery options^{1/}					
Increase productions maintaining current catch rate	73	78	85	82	86
Maintain present levels of hatchery production with a catch rate somewhat below the present level	21	20	14	16	13
Decrease hatchery production with future catch rates below the present level	6	2	1	2	2
Bag limits for troupe in streams^{1/}					
Remove	0	0	1	0	1
Increase	3	10	7	7	9
Maintain	70	70	79	81	79
Decrease	27	20	14	12	12
Level of emphasis for wild trout^{1/}					
Increase	68	54	46	39	47
Maintain	31	44	52	59	50
Decrease	1	2	1	2	4
Action preferred for protection of wild fish from overharvest^{1/}					
Restriction on bag limits	53	71	73	74	75
Fishing method (i.e., fly or lure angling)	36	16	8	8	11
Length of season	11	14	19	18	15
Size limits on trout^{1/}					
Remove	6	4	3	3	6
Decrease	3	2	1	3	1
Remain	58	67	58	72	70
Increase	32	28	29	23	23
Preference for opening month of season for stream trout fishing^{1/}					
April	60	65	70	75	64
May	32	32	28	23	30
June	8	4	3	2	6
Preference for opening month for lake trout fishing					
April	41	40	39	46	41
May	28	29	23	23	25
June	5	5	5	5	6
All year	27	27	33	27	29
Bag limits on trout fishing in lakes should be^{1/}					
Removed	1	1	1	0	1
Decreased	20	16	11	10	10
Remain	74	72	79	80	78
Increased	6	11	9	10	11

^{1/}All tests were made a $p < 0.05$ using Chi square. The source of these data was the Preference Survey of Oregon Resident Anglers (Lowry 1978).

pare the proportion of fly anglers in the population to the proportion of stream miles managed as fly or fly and lure angling only. We found fly angling on streams the preference of 15 percent of the population, which is actually 28 percent of all anglers who preferred fishing streams. However less than 1 percent of Oregon's stream miles are managed as fly or fly and lure angling only. In making this comparison we are not suggesting that 28 percent of Oregon's stream miles be managed as fly or fly and lure angling only. Yet this large imbalance

should be one of several criteria used in setting annual fishing regulations concerning the availability of fly angling only areas.

As a final note we would like to reiterate what we feel are the essential components to consider in developing a typology of fishing opportunities that would accurately reflect user desires and would be useful to fisheries managers in making allocation decisions. The basis of our typology rests on the users degree of activity specialization, desired outcomes (or

motivation) for fishing, and the resource, social, and management settings preferred. Although we have provided a portion of this information, more is needed--particularly on the types of resource and social settings desired by fishermen. It is the entire setting that gives users the opportunity to engage in experiences desired. It should be recognized that fisheries managers cannot only affect the type of social resource and management setting of an area but also can ensure desired settings are maintained by cooperative efforts with land management agencies.

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MISSOURI TROUT PARK ANGLERS: THEIR MOTIVES AND OPINIONS OF MANAGEMENT

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The task of providing fishing opportunities to satisfy trout anglers is a challenging one for government agencies. Managers of trout fisheries face contrasts in angler types--from those who describe their catch-and-release experiences in reverential tones to those who talk more in terms of fish on the stringer. Accommodating fishermen of different interests would be no problem were it not for fiscal realities that limit the stocking and management alternatives agencies can consider.

Of the many approaches taken by fish, wildlife, and park agencies to serve a range of angler interests, certainly one of the more novel are the "Trout Parks" in Missouri. Four parks are located in forested settings in southern Missouri on headwaters of cold springs large enough to permit trout rearing and fishing. Management of three of the parks is a cooperative effort between the Missouri Department of Conservation, responsible for the fisheries, and the Missouri Division of Parks and Historic Preservation, which manages the land. Responsibility for the remaining park is divided in a like manner between the Department of Conservation and the James Foundation, Inc., a private organization. Each park is stocked daily from March 1 to October 31 with 10-inch rainbow trout (*Salmo gairdneri*) at a rate of 2.25 fish per anticipated angler. The average length of stream stocked at each park is 1.5 miles. Most baits, lures, and flies are permitted, however, fishing techniques are separated through zoning in some parks. Every attendee pays \$1.50 for a daily tag that entitles him to keep five trout.

Liberal regulations on angling techniques, intense stocking of the fisheries, and cooperative management of the parks have produced an appealing angling opportunity. Visitation at the Trout Parks has increased at an average annual rate of 4 percent since 1960, and total seasonal tag sales are approaching \$0.5 million.

However, increasing visitation at the Trout Parks is generating two threats to continuation of the present program. First, stocking demands will soon exceed hatchery potential if 10-inch fish continue to be stocked at a rate of 2.25 fish per expected angler. Second, fishermen often are concentrated in numbers that conventional "trout lore" might call "crowds." Both

situations begged an evaluation of the current program and formulation of possible management responses.

A status assessment of the Trout Park program was begun in 1979 by the Missouri Department of Conservation. The fisheries managers involved felt that this assessment of stocking demands, number of anglers served, and types of techniques allowed should be based not only on hatchery production data but also on angler information. Anglers were surveyed in 1979 at Bennett Spring and Montauk Trout Parks and in 1980 at Maramec and Roaring River Trout Parks as well. Specific objectives of the survey were to determine: (1) motives for fishing at the Trout Parks; (2) opinions of present management and alternatives; (3) angling techniques used and preferred; (4) effort and catch; and (5) selected background characteristics (age, gender, place of residence, and prior Trout Park visitation). This paper details angler motives and management opinions.

METHODS AND PROCEDURES

Data Collection

1979 Survey

Beginning September 1, 1979, and on every other day thereafter until October 31, each fisherman purchasing a daily fishing tag at Bennett Spring and Montauk Trout Parks received a Trout Fishing Information Card. Fishermen were instructed to answer the questions at the end of the fishing day and deposit the cards in drop boxes at concessions, campgrounds, and exits. At Bennett Spring, 2,881 (15 percent) cards were returned, and at Montauk, 1,685 (17 percent) cards were returned, for a grand total of 4,566 (15 percent).

1980 Survey

On 36 randomly selected sample days from May 1 to October 31, 1980, each fisherman purchasing a daily tag at Bennett Spring, Maramec, Montauk, and Roaring River Trout Parks received a Trout Fishing Information Card. The content of the questionnaire was reduced in light of 1979 results. Returned cards totaled 4,222 (16 percent) at Bennett Spring, 1,748 (20 percent) at Maramec, 3,170 (23 percent) at Montauk, and

2,242 (13 percent) at Roaring River, for a grand total of 11,382 (17 percent).

Variables and Data Treatment

No follow-up study of nonrespondents was undertaken, so no assessment of nonresponse bias can be offered. Low response dictated conservative treatment of the data.

Motives

Respondents rated the importance of 16 possible reasons for fishing at Missouri's Trout Parks. These items were adapted from Driver (1977) and appeared in the 1979 survey only. Each motive's importance (very, somewhat, not) was determined using a scoring procedure described by Gilbert (1977, p. 71). Item means were used to establish the rank order of motives.

Management Opinions

Respondents to the 1980 survey were asked to express opinions toward present management by (1) rating the fishing quality, (2) indicating if the day was enjoyable, and (3) comparing the enjoyment they get from fishing at the Trout Parks to angling pleasure experienced elsewhere in Missouri. Participants in the 1979 survey expressed opinions toward three management alternatives that could reduce strains on hatchery production while presumably improving anglers' success: (1) limiting number of fishermen, (2) reducing daily limit, (3) having catch-and-release fishing in some stretches. Frequency analysis was used on the opinion data.

RESULTS

Motives

Respondents felt it was "very important" that the Trout Parks afforded them opportunity to relax, enjoy nature, catch at least one trout, and escape daily routine and work pressure (table 1). "Somewhat important" to respondents were chances to experience family togetherness, catch a limit, see a trout in the water, get exercise, get away from crowds, have contact with other people, catch a trophy, and relive memories. Only two reasons were "not important"--escaping family for a while and displaying fishing skills.

Differences among anglers' motives were apparent when respondents grouped by selected background characteristics were contrasted. Most anglers said catching a limit was only somewhat important to them while fishing the Trout Parks, but bait fishermen as a group saw taking a limit as very important, as did anglers under age 15. Most respondents said that

showing others their fishing skills was not an important aspect of their experiences; however, display of skills was somewhat important for those under age 20. Overall, family togetherness was somewhat important to subjects, but was very important to bait fishermen and to female anglers. Escaping family for a while was unimportant to respondents as a group, but was somewhat important to those from age 16 to 20. For fishermen over age 70, reliving memories, watching and meeting other people, getting exercise, and simply seeing a fish in the water were very important elements in their Trout Park experiences, while these items were only somewhat important to other age groups. And for those over age 60 and under age 16, escaping work was only somewhat important, contrasted to the high importance assigned this item by other age groups, particularly the 31 to 50 year class.

Opinions of Management

To gain insights to anglers' views of present management of the Trout Parks, subjects were asked to rate the fishing quality: 10 percent responded "excellent"; 24 percent, "good"; 29 percent "fair"; and 37 percent "poor". Those rating the fishing poor were asked to explain. Most (67 percent) said they caught few or no fish, some (20 percent) said they caught too few fish and these were too small, and other (13 percent) felt the fish caught were simply too small.

Next, anglers were asked, "Considering everything, did you have an enjoyable day?" Most did (79 percent); of those who did not, 76 percent attributed their displeasure to poor fishing, 11 percent said poor fishing combined with other factors was responsible, and 13 percent said reasons apart from fishing accounted for their dissatisfaction.

Each subject was asked to compare the enjoyment afforded by the Trout Parks to other places he or she had fished in Missouri. Trout Park fishing was called "the most enjoyable fishing I know" by 25 percent of the respondents; 32 percent considered the parks "more enjoyable than most places"; 33 percent said the areas were "as enjoyable as most places"; 7 percent responded "less enjoyable than most places"; and 3 percent felt the parks provided "the least enjoyable fishing I know".

When presented with three management alternatives that presumably could improve fishing by either reducing the number of fishermen, redistributing trout by limit reduction, or recycling trout; respondents rejected limiting fishermen (84 percent) and reducing the limit (86 percent). More acceptable was establishing catch-and-release stretches to recycle trout,

but even this idea met the approval of only 46 percent.

Stocking Demands

DISCUSSION

The results of these surveys must be interpreted cautiously due to low response. The management implications of the findings are presented in four sections: (1) stocking demands; (2) number of anglers served; (3) types of techniques allowed; and (4) improving angler response to future surveys.

Catching at least one trout is very important to Trout Park anglers, and catching a limit of fish is also important. Restating these findings would be unnecessary except that, as observed by Weithman and Anderson (1978), it has become popular to say that the outcome of angling is not fish but fishing. Relaxing, enjoying nature, escaping daily routine, and so on, are important elements of a fishing experience, granted; but so is catching a fish,

Table 1.--Importance of possible reasons for fishing at Missouri's Trout Parks, 1979 Survey (Categories: 2=very important, 1=somewhat important, 0=not important)

Reason	Importance			Mean Importance	N
	Very	Somewhat	Not		
-----Percent-----					
Very important					
Relax	74	24	2	1.71	4,011
Enjoy nature	64	32	4	1.59	3,859
Catch at least one trout	64	24	12	1.52	3,762
Escape daily routine	61	31	8	1.52	3,768
Escape work pressures	55	28	17	1.38	3,695
Somewhat important					
Family togetherness	48	32	20	1.28	3,640
Catch a limit	44	37	19	1.25	4,013
See at least one trout in water	50	18	32	1.18	3,705
Get exercise	35	42	23	1.12	3,804
Get away from crowds	31	42	27	1.04	3,548
Watch/meet other people	28	47	25	1.03	3,812
Have privacy	27	46	27	.99	3,573
Catch a trophy (over 15")	36	26	38	.98	3,673
Relive memories	19	31	50	.69	3,559
Not important					
Escape family for a while	11	18	71	.41	3,482
Show others my fishing skills	10	15	75	.36	3,524

1/ Example of 2-step scoring procedure to place items in categories:

RELAX Step 1. Establish ranges of values.

4,011 (respondents) x 2 ("very important") = 8,022 (highest possible score) 8,022 3
(possible responses) = 2,674 (minimum value for "somewhat important")

Somewhat important = 2,674 to 5,348 (2,674 + 2,674)

Very important = 5,349 to 8,022 (5,348 + 2,674)

Step 2. Determine importance of item.

$$0.74 \times 4,011 \times 2 = 5,936$$

$$.24 \times 4,011 \times 1 = 963$$

$$.02 \times 4,011 \times 0 = 0$$

$$\underline{6,899} = \text{very important}$$

evidenced by the fact that most anglers who did not enjoy their visits blamed poor fishing (meaning few or no fish), and not an inability to have other experiences. Those anglers dissatisfied with the Trout Parks are not likely to be placated by agency efforts to make the parks more relaxing, prettier, or more natural. Their satisfaction probably will come when they experience the returns of a stocking program designed to improve chances to catch fish.

Catching at least one trout was more important than catching a limit, which in turn was more important than catching a trophy. The order of important events for Trout Park anglers might be interpreted, "to catch at least one fish, then more fish, then bigger fish." If Trout Park anglers were indicating that numbers of trout generally are more important to their immediate enjoyment than size of trout, then one management alternative that could help keep pace with increasing visitation would be to increase the number of trout produced at the expense of size. For illustration, in place of annual production of 1 million 10-inch trout, 1.2 million 9-inch trout might be raised, or 1.5 million 8-inch trout. At least this alternative would forestall the need for reducing the creel limit, a management alternative that received practically no support from anglers.

The most creative management response to growing stocking demands, however, probably is not a single action but a combination of efforts. For example, the policy of stocking fish at the rate of 2.25 fish/expected angler could be eliminated in favor of stocking a set number of fish that would be unaffected by expected visitation. This change might be accompanied by slightly reducing size of fish, reducing creel limit by 1 fish, and establishing catch-and-release stretches. Stocking demands thus could be held in check while making more fish available by redistributing and recycling.

Number of Anglers Served

Limiting the number of anglers using the Trout Parks is another method of controlling visitation, but fishermen gave practically no support to this idea. Indeed, in contrast to fishermen studied in other settings (Driver and Cooksey 1977, Manfredo *et al.* 1978), Trout Park anglers placed low importance on getting away from crowds and having privacy.

Understanding anglers' tolerance of other fishermen is a topic toward which additional research should be directed for cold and warm water settings. The results will become increasingly important as personal travel costs

continue to rise and as fishermen request that agencies provide fishing areas convenient to urban centers--areas that will undoubtedly receive intense use.

Types of Angling Techniques Allowed

The lenient policy of permitting most baits, lures, and flies to be used at the Trout Parks strikes some "purists" as peculiar, best illustrated by good-natured satire on bait fishing and fishermen at Montauk Trout Park in Fly Fisherman magazine (Zahner 1979). But the success of providing "something for everyone" cannot be disputed considering that 33 percent of the respondents said Trout Park fishing was "as enjoyable" as most other angling opportunities in Missouri, 32 percent said it was "more enjoyable" than most, and 25 percent called Trout Park fishing "the most enjoyable" angling in the State.

Satisfactorily accommodating trout anglers of different interests and abilities yields important benefits to the agency. A pressing need facing fish and wildlife organizations is to stimulate the broadest program appeal possible, thereby encouraging a broad base of financial support. Services catching the attention of the angling public at large are critical in helping to generate and maintain this support. The major source of funds for the Missouri Department of Conservation--a one-eighth percent sales tax approved by the citizenry--exemplifies the backing that can be expected from the public if as many outdoor interests as possible are served (Brohn 1977).

Policies that might affect the balance in types of techniques used at the Trout Parks must be considered closely. For example, establishing catch-and-release stretches obviously would result in higher catch rates for some anglers, but might not be in the interests of bait fishermen. First, allowing bait fishing in "no-kill" zones would be impractical because of the high mortality among returned bait-caught fish, so the amount of stream accessible to bait anglers would be reduced. Second, bait fishermen placed more importance on reaching the limit than anglers using lures or flies, suggesting that even if bait users could use catch-and-release zones, they might be discouraged from using these stretches because of the no-harvest regulation. Most important, the Trout Parks held greater family recreation appeal for bait fishermen than anglers using lures or flies. Managers would want to carefully weigh a catch-and-release policy that might prohibit or discourage bait angling, thereby discouraging family recreation.

Improving Angler Response to Future Surveys

The survey data reported here represent only one input in a decision-making process that incorporates biological characteristics of the resource, fiscal constraints, professional opinions, and management philosophy of the agency and commissioners. Nonetheless, the fisheries managers involved in the status assessment agreed that the surveys provided enough management clues and stimulated sufficient questions to justify continued monitoring of the Trout Park program.

The following several ways to increase angler response to future surveys are being considered: (1) substantially shorten and simplify the current questionnaire; (2) on sample days, collect anglers' licenses as they purchase their daily fishing tags and receive questionnaires, and return licenses as fishermen hand in their questionnaires at the end of the day; and (3) change the methodology from self-administered questionnaire to personal interview at the stream. Continual refinement of social research is important if the resulting information is to play an increasingly useful part in answering the challenging questions of how and for whom fisheries resources should be managed.

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ELK HUNTER CONSUMER SATISFACTION PATTERNS

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Because recreation associated with wildlife is important to many people, wildlife managers have found it useful to increase their knowledge of recreationists and to manage according to this knowledge. This has been partially stimulated by a trend toward consumerism in recreation planning and management.

This study was done to increase our understanding of elk hunters. Several objectives were sought through the study. First, we attempted to learn about the dimensions of satisfaction-dissatisfaction that elk hunters use to describe their hunting experience. Second, we wanted to describe groups of hunters within license categories by their patterns of satisfaction over the dimensions of elk hunting experience. These groups we called hunter types, and they can be thought of as empirically determined market segments of hunters based on the kinds of satisfaction they experience. Third, we tried to learn about other characteristics distinguishing the empirically determined types from each other. We looked for differences between the types on demographic, personal history, and hunting activity items, and on their support of hunting policy issues. Finally, we tried to consider how the dimensions and types could be used in resource management. The first three objectives are dealt with by the empirical parts of this study. The last objective is considered in the discussion.

A key idea in our approach to studying recreationists is the assumption that experiences involving elk hunting must be described multidimensionally. Hendee (1974) and Driver and Brown (1975) hold that users seek more than one kind of satisfaction from environmental resources and multivariate measurement is required to accurately assess users' experiences.

A number of researchers have examined aspects of the hunting experience (Brown *et al.* 1977, Davis 1967, Hautaluoma and Brown 1978, Kennedy 1974, More 1973, Peterle 1967, Potter *et al.* 1973). It has been common to find dimen-

sions of satisfaction from the experience such as being in natural settings, harvesting game, practicing or developing outdoor or hunting skills, and being with friends. Other, less general dimensions that have been found refer to using hunting equipment, releasing frustrations, having vicarious experiences while anticipating a hunt, displaying trophies, and contacting persons of other hunting parties.

Few studies have examined empirical types of hunters based on patterns of experience dimensions. Brown *et al.* (1977) and Hautaluoma and Brown (1978) were exceptions when they studied deer hunter types in Washington and Colorado.

METHOD

Respondents

Approximately 120,000 persons purchased licenses to hunt elk in Colorado during the 1976 season. The sample for this study consisted of 2 percent of these hunters randomly drawn from each county's license stubs, for a total sample size of 2,500. Within the sample were four license categories: Colorado resident rifle hunters, Colorado nonresident rifle hunters, muzzle-loader hunters, and archers. The last two categories included both residents and non-residents of Colorado, because the sample size would have been too small to be useful for clustering and typing if we would have separated them.

Instrument

The questionnaire containing four sets of questions relevant to this study was sent to the 2,500 randomly selected hunters. The first set of questionnaire items dealt with the respondents' overall satisfaction with and interest in elk hunting. Information on success rates in the past, access to hunting areas, and perceived congestion was solicited. The second set of questions asked about the importance of specific aspects of the hunters' experience as it affected their satisfaction. Based on previous

research and pilot interviews with elk hunters, 59 items were written to predict the following dimensions of the elk hunting experience: nature, skill, equipment, excitement, harvest, easy hunt, ingroup contact, and outgroup contact. At least six items were written to tap each dimension and items were chosen that were maximally different in content from each other but that still aimed at the hypothesized dimensions. Respondents were asked how much each item affected their satisfaction with elk hunting. A third section of the questionnaire required the hunters to rate their level of approval of possible game management actions. The last section requested biographic and demographic information about the respondents.

A pilot study showed the questionnaire to be easily understood and interesting to the respondents. About 20 minutes were required to complete it.

Procedure

A mail survey was used. The mailing contained a cover letter on university stationery, the questionnaire, and a stamped, addressed, return envelope. The initial mailing was sent in January 1977, about 2 months after the end of the elk season. Fourteen percent of the questionnaires came back as undeliverable. Another mailing to the nonrespondents went out in March 1977, with a follow-up letter, a duplicate questionnaire, and the return envelope. The overall response rates after the second mailing were: resident rifle, 56 percent (N = 648); nonresident rifle, 52 percent (N = 203); muzzle-loader, 68 percent (N = 288); and archer, 89 percent (N = 299).

Nonrespondent Follow-up

A follow-up phone survey of 30 nonrespondent resident rifle hunters disclosed that they were slightly older ($\bar{X} = 42.1$ vs. 34.5 years, $p < 0.001$) and that they had higher incomes ($\bar{X} = \$15,000$ vs. $\$13,000$, $p < 0.05$) than the respondents. None of the other items concerning education, number of days hunted, success rate, or importance of elk hunting were different between nonrespondents and respondents. Despite the small number in the nonresident follow-up, the reader may want to consider these data in interpreting the results of the study with the resident rifle hunters.

RESULTS

Dimensions of the Elk Hunting Experience

The first step in the analysis identified dimensions of the elk hunting experience for each license group separately. We used the BC TRY Cluster Analysis System to do the clustering and typing (Tryon and Bailey 1970).

The initial clustering for each license group indicated from 8 to 12 clusters per group. Six clusters, or dimensions of the elk hunting experience, were relatively stable across all the license groups, and these six clusters were used in subsequent analyses (table 1). Each cluster includes at least four items and has a reliability exceeding 0.60. All but one of the predicted clusters were found. The predicted skill, equipment, nature, and excitement clusters merged into one large general cluster and formed a deviation from the hypotheses. All of the clusters found have strong domain validities (estimates of the strength of the cluster).

The clusters are not independent. In general, the ingroup and outgroup contact clusters are correlated, and the large general cluster and harvest are correlated.

Differences Between Hunters of Different License Groups

We used analyses of variance and chi-squared analyses to learn how the dimensions of experience are perceived by the different license groups. The outgroup contact dimension was rated the most differently across the license groups. The nonresident rifle hunters got the most satisfaction from it, followed in order by muzzle-loaders, resident rifle hunters, and archers. The archers were only neutral toward it. Ten percent of the variance between the license groups was explained by the outgroup contact dimension. Ingroup contact and harvest had similar patterns to outgroup contact across the license groups, but they only explained 4 percent and 3 percent, respectively, of the variance. Resident rifle hunters and archers were most positive toward the easy hunt dimension. The large general dimension and frustration release did not differentiate the license groups well.

Other analyses were done to describe the distinguishing demographic and other characteristics of the license groups. The significant results indicate that the resident rifle hunters have a high proportion of outdoor and land-use tasks in their occupations. They have the lowest incomes of any group. They have hunted elk for many seasons, but they were not older than other hunters. They were the least satisfied with their harvest success rate. During the previous season they had seen the most hunters per day, and they were the most dissatisfied about the number they had seen. They hunted the least days during the previous season (4.8 days). On the policy items they were the least favorable to an antlered-only season, the most favorable to providing accesses to hunting sites, and preferred having the elk season after the deer season.

Table 1.--Oblique factor coefficients^{1/} for dimensions of elk hunter satisfaction

Dimensions of elk hunter experience	License classes			
	Resident rifle	Non-resident rifle	Muzzle loader	Archer
<u>Skill, equipment, excitement, and nature</u>				
Improving hunting skills	0.57	0.67	0.70	0.78
Using my skills to stalk elk	.65	.61	.62	.62
Being knowledgeable about hunting equipment	.65	.64	.70	.75
Selecting hunting equipment and supplies	.64	.68	.56	.70
Being outdoors	.61	.78	.54	.66
Being a well equipped hunter	.61	.78	.54	.66
The suspense of waiting to see elk	.58	.54	.52	.64
Carefully preparing and planning my hunting trip	.57	.60	.71	.63
Challenging elk with my skills	.52	.55	.63	.60
The smells, sights, and sounds of the woods and meadows	.51	.70	.50	.56
The thrill of finding fresh elk sign	.46	.42	.66	.67
Being where things are natural	.42	.68	.48	.52
	(.87)	(.90)	(.88)	(.90)
<u>Outgroup contact</u>				
Seeing hunters from other parties	.71	.82	.87	.79
Hearing other hunters' shots	.69	.68	.72	.63
Being able to count on hunters of other groups for help if it is needed	.59	.65	.65	.65
Socializing with hunters from other parties	.59	.55	.66	.60
Seeing other hunters move elk	.59	.67	.64	.62
Hunting where there are no other groups	-.37	-.52	-.33	-.48
	(.78)	(.84)	(.83)	(.80)
<u>Harvest</u>				
Showing elk I have killed to my family and friends	.73	.82	.66	.73
Comparing my kill with that of others	.56	.55	.57	.50
Killing an elk	.55	.32	.65	.57
Excitement of waiting for a shot once elk are seen or heard	.42	.48	.49	.37
	(.67)	(.66)	(.70)	(.65)
<u>Easy hunt</u>				
Killing an elk close to my vehicle	.60	.51	.73	.60
Hunting where you do not have to work to find elk	.55	.61	.65	.80
Getting a quick kill	.48	.74	.44	.32
Hunting in pleasant weather	.43	.30	.48	.42
Being able to hunt close to home	.35	.16	.19	.40
	(.62)	(.61)	(.65)	(.66)
<u>Frustration release</u>				
Relieving frustration	.67	.68	.79	.66
Getting away from everyday problems	.61	.55	.56	.54
Letting off steam	.55	.75	.66	.55
Being my own boss for a while	.50	.45	.47	.49
	(.70)	(.74)	(.73)	(.67)
<u>Ingroup contact</u>				
Being able to count on hunting companions for help if it is needed	.71	.56	.70	.73
Getting to know hunting companions better	.65	.82	.76	.64
Using teamwork to hunt	.62	.33	.63	.53
Companionship of friends in the hunting group	(.78)	(.73)	(.85)	(.78)

^{1/}Parallel-forms reliability coefficients of clusters in parenthesis (Tryon and Baily 1970).

The nonresident rifle hunters were most different from the other groups. They had fewer females, were older, and had less education. They had the highest success rates (28 percent).

They had the highest incomes and were among those with the most outdoor and land-use tasks in their occupations. They expect to hunt elk the fewest times in the next 5 years.

They saw a large number of hunters per day. On the policy items they were the least favorable to an antlered only season, the most favorable to providing accesses to hunting sites, and preferred having the elk season after the deer season.

The muzzle loaders had high educations and had hunted elk for many years. As might be expected, they saw few other hunters per day. They favored having some antlerless permits, they were the least against drawing for a license, and they were against providing accesses to hunting sites.

Few of the archers were females. Archers had high educations, the lowest harvest success rate (15 percent), and their interest in elk hunting has stayed about the same for the last 5 years (the other groups' interest has increased). They saw the most elk per day, saw few hunters, and hunted the most days during the previous season (7.3 days). They were the most favorable to having either-sex permits and the least favorable to drawing for a permit and to improving accesses to hunting areas.

The policy items that were not responded to differently across the license groups pertained to giving privilege to landowners in a license draw (overall slightly against), having an elk hunting information center (overall favorable), and extending the season but only allowing individual hunters to hunt in parts of it (overall slightly against).

Hunter Experience Types

After finding the six dimensions of experience, we used the BC-TRY System OTYPE program (Tryon and Bailey 1970) to identify types of hunters within license groups according to their patterns of responses to the dimensions of experience. Each hunter was scored on each dimension. The hunters' score patterns across all six dimensions were then compared to each other and types of hunters with similar patterns were identified (table 2). We then reduced the number of types under each license group from the original number by using the hierarchical condensation method presented in Tryon and Bailey (1970). For each license group, between 10 and 12 percent of the hunters had patterns so unique or had so much data missing that they could not be included in the final list of types.

Because of little previous research using types, their numbers and form could not be predicted. In the results of this study it was also difficult to compare types across license groups, but every group except the nonresident rifle hunters had a type expressing low values on most of the dimensions. Even these hunters, however, said they obtained some benefit from

the large general cluster and from harvest. Every license group had at least one type that could be labeled enthusiastic hunters. They received high gratification from all the dimensions. The other types' patterns take a variety of forms within the license groups.

Differences Between Hunter Types Within License Groups

As with the license groups, we used analyses of variance and chi-squared analyses to determine if the hunter types would be discriminated by demographic and other variables. The results, in general, indicate that fewer clear differences exist between types than between license groups. It should be noted, however, that the sample sizes for the license groups are larger than for the types, making significant differences easier to obtain for the license groups. Also, the hunter types were identified within license groups, which were already more homogeneous than is the total sample of hunters, so the differences for the types would be based on smaller variations than the license groups.

For the resident rifle hunters several significant differences by type were found. Type 1 hunters included the least amount of manual work in their occupations. Compared to the other types they rated elk hunting the least significant and had the lowest interest in elk hunting (still about the same as in the past) but had hunted the most years of any type. They were among the least in favor of having either-sex permits to hunt elk, or of having a center to disseminate hunting information, or of improving accesses to hunting sites. Type 2 hunters said elk hunting was important to them and that their interest in hunting had increased during the last several years. They were against improving accesses to hunting locations. Type 3 hunters were among the most favorable to having a center to disseminate hunting information and they were at least neutral to improving accesses to hunting areas. Type 4 is distinguished by its low education level. Its hunters are the most likely to have manual tasks in their jobs. For them, elk hunting is important and their interest in it has increased during the last 5 years. They were the least likely to complain about seeing too many hunters. They most wanted either-sex hunting licenses and a center for disseminating information. Type 5 had the highest educations. They thought they saw too many hunters in the field, and they were among the most against the center for disseminating information and improving accesses. Type 6 had spent the least years hunting elk.

Fewer significant distinctions were found among the nonresident types. Type 1 hunters were the most educated, had a high success rate in harvesting an elk, but said elk hunting was

Table 2.--Cluster means^{1/} for hunter types based on the satisfaction dimensions for each license category.

Type number and name	Resident Rifle						
	Hunters Number	Elk hunter experience dimension					
		Skill, equipment, excitement, nature	Outgroup contact	Harvest	Easy Hunt	Frustration release	Ingroup contact
1. Low general interest.	81	1.62	.51	1.16	.64	.58	1.31
2. High skill, equipment, excitement, and nature. Low easy hunt and frustration release.	57	3.23	.98	2.02	.18	.75	2.71
3. Enthusiastic hunter. High frustration release.	74	3.51	2.24	3.23	2.00	3.08	3.27
4. High hunting interest except frustration release.	66	3.55	1.97	3.23	1.47	.96	3.48
5. Low outgroup and ingroup contact.	88	2.78	.23	2.31	1.02	1.54	1.29
6. Moderate general hunting interest.	221	2.68	1.22	2.16	1.75	1.29	2.58
Untyped hunters.	61						
	648	(2.83) ^{2/}	(1.10)	(2.23)	1.27)	(1.38)	(2.36)
Nonresident rifle							
1. Low outgroup contact, easy hunt, and frustration release.	12	2.78	.15	1.98	.46	1.02	2.44
2. Low easy hunt and ingroup and outgroup contact.	23	2.68	.96	2.09	.41	1.41	1.47
3. Enthusiastic hunter. Low easy hunt.	10	3.87	2.88	3.75	.72	3.38	3.75
4. Enthusiastic hunter. High easy hunt.	19	3.60	2.41	3.50	2.28	2.14	3.67
5. High general interest except outgroup contact and negative easy hunt.	35	3.65	1.37	3.11	-.12	2.22	3.01
6. Moderate general interest.	56	2.75	1.59	2.78	1.35	1.09	2.82
7. Low general interest.	24	2.28	1.33	1.60	.99	.92	2.38
Untyped hunters.	24						
	203	(3.00)	(1.39)	(2.62)	(.81)	(1.45)	
Muzzle-loaders							
1. Low general interest.	24	1.79	-.13	.67	.50	1.08	.70
2. Low moderate interest. Negative outgroup contact.	25	2.84	-.84	1.84	.90	1.24	1.61
3. High skill, equipment, excitement, and nature. Low otherwise.	10	3.02	.03	1.68	-.62	.70	.48
4. High skill, equipment, excitement, and nature. High frustration release and ingroup contact.	24	3.35	1.29	1.91	1.08	2.90	2.95
5. High skill, equipment, excitement, and nature. High harvest and ingroup contact. Low easy hunt.	34	3.36	.76	3.13	.45	1.35	2.71
6. Enthusiastic hunter.	35	3.60	2.15	2.96	2.02	1.99	3.53
7. Low moderate interest overall	105	2.58	.86	1.96	1.49	.90	2.12
Untyped hunters.	31						
	228	(2.87)	(.72)	(2.10)	(1.16)	(1.37)	(2.15)
Archers							
1. Negative easy hunt. Low outgroup contact.	13	2.54	.14	1.93	-1.11	1.63	1.54
2. Negative outgroup contact. Low easy hunt and frustration release. High skill, equipment, excitement, and nature.	25	3.41	-.51	2.35	.01	.20	2.07
3. Enthusiastic hunter. High frustration release and easy hunt.	36	3.59	.56	2.63	1.91	2.71	3.07
4. Enthusiastic hunter except for easy hunt							
5. Low general interest.	101	2.46	-.06	1.58	1.04	.94	1.49
Untyped hunters.	22						
	229	(2.96)	(.12)	(2.09)	(.82)	(1.30)	(2.00)

^{1/}A 9-point satisfaction cluster scale was used: +4 = most strongly adds, +3 = strongly adds, +2 = moderately adds, +1 = slightly adds, 0 = neither adds or detracts, -1 = slightly detracts, -2 = moderately detracts, -3 = strongly detracts, and -4 = most strongly detracts.
^{2/}Group means are in parenthesis.

only moderately important to them. Type 2 had a low success rate but said elk hunting was important. Type 3 hunters were among the least educated but were successful in harvesting elk. Type 4 also had little education. Type 5 had a high harvest success rate and said elk hunting was important to them. Type 6 had a low success rate and along with Type 7 hunters said that elk hunting was only moderately important to them.

The muzzle-loaders showed few distinctions on these analyses. Types 2 and 5 included the most females. Harvest success rate varied greatly over the types with Type 3 being successful and Types 2, 7, and 1 being unsuccessful. Elk hunting was least important to Type 1 and most important to Type 5.

For the archers, Type 5 had the lowest harvest success rate. Two policy items produced distinctions between the types: (1) Type 1 did not like the idea of providing an information center while Type 4 favored it, and (2) Types 1 and 2 were solidly against improving road access to hunting areas but Type 3 was only moderately against it.

DISCUSSION

An aim of this study was to describe types of elk hunters according to the pattern of experience dimensions that they obtain from their recreation. The description was done to evaluate a typing methodology for determining market segments of resource users and to furnish one basis for theory-building and resource management concerning users of environmental resources.

The cluster analysis of this study revealed six dimensions of the elk hunting experience. According to their average score, their order of importance in contributing to satisfaction is: (1) skill, equipment, excitement, and nature, (2) ingroup contact, (3) harvest, (4) frustration release, (5) easy hunt, and (6) outgroup contact. This pattern is basically consistent for each of the hunter license groups. Some caution should be used in interpreting the ranking, because the positivity of response is partially dependent on the wording of items. However, we attempted to cast the items in a neutral tone so that the content of the items, and not the evaluative intensity of their words, would define the cluster scores.

Resource managers should be interested to learn harvest was not the highest kind of satisfaction sought by elk hunters. Hunters gave higher ratings to experiencing nature, using their equipment, and being excited about the process of anticipating and going hunting.

Close to harvest, but still more important for all but the archers, were the benefits that hunters gain from being with their friends.

Two dimensions besides harvest that are commonly influenced by resource managers are easy hunt (through access to hunting areas, etc.) and outgroup contact (through hunter density control). These two dimensions contributed the least to hunter satisfaction. A surprising point is that outgroup contact, in the aggregate, was not a dissatisfier; instead it was slightly positive. These points suggest that priorities of game management strategy, usually directed at harvest, easy hunt, and outgroup contact, might be refocused to concentrate more on skill, equipment, excitement, nature, and ingroup contact.

The six experience dimensions were used to create the empirical types of hunters. The hunters were organized into types according to their patterns of satisfaction over the dimensions. Hunters with similar patterns within a license group were placed in a type. Between five and seven types were found for each group, and some similarities were found in types across the groups.

An effort was made to enhance the meaning of the types and the license groups by learning which of them could be distinguished by demographic, personal history, hunting activity, and advocacy of elk management and policy items. Several types and license groups were distinctively different from each other on these items. The license groups had stronger differences than the types, but this was partially due to sample size and homogeneity differences between the license groups and the types.

Information from this study, about elk hunters, should be useful for resource managers. Rather than managing as if all users are alike, it is possible to conceive of the kinds of users according to the patterns of satisfaction they seek, the relative proportions of the kinds of users in the population, and the characteristics that distinguish the kinds of users from one another. Having this information should contribute to management decision-making about how best to accommodate hunters' needs.

Three general approaches for managers to use these data might be to: (1) manage according to the ranking of experience dimensions described above, (2) learn about the common types of license groups of users in a resource area and manage the area to meet their strongest needs, or (3) determine which of the experience dimensions a given resource area is most likely to satisfy, and then advertise the area to attract users who would most benefit from the area.

The first approach suggests accounting for the most important experience dimensions (skill ..., ingroup contact, and harvest), and then doing things to make satisfaction concerning them possible. It's difficult to manage for the general dimension (skill...), but its content suggests that hunters like opportunities to use and test their skills, to be outdoors in natural settings where they are likely to see elk, and to use their equipment. Some of the types prefer this dimension even if they have only a small chance to harvest an elk. Management concerning it is almost the opposite of what would be done for managing to gain ingroup or outgroup contact or easy hunt satisfactions. The general approach for managing for skill...satisfaction would be to maintain reasonably challenging hunting conditions while keeping the areas as natural as possible. Some policies affecting this dimension might be to limit the amount of ammunition a hunter can use (skill), and to minimize trails and other developments to those necessary to maintain the resource and provide user safety (nature). On the other hand, to manage for ingroup contact, one could consider policies affecting party hunts. An example might be using drawings to encourage parties to hunt in an area so that friends could be together. Another approach might be to ensure that adequate group camping sites are available.

The second suggested management approach requires that managers assess their areas' common users and determine their types or some surrogate for them. Once the common users' patterns of satisfaction for elk hunting are established, managers can attempt to modify management practices to maximize the likelihood of user satisfaction.

The third suggested approach requires learning of the satisfactions likely to be gained from an area and advertise the area accordingly. Some areas may not be beautiful but may have a good elk population. Other areas may have much natural beauty and require good skill to hunt. The assessment of the likely benefits of the area in terms of the dimensions should be publicized at the time the hunting seasons are announced, so hunters can match their needs with the expected benefits they will find in a certain area. A more refined strategy might be to place descriptions of the areas in publications that specific types of hunters are likely to read. Data are available on the readership characteristics of most large publications, and these characteristics can be matched to the distinguishing features of the types to selectively recruit the types, through advertising, to certain areas that would best satisfy them.

Some questions remain after completing this study and future research might address them. First, for theoretical reasons it would be

interesting to know whether the hunters remain within a type or whether they shift their patterns of experience dimensions during their hunting career or across species. Second, do similar types hunt together? Third, do certain hunting areas attract certain types? Fourth, what are indicators of the types beside questions about the dimensions of their experiences? Are there some biographical or other items that would allow a quick, inexpensive assessment of type membership? Fifth, which kinds of management decisions or environmental characteristics related to the dimensions most influence hunter satisfaction? We encourage other researchers to work on these questions because we believe that answers to them will help lead to an effective use of wildlife resources.

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AN ECONOMIC MEASURE OF NONCONSUMPTIVE WILDLIFE VALUES

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Natural resource managers, planners, and policy makers are continually faced with the problem of allocating scarce resources among competing uses. Two broad categories of wildlife resource use are consumptive and non-consumptive (benefits derived from wildlife while not taking their lives for sustenance or pleasure). Wildlife professionals are criticized for their strong orientation toward management of wildlife for consumptive uses; a rather narrow focus, but not without justification. Traditionally, financial support has been almost exclusively provided by sportsmen. The nonconsumptive use of wildlife resources, however, can be expected to increase in importance and the corresponding demand on public land managers to provide opportunities for such use constitutes a potent political force. It would be beneficial to agencies and individuals concerned with wildlife management to be able to weigh the importance of alternative wildlife resource uses in commensurate terms.

The purpose of the research reported in this paper was to estimate the value of using riparian resources for nonconsumptive wildlife appreciation. A method was employed to improve such estimates by explicitly valuing the cost of time spent enjoying wildlife.

METHODS

Although not priced in the typical fashion, it has long been recognized that the nature of public outdoor recreational activities are such that variable costs of participation are incurred. Assuming that such costs can serve as a proxy for price, the basic ingredients of price-quantity (demand) functions are available. The most widely accepted method of estimating recreation resource demand curves is the travel cost technique (Dwyer et al. 1977).

More than 700 visitors to popular wildlife viewing sites in southeastern Arizona were asked to complete a mailed questionnaire upon returning home. Six hundred four completed questionnaires were returned for a response rate of 86 percent, producing a voluntary sample of highly committed visitors. Each respondent provided information about his household travel expenses and demographic characteristics.

Using multiple regression analysis, demand functions were estimated for three representative sites, incorporating an explicit measure of the value of travel time. Consumers' surplus values were then estimated for each site.

The explicit form of the model developed for this study is:

$$q_{ij} = a_j + \sum_{k=1,7}^7 (b_{jk}X_{ik}) + \sum_{m=1,3}^3 (b_{jm}S_{im}) + e_{ij} \quad (1)$$

where:

q_{ij} = the number of days stayed per trip at site j by household i
 a_j = the regression constant
 b_j = the regression coefficients
 e_j = the error term
 X_{ik} = the value of k independent variables measured for the i th household as follows:

- $k = 1.$ the food and lodging costs per day at site j
- $2.$ the monetary value of travel time
- $3.$ the age of the head of the household
- $4.$ the place of residence of the household in terms of population size
- $5.$ the education of the head of the household
- $6.$ the annual household income
- $7.$ the food and lodging costs per trip to and from site j , a measure of substitutes

S_{im} = the dollar cost of transportation from site j to site m plus on-site food and lodging costs at site m ($m \leq j$), a measure of substitute sites

Two modifications of the traditional Clawson travel cost model are apparent. First, the dependent variable is number of days spent at the site rather than number of trips to the site and the major price variable is on-site cost per day rather than the usual travel costs. The number of trips per year to southern Arizona by respondents in this study provided too little

variation in the dependent variable for proper regression analysis. Using number of days on site as the dependent variable is appropriate if the "price" is daily variable costs (Burt and Brewer 1971). Second, variable $k=2$ is a monetary expression of the time cost of travel. Conceptually, the amount of time spent at a recreation site is related to the time spent traveling to and from the site. The relation between travel time as a cost and the number of days spent recreating at a site requires further model specification.

Cesario (1976) states that travel time has both a scarcity value (as a resource in other uses) and a commodity value (value of time in its existing use). It can thus be important to "save" time in travel if the prime objective is on-site recreational activity. In this study travel time is valued as "time saved". People traveling great distances to visit particular sites have alternative modes of travel available at various costs per mile. Visitors may then trade the money cost of travel for time on-site.

In order to specify the relation between travel time and the money cost of travel two aspects must be considered. The functional form of the relation must be determined as well as the opportunity cost (scarcity value) of time in travel. Drawing upon the comprehensive review of the issues of including time in travel cost models by Nichols *et al.* (1978), three formulations of the relation between time and money cost of travel were considered in this study—linear, convex, and concave.

In an attempt to determine the most appropriate functional relation between travel time and the money cost of travel, demand equations were estimated using each of the functional forms. Values for three variables must be selected and the particular functional form constructed prior to entering it as variable X_{12} in the model. This permits the estimation of a single coefficient (b_{j2}) representing the interactive effects of travel time and transportation money costs within a linear regression analysis.

Several researchers have speculated on the correct value of time in travel for recreational pursuits (McConnell 1975, Cesario 1976, Nichols *et al.* 1978). These studies indicate that the appropriate value should lie between 25 and 50 percent of the wage rate for recreators involved. In this study we computed the value of the factored

coefficient $\frac{d}{b_{j2}}$ (note that the concave formulation $X_{12} = (C_{1j} + \frac{d}{b_{j2}} T_{1j})^{P_2}$, for example, is derived from its effective contribution to Equation (1): $q_{1j} = a_j - b_{j2} C_{1j}^{P_1} - d T_{1j}^{P_2}$. C and T are round trip travel cost and time

respectively, and $P_1 > 1$. Values must be specified for P_1 and $\frac{d}{b_{j2}}$ using several percentages of annual household income converted to an hourly wage (assuming an average of 2,000 work hours per year). Our intent was to test for "best fit" by running several regressions on the model.

RESULTS

Respondents can be generally characterized as highly educated, affluent, middle aged, metropolitan residents. Final demand equations for resident and non-resident visitors are shown in table 1. Only the money and time cost variables were consistent in their contribution to the significance of each equation and are germane to this analysis. The number of households with complete data for regression analysis was 569.

The concave function consistently showed the best response. Regression runs were made for values ranging from 25 to 150 percent of the wage rate ($\frac{d}{b_{j2}}$). Exponent values (P_1) of 2 and 3 were tested in various combinations with the travel cost term. The same treatment was given the travel time term. Overall, the most effective combination was to raise both terms to the second power and set the dollar value of time at 100 percent of the wage rate.

Consumers' surplus associated with each demand equation was calculated (except for resident respondents to Cave Creek Canyon where the demand function was not statistically reliable) and summed. The total consumers' surplus for all respondent households visiting southeast Arizona is \$240,809. An aggregate of 3,037 household days for these visitors results in an average consumers' surplus of \$79 per day.

DISCUSSION AND CONCLUSIONS

In this study the values respondents have for nonconsumptive wildlife use are measured using economic methods. They represent an economic measure of the benefits these people received while engaged in such pursuits in southeast Arizona. In other words, it is the dollar amount that a selected group of people would be willing to pay rather than forego their particular use of riparian resources.

Of importance, especially to wildlife managers, is the potential impact on consumer welfare of a reallocation of riparian resources to alternative wildlife uses. Certainly, such reallocation may have biological impacts, as well as social impacts in terms of the incidence of benefits and costs on a spectrum of wildlife uses.

Table 1.--Regression coefficients for residents and nonresidents by site

RESIDENTS							
Site	Households No.	Intercept	On-site		Cost variables ^{1/} Travel time		Adjusted R ²
			X ₁	X ₁ ²	X ₂	X ₂ ²	
Cave Creek Canyon	49	4.9119299 (2.3174146) .04	-.0171262 (.0913375) .85	-.0001246 (.0012927) .090	-.0406513 (.0235220) .09	.0000944 (.0000703) .19	0.04
Patagonia	23	2.9549665 (1.3080415) .04	.2576604 (.1168866) .04	-.0051975 (.0032002) .12	-.0051732 (.0319029) .87	^{2/}	.26
Ramsey Canyon	48	1.2831916 (.6713286) .06	.0406086 (.0192245) .04	-.0002356 (.0001228) .06	.0239481 (.0073840) .00	^{2/}	.28
NONRESIDENTS							
Cave Creek Canyon	263	3.3445541 (.4024619) .00	-.0176500 (.0045759) .00	.0000131 (.0000048) .01	.0000007 (.0000004) .12	-.0000000 (.0000000) .19	.08
Patagonia	47	.8484830 (.3643114) .03	.0088828 (.0036855) .02	-.0000264 (.0000096) .01	-.0000003 (.0000002) .17	^{2/}	.27
Ramsey Canyon	139	.5346354 (.9001616) .55	.0021055 (.0046031) .65	-.0000017 (.0000025) .51	.0000000 (.0000000) .01	^{2/}	.12

^{1/} Coefficients are rounded to the seventh decimal place. Values in parentheses are standard error terms and the numbers below these represent the significance of the "F" statistic. For example, the number 0.10 suggests a 90 percent probability that the value of the coefficient will be different from zero.

^{2/} Not estimated for the equation.

Obviously, a detailed incremental analysis of gains to one group and costs to others, as between hunters and nonhunters, is not possible with the data developed in this study. Rough comparisons can be made, however, between consumptive and non-consumptive user benefits in southeast Arizona that can provide political actors, including wildlife managers, with bases for improved decision making.

For example, Martin *et al.* (1974) developed consumers' surplus values for Arizona households engaged in various types of hunting, fishing, and outdoor recreation by Arizona Game and Fish Regions. Consumers' surplus values for the Regions that most closely approximate the study area are shown for each activity in table 2. Although these values are based on the number of trips made per year rather than days spent on-site, average consumers' surplus per day values were calculated and are also shown in the table. These latter figures can be compared with the

average consumers' surplus per day value of \$79 for nonconsumptive wildlife users (also shown in table 2).

Estimates were obtained of the annual visitation of nonconsumptive wildlife users at the three representative sites and were converted to annual household days. The aggregate estimate of 36,200 household days at 3 representative sites in southeast Arizona suggests a total consumers' surplus value (at \$79 per day) of \$2,859,800 for these sites. This figure is likely an overestimation because the average consumers' surplus per day value was obtained from respondents whose visitation patterns are not necessarily representative of most visitors to the sites. These calculations show, however, the potentially large value, in economic terms, of nonconsumptive wildlife to users of river riparian areas in southeast Arizona.

Importantly, a method exists for measuring the economic value or social welfare of the non-

Table 2.--A comparison of total consumers' surplus values for Arizona households engaged in hunting, fishing, and outdoor recreation with total consumers' surplus value of nonconsumptive wildlife users in southeast Arizona

Activity	Consumers' Surplus value(\$) ^{2/}	Average Consumers' Surplus per day (\$) ^{2/ 3/}
Total consumers' surplus values for Arizona households engaged in hunting, fishing, and outdoor recreation in Arizona game and fish regions 6 and 7, by activity. ^{1/} :		
Deer hunting	6,366,880	51
Other big game hunting	1,591,040	26
Small game hunting	10,212,640	39
Waterfowl hunting	372,061	17
General hunting	477,346	10
Cold water fishing	2,533,826	24
Warm water fishing	3,898,808	16
General rural outdoor Recreation	32,916,480	34
Total consumers' surplus value for nonconsumptive wildlife users visiting southeast Arizona, by activity:		
Nonconsumptive wildlife use	240,809 ^{4/}	79

^{1/}Source: Martin et al. (1974).

^{2/}Values are in 1977 dollars (based on the appropriate Consumer Price Index, U. S. Department of Labor).

^{3/}Average per day values are based on value per trip divided by the average number of days per trip, as reported in Gum et al. (1973).

^{4/}Estimated value for the three study sites--Ramsey Canyon, Cave Creek, and Patagonia.

consumptive use of wildlife. Such measures, widely assessed, could permit the comparison of economic values between consumptive and nonconsumptive wildlife uses and the evaluation of the associated change in the consumer welfare resulting from alternative management activities.

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PREDICTING ALTERNATIVE RESOURCE CHOICES

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Individuals who are constrained from participating in a desired activity may substitute an alternative activity or seek out an alternative resource where the original activity may take place. Most of the substitutability research has concentrated on predicting the types of activities recreationists are likely to select as alternatives (Hendee and Burdge 1974, Christensen and Yoesting 1977). Although few empirical studies have examined the notion of resource substitutability (Ditton *et al.* 1975, O'Leary and Dottavio 1981), the findings from these investigations reveal that the individual's choice of environmental setting affects participation in selected activities. For example, fishermen on Green Bay were unlikely to fish Lake Michigan, despite the close proximity of the two resources (Ditton *et al.* 1975). This suggests that although different resources may share similar characteristics, the recreationist may not perceive them as substitutable for certain activities. The objective of the present study is to identify the type of individual who is more likely to substitute an alternative resource when situational constraints prevent participation in a given activity.

The activity and resource selected were turkey hunting in Maryland. During 1978, Maryland's fall turkey hunting season was closed due to reductions in the game population. In effect, all of the State's turkey hunters were displaced from their activity. This paper examines how individuals who substituted Maryland's fall turkey hunt with turkey hunting in another State differed from those who did not go out-of-state. Based on earlier studies of recreational substitutability (Baumgartner and Heberlein 1981, Vaske 1980), we hypothesized that individuals who participated in another State's fall hunt when Maryland's season was closed would show:

- 1 A higher mean rating for items measuring knowledge and perceived availability of turkey hunting areas outside of Maryland.
- 2 A higher mean rating for items measuring number of years and frequency of involvement with turkey hunting (behavioral commitment).

- 3 A higher mean rating for items measuring psychological commitment to the sport.
- 4 A higher mean rating for items measuring number of turkeys bagged (success).
- 5 A higher mean rating for items measuring willingness and ability to pay (income) for an out-of-state hunting license.

METHODOLOGY

Data on Maryland turkey hunters were obtained from a questionnaire mailed to 543 individuals who had purchased turkey hunting licenses in the previous 2 years. Three separate mailings were used with a reminder postcard after the first mailing. The overall response rate for the 507 individuals who could be contacted was 89 percent, or 452 usable questionnaires (see Vaske 1980 for details).

Respondents were asked whether or not they had gone turkey hunting in another state when Maryland's season was closed. A yes/no response was used in the analysis.

The following five categories of variables corresponding to the five hypotheses were used to differentiate those Maryland hunters who went out-of-state to hunt turkey when Maryland's fall season was closed from those who did not participate in another State's fall hunt: (1) two items measuring the respondents' knowledge and perceptions of alternative hunting areas, (2) three items measuring behavioral commitment to turkey hunting, (3) two items pertaining to the individual's psychological commitment to the sport, (4) two items measuring previous turkey hunting success, and (5) two items pertaining to willingness and ability to pay for an out-of-state license.

Differences between those respondents who hunted in another state during the closed season and those who did not were identified through two types of analyses. First, one-way analysis of variance was used to test for significant mean differences between the two groups for each variable in the five categories. Second, a stepwise discriminant analysis was performed to identify which of the five classes of variables

could best differentiate between the two groups of hunters and the extent to which group membership could be predicted.

RESULTS

The data show that several types of variables are useful in describing differences between the hunters who opted for an alternative resource and those who did not (table 1).

Consistent with Hypothesis 1, individuals who participated in another state's fall hunt had some previous out-of-state turkey hunting experience and therefore were more likely to perceive turkey hunting in others states to be available to them.

The behavioral commitment hypothesis (Hypothesis 2) predicts that individuals who have been turkey hunting for a greater number of

Table 1.--Factors affecting an individual's selection of an alternative State for turkey hunting

Variable	Did you hunt turkey in another State this fall? ^{1/}		F-ratio ^{2/}
	Yes	No	
Knowledge of areas outside of Maryland			
Previous turkey hunting in another state while living in Maryland ^{3/}	0.89	0.25	226.4**
Perceived availability of turkey hunting in other States ^{3/}	0.79	0.26	140.0**
Behavioral commitment to turkey hunting			
Number of years turkey hunting ^{4/}	9.82	7.54	10.4**
Average number of days spent turkey hunting each season ^{5/}	4.37	3.29	42.9**
Number of days turkey hunting during 1977 ^{6/}	5.83	3.73	23.5**
Psychological commitment to turkey hunting			
Psychological importance of the hunt ^{7/}	2.39	1.87	30.2**
Perceived number of substitutes for turkey hunting ^{8/}	2.39	2.59	n.s.
Success			
Number of turkeys bagged since first hunt ^{9/}	4.11	1.58	40.7**
Turkeys bagged since last year ^{9/}	.20	.09	10.1**
Willingness to pay			
Willingness to pay for an out-of-state turkey hunting license ^{10/}	36.73	21.98	95.7**
Income ^{11/}	18.02	16.00	5.3*

^{1/}Cell entries represent means for individuals who participated in another state's fall hunt and those who did not.

^{2/}*p < 0.05; and ** p < 0.001.

^{3/}Dummy variable where "0" equals No and "1" equals Yes.

^{4/}Variable coded on a nine point scale ranging from "1 year" to "more than 30 years".

^{5/}Variable coded on a six point scale ranging from "only 1 day" to "6 or more days".

^{6/}Coded from open-ended responses.

^{7/}Variable coded on a four point scale ranging from: a) If I couldn't go turkey hunting: "I would probably find something else that was just as enjoyable" to "I would miss it more than all of the other interests I have".

^{8/}Variable coded on a four point scale ranging from "I have no substitutes" to "I have many substitutes" for fall turkey hunting.

^{9/}Variable coded on a seven point scale ranging from "none" to "more than 20 turkeys".

^{10/}Response categories were 0, 15, 30, 50, 75, and 100 dollars.

^{11/}Variable coded on a 13 point scale ranging from "less than \$3,999" to "more than \$48,000".

years and have gone more frequently are more likely to have gone out-of-state during the fall of 1978. On the average, respondents who went to another state to hunt turkey during 1978 had hunted more years, spent a greater number of days turkey hunting each season, and reported more days turkey hunting during the previous year than those individuals who did not participate in another state's fall season (table 1). These findings suggest that individuals who selected an alternative resource were more behaviorally committed to the activity.

There is also some indication that those who hunted out-of-state were more psychologically committed to the sport (Hypothesis 3). Respondents evaluated how much they would miss turkey hunting if they had to give it up. Comparisons between the two groups indicated that those who sought an alternative site were more likely to report that turkey hunting was more important than all of their other recreational interests. The difference between the two groups' perceived number of substitutes, however, was not statistically significant.

Hypothesis 4 predicts that the more successful hunters will choose an alternative resource. Both items pertaining to this category of variables support the hypothesis. Individuals who went out-of-state reported bagging more turkeys since their first hunt and were more likely to have bagged a turkey during the year before the season was closed, when compared to the other group.

Finally, the out-of-state hunters reported a greater willingness and ability to pay for an out-of-state license. Both findings support Hypothesis 5.

Overall, the results indicate that hunters who opted for an alternative resource and those who did not differed with respect to several types of variables. To develop some understanding of which of the variables contained in the five categories are most useful in distinguishing between the two groups of hunters, a stepwise discriminant analysis was used. This analysis correctly classified 83 percent of the hunters into their respective groups. Eighty-seven percent of the individuals who did not participate in another state's fall hunt were correctly classified, while the out-of-state participants were predicted with 72 percent accuracy. Examination of the standardized coefficients revealed that the two knowledge variables were the most important in discriminating between the two groups (table 2). The hunters' willingness to pay for an out-of-state license was the third variable to enter the equation. One variable from each of the other initial categories of items also entered the function. In order of importance these include: average number of days spent turkey hunting each season, number of turkeys bagged since first hunt, and the perceived psychological importance of the activity.

CONCLUSION

Previous research related to resource substitutability has indicated that the type of environmental setting selected for recreation influences the individual's choice of activity (Ditton et al. 1975, O'Leary and Dottavio 1981). The findings presented in this paper extend the results obtained by these earlier investigations by examining five criteria that influence the linkages between the selection of an alternative resource and participation in a specific activity.

Table 2.--Results of discriminant analysis predicting hunters who selected an alternative resource when Maryland's fall season was closed^{1/}

Classification variables	Standardized Discriminant coefficient	Wilk's λ ^{2/}
Previous turkey hunting in another State while living in Maryland	0.555	0.665
Perceived availability of turkey hunting in other States	0.341	0.763
Willingness to pay for an out-of-state license	0.316	0.825
Average number of days spent turkey hunting each season	0.186	0.913
Number of turkeys bagged since first hunt	0.162	0.917
Psychological importance of the hunt	0.154	0.937

^{1/}The dependent variable refers to whether or not the respondent had participated in another State's fall hunt when Maryland's season was closed: "1" equals yes and "0" equals no.

^{2/}All variables significant at $p < 0.001$.

Variables contained in each of the five categories of analysis were shown to affect whether or not the individuals engaged in another state's fall turkey hunt when Maryland's fall season was closed. Results obtained from the discriminant function analysis revealed that the hunters' previous experience with and perceived availability of alternative resources accounted for most of the differences between the two groups. These findings suggest that when declining wildlife populations force the closure of certain hunting seasons, game managers can provide individuals with substitutes by increasing the hunters' knowledge of alternative resources.

The present study is one of the first to examine the characteristics of individuals who are more likely to substitute a different resource. The five classes of variables examined here represent a subset of the potential factors that may influence an individual's choice. Other criteria that affect such decisions, such as the role of family and friends in influencing behavior, should be included in future research.

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CHOOSING AND ALLOCATING OUTDOOR RECREATION OPPORTUNITIES:

THE DECISION PROCESS

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Our understanding of leisure behavior is largely the result of intensive efforts to identify individual motivations and preferences for environmental attributes. These, in turn, have been correlated with various socioeconomic characteristics in order to categorize participants and predict trends. Recently we have entered a new phase of inquiry that deals with the mechanisms and dynamics of the decisionmaking process itself. Although motivational research obviously needs to be refined, it is this newer phase that promises to lead to a deeper understanding of how people choose from infinite alternatives.

The purpose of this paper is to outline the scope of decisionmaking in respect to outdoor recreation participation and the provision of opportunities. We will consider two broad classes of decisions and an interface between the two: 1) personal or economic decisions, and 2) collective or political decisions. Language and information systems are critical components of decisionmaking and will be dealt with as a specific topic.

The literature on decisionmaking comes from a wide range of sources. When appropriate and possible we will refer to studies and discussions focusing on outdoor recreation. Where gaps appear, e.g., many aspects of collective decisionmaking, we will cite literature from other areas of inquiry.

We will not provide a definite treatment of so vast and complex a subject. Rather, we will attempt to offer a framework to help organize our thinking and call attention to some of the questions we feel need to be answered.

PERSONAL DECISIONS--CHOOSING ACTIVITIES AND PLACES

The personal decision process--how individuals choose an activity and a place--has received much attention in the outdoor recreation literature. We have come a long way toward identifying variables and attributing effect. The primary emphasis has been on motivational factors, often referred to as "needs," "desires," "reasons," or similar terms. Some researchers have included what can be called "intervening" factors, e.g., cost, distance,

access, knowledge. Access factors, particularly distance, are commonly used in economic valuation models. Knowledge as a factor in decisionmaking is beginning to receive more attention.

Most of the research and analyses of decisionmaking to date have one thing in common--they fail to take into account changes in the individual's preferences influenced by experience. For some users, participation may result in increased confidence and a demand for more challenging environments. Others may tire of an activity and drop it to take up a new, more novel pastime. Although the techniques derived from static concepts may permit reasonably successful predictions, we will always be limited until we understand the mechanisms of decisionmaking.

Many questions are raised once we take a more dynamic view: How does an individual balance conflicting desires? How does a person's perceived needs change as a result of experience in an activity or an environment? How does the time factor enter into the substitution equation, i.e., is "putting off" a desired experience the same as substituting? How do small groups or organizations arrive at a consensus? How do intervening factors influence decisionmaking? The list is endless.

We don't mean to imply that these questions have never been asked. Stynes and Spotts (1980) and Knopp *et al.* (1980) presented some interpretations of time-correlated data that suggested dynamic processes. More recently Bergier (1981) outlined a conceptual model of leisure-time choice behavior that draws upon consumer behavior theory. This session of the NRPA Research Symposium has brought together several recent contributions. Brown and Ross (1982) have worked to bridge the gap between "desired experiences" and "setting preferences." Ballman (1980) and others have added to this endeavor. McDonough (1982) also focuses on recreational settings in the framework of a comprehensive, multivariate systems approach. Krumpke and McLaughlin (1982) offer a step-wise, process-oriented model derived from their study of how users select backcountry trails. This last paper probably comes the closest to describing how decisions are actually made.

One of the symposium papers highlights little recognized variables. Allen and McCool (1981) talk about "ecologically responsible behavior" and its relation to recreational activity patterns. This discussion suggests that the hedonistic philosophy upon which most recreation research is based may have some serious deficiencies. Ethical standards may significantly influence recreational behavior.

Stynes (1981) and Krumpke and McLaughlin (1981) focus on the function of information in the decisionmaking process. Language and information systems deserve special emphasis and will be treated later in our paper.

We are just beginning to study the dynamics of decisionmaking. Although we've made some headway, we won't make any real progress until we examine our methods as well as the questions posed. The typical questionnaire format is a poor instrument for revealing processes. Interviews can be better. To be effective the interviewer should get the respondents "on track" and then allow them to relate their own thought processes. The techniques of the psychiatrist may be more appropriate than those of the sociologist. In-depth interviews are costly; however, they may uncover factors and processes never considered in the more structured approaches.

COLLECTIVE DECISIONMAKING

Generally, a group of people, performing in a coordinated fashion, can accomplish things an individual cannot. In a democratic society, certain types of decisions have to be made collectively. Hardin (1977), Haefele (1974) and others have said this well. Designated outdoor recreation areas and most environments used for outdoor recreation are a portion of the commons.

Much of the collective effort to allocate outdoor recreation resources falls under the general rubric "planning." Planning is often perceived as a small group making decisions for a much larger group. In reality it is much more complex and the larger group influences decisions in a variety of little understood ways. However, for the sake of discussion, we can describe two basic approaches.

The first approach, labeled "formula," consists of the systematic collection of data which are then entered into a formula that, in turn, produces a decision. This approach has a special appeal to professionals who are striving for objectivity and results "untouched by human hands." But it has some serious drawbacks. First, especially in regard to recreation, it is difficult, perhaps impossible, to quantify many of the variables entering the equation. Second,

those individuals affected enter into the process only indirectly and are therefore suspicious and reluctant to accept the results. Thirdly, no human process can be completely objectively--personal and institutional biases often enter in subtle ways.

The past two decades of SCORP (State Comprehensive Outdoor Recreation Plan) operations provide an extensive test of the formula approach. Although it is difficult to evaluate how these programs actually affected decisions, we can compare methods along selected criteria such as equity, validity of data, and assumptions.

Public pressure and growing recognition of the limitations of the formula approach have greatly increased the role of public involvement in decisionmaking. This second basic approach differs from the formula approach primarily in the more direct manner in which individual preferences are expressed. Direct expression seems particularly appropriate where subjective, often intangible values and benefits are being considered. Yet, the processes used to date are at best crude, little understood, and of questionable validity.

Hendee *et al.* (1973) and Royer *et al.* (1975) have done a good job of describing public involvement as it affects the administration of public land. Several case studies have also contributed to our understanding of public involvement and land use decisions. Notable among these is the story of Wye Island (Gibbons 1977). These analyses raise many important questions.

For example, how should the infinite alternatives be presented? How representative are or should the methods of public involvement be? How can individual inputs be weighted as they enter the decisionmaking process? These, and other questions, demand research data and imagination; we have a long way to go before administrators and the public will be comfortable with the process. Ideally, if the public could agree to a decisionmaking process, they should be much more willing to live with the results.

The role of voluntary associations is an especially interesting aspect of public involvement. Some writers have claimed that these groups and the pressures they exert represent true democracy at work (Bently 1949, Commons 1950, Latham 1952, and Truman 1958). Olson (1965) disagrees with this notion and argues that small groups are more effective than large groups, and voluntary associations cannot be truly representative. A recent analysis of two federal agencies and their response to

pressure groups concludes that pressures tend to balance each other (Culhane 1981). The problem with these arguments is that there is no truly objective standard on which to base comparisons. Again, research can help us to better understand the process. Ballman *et al.* (1978) compared the preferences of members of an organized user group with those of the general user population. A recent Resources For the Future report (Mitchell 1978) measured the degree of sympathy held by the public for the positions of environmental groups. We need additional studies to reveal the methods and effectiveness of voluntary groups.

Collective decisionmaking is individual decisions compounded many times. Simple observation produces few clues to the complex processes at work. The development and testing of models appears to offer the most promise for understanding. Both the "formula" and "public involvement" approaches need to be refined and integrated with each other. Studies of outdoor recreation resource allocation can contribute much to these efforts.

THE INTERFACE BETWEEN PERSONAL AND COLLECTIVE DECISIONMAKING

Every decision is a personal investment. An individual must first decide whether to act independently or with others. For example, someone concerned about crime can buy locks and a guard dog or work with others for better police protection. One can get pure drinking water by purchasing bottled water or by pushing for pollution control. In the realm of recreation we can invest in a private cabin or join a group advocating the development of a State Park. Even a wilderness experience can involve this sort of decision. We may elect to join a group striving to protect a nearby area or choose to travel to distant, less developed areas.

These decisions are seldom absolute dichotomies; nevertheless, a choice must be made before we enter into the personal or collective process.

It would be particularly interesting to investigate if and how our society is changing. Are we, as some observations indicate, losing interest in public places and investing more in private opportunities? Or, is there an inevitable trend toward recognizing the earth as a vast commons that can only be protected by a cooperative spirit?

THE FUNCTION OF LANGUAGE AND INFORMATION SYSTEMS

We have already alluded to the importance of information in decisionmaking. The function

of information is most easily understood in the context of personal decisions. Stynes (198) describes how park awareness affects visitation. Before we can actively choose, we must know what alternatives exist. Other kinds of knowledge are also important. Knowledge of the content of each opportunity influences our decisions, as does knowledge of the means of access to and within an area. The latter may range from something as simple as a map to a highly developed knowledge of technical skills, e.g., rock climbing or celestial navigation. Finally, knowing the consequences of an experience may affect our choice. Although some individuals will risk much to have a new experience, most of us prefer to anticipate some fairly certain benefits.

Whether to participate in an activity and whether to visit a recreational site are personal decisions involving the use of information. External agents can affect the process by creating and distributing information. Quantity, quality, and distribution of information are important dimensions; we need to know much more about their effects.

Information is transferred between and among individuals by means of language. We often operate under the assumption of shared meetings. In reality, commonly used terms, such as National Park, wilderness, etc., are vague and ambiguous, creating problems for both personal and collective decisionmaking. For example, a person may be attracted to an area by a distorted perception of its character and purpose. Disappointment and conflict can result.

A few studies have contributed to our understanding of the problem. Merriam *et al.* (1972) examined how users and administrators defined "State Park." They found differences in respect to a nature orientation. A more comprehensive study by Moeller *et al.* (1974) compared three user groups and their perception of six terms associated with recreation environments. Meanings vary with an individual's experience, beliefs, and values.

Collective decisions are also affected by the vagueness and ambiguity of our language. Statements from the public may not accurately reflect real preferences. Vague terminology permits decision makers to avoid accountability. Conflict is often perpetuated when issues are not resolved at the administrative or legislative level.

A recent study by Knopp and Bruder (1981) compared five groups involved in the decisionmaking process and the meanings they attached to five land use terms. Vagueness and

ambiguity were pronounced and associated with group membership. Studies of this kind can help to clarify our meanings, evaluate input to the decisionmaking process, and identify the need for educational programs.

We feel that decisionmaking can only be investigated in the context of language and information systems. Any efforts to understand language and information systems will help us comprehend the decisionmaking process.

SOME FINAL COMMENTS

The next phase of recreation research will require a much broader perspective. Although we have built a good base in our examination of motivations and preferences, it is not sufficient to deal with the complex process of decisionmaking. Now we must incorporate other concepts and empirical findings.

In the realm of personal decisionmaking, consumer and marketing research appears to have much to offer. Krumpal and McLaughlin (198) provide a good beginning bibliography. Recent publications on public choice theory and group behavior can help us to deal with collective decisionmaking (Arrow 1966, Russell 1979, Tribe 1976). We needn't feel like poor relations looking for a handout. Outdoor recreation is a unique context, one that may reveal new insights and facts; we can repay the sources from which we draw.

Our investment promises exciting returns. An understanding of decisionmaking processes will enable us to deal with unforeseen conditions in which concepts based on simple correlations or factor analysis have little or no meaning. If we know the mechanisms involved, we may be able to predict behavior in the most exotic environments the future will offer.

If decisionmaking is such a basic construct, why haven't we done more? Much of the problem stems from the traditional format of recreation research instruments. Typically, we have simply asked people what they want through some sort of Likert scaling device to measure intensity. Studies of decisionmaking require tools or instruments designed on a choice format.

One approach could use a list of paired alternatives. For each item the respondent is asked to make a choice. Elaborations could include rearranging the order of choosing and adding questions on why a choice was made. Another tactic asks the respondent to allocate a hypothetical investment among several alternatives. The investment could be expressed in tax dollars, time, or personal interest in the public land.

Both of these methods tend to multiply to number of items that need to be considered. This drawback can be overcome by making careful judgments, based on past research, about which items to include. With either approach, the items should be as concrete and realistic as possible, thus reducing the ambiguities of language. To understand decisionmaking, we must look at choice or choosing itself.

Others will contribute more imaginative concepts and methodology. The prospects are challenging and rewarding.

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A MODEL OF RECREATIONISTS' DECISIONMAKING PROCESS

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Whether it be redistributing backcountry use or educating the public about acceptable camping practices, providing information as a way to change behavior presently is advocated by many recreation professionals (Fazio 1979, Schomaker 1975, Lime and Lucas 1977, Krumpe 1979, Roggenbuck and Berrier 1981, Lucas 1981). At first glance the approach seems straightforward and simple—identify desired behavior patterns, produce the appropriate message, disseminate the message, and then measure the people's behavior change. A more critical look reveals that information is only one element of the much larger cognitive behavioral decision process that recreationists use when selecting recreation opportunities. Understanding this underlying decision process is important if we are to ultimately predict and exert influence on how recreationists make decisions.

This paper describes the development of a conceptual model showing how recreationists process information to select recreation opportunities in which to participate. To accomplish this, multi-attribute, multi-alternative behavioral decision models from consumer science are reviewed and preliminary evidence from our recreation studies is presented to support components of the proposed model.

BEHAVIORAL DECISION MODELS

In the last 3 decades, thousands of articles on decision theory have appeared in the literature. In a recent review, Slovic *et al.* (1977) cite ample evidence that people are not good intuitive statisticians, but rather systematically violate the principles of rational decision making. Therefore, researchers have concentrated on understanding how the underlying psychological processes are molded by the interaction between the demands of the task and the limitations of the thinker. A number of basic decision models have been developed and we will briefly describe them to illustrate their relevance to the recreation decision process (see Slovic *et al.* 1977; Hansen 1976; Bettman 1970, 1971; Tversky 1972; Nicosia 1966; Green and Devita 1974; Newell *et al.* 1958; Edwards 1954, 1961; Lancaster 1966; Coombs 1964; Ajzen and Fishbein 1973).

A basic tenet of this paper is that participation in recreation involves a cognitive behavioral decision process that is multi-attribute and multi-alternative in nature. Attributes are the perceived characteristics or qualities that something is believed to possess. For example, attributes of a river may be easy access, calm water, a pastoral setting, and so forth. Alternatives are the things from which people must choose when making a decision. Selection of a particular alternative is largely determined by the attributes (both positive and negative) that each alternative is perceived to possess (Lancaster 1966).

The decision process may also be affected by many situational factors, such as previous experience and learning, personality factors, elapsed time since last engaging in the activity, level of skill, amount of information available, importance of the decision, the number of available alternatives, as well as many constraining influences such as cost, distance, availability, time, and so forth. It could be expected that different people would process information differently to choose a recreation experience in which to participate. To account for these differences, several types of multi-attribute, multi-alternative decision models will be presented. Multi-attribute, multi-alternative models of choice can be divided into compensatory and noncompensatory models.

Compensatory Models

Compensatory models have been developed in conjunction with attitude and motivation theories that focus on determining a single value or measure of utility for each alternative; the assumption being that the alternative with the highest value will be selected (Edwards 1954, Lawler 1975, Ajzen and Fishbein 1973). In compensatory models, the importance and the utility of each attribute of an alternative are calculated and a high rating on one attribute may compensate for a low rating on another attribute.

Although these models may be useful for some predictive purposes, they do not represent how individuals actually process information to

reach a decision (Hansen 1976, Wright 1972). Their formulation assumes an unrealistically extensive cognitive burden on the decision maker to multiply the utilities by the importance weights and then sum and compare to reach a utility index for each alternative.

Noncompensatory Models

Noncompensatory, or process-oriented models, have evolved partly as a search for alternatives to the probabilistic and mathematically complicated compensatory models. Whereas compensatory models of choice permit the lack of one attribute to be mathematically compensated by the presence of another, noncompensatory models generally do not permit such trade-offs. In noncompensatory models, alternatives are compared in sequence on an attribute by attribute basis (rather than by comparing an overall evaluative score). Failure of an alternative to meet some predetermined selection criteria on one particular attribute may result in the rejection of that alternative. This approach allows the decision maker to simplify the decision process by quickly narrowing down a large set of multi-attribute alternatives to a smaller, more manageable subset.

Coombs (1964), Wright (1972), and Goldberg (1971) have proposed that an alternative is chosen only if it is sufficiently good on each of several preselected important attributes (referred to as the "conjunctive" model) or if the alternative measures up to some minimal acceptable level on a set of attributes (referred to as the "disjunctive" model). In other words, instead of maximizing, the person may "satisfice" or make do with an acceptable level of selected attributes. For example, in choosing a place to picnic, all picnic grounds may be eliminated that did not have charcoal grills, drinking water, and room to play frisbee. Although either of these models may not account for the total choice process, they can be used as a point of departure.

Elimination-by-aspects Model

Another noncompensatory model that better accounts for the sequential steps a decision maker may undertake is the elimination-by-aspects model (EBA) which is also referred to as a lexicographic model (Tversky 1972). This model describes choice as a sequential elimination process in which the decision maker directly compares alternatives based on whichever attribute is most important (Park 1978). If one alternative is far superior, it is chosen. If several alternatives are about equal, they are re-compared based on the attribute that is second most important (or salient). If an alternative is unsatisfactory on this second dimension, it

is eliminated, and if ties remain, a third most important attribute is selected for comparison. This sequential elimination by aspects continues until only one alternative remains.

To illustrate, a wilderness camper using EBA to decide upon a trail might first decide that getting above timberline to see rugged peaks was most important. All trails in a given area that only lead to forest meadows or down along river bottoms would be eliminated. If next in importance was gaining isolation and solitude, any heavily used highcountry trail would be eliminated. An attribute third in importance might be physical challenge. Of the remaining lightly used to highcountry trails, any would be eliminated if they were too easy. This process would be repeated until only one alternative remained. A major problem is that this model often results in a suboptimal choice when there are many alternatives, each possessing attributes similar in importance (Park 1978, Fishburn 1974). Although this model may not account for the total choice process, its sequential aspects may be utilized as part of the decision process.

PROPOSED RECREATION DECISION MODEL

We propose that the recreation choice process can be modeled as a constraint driven, conditional, sequential elimination by attributes model (fig. 1). The model is patterned after Park's (1978) sequential conflict resolution (SCR) model. The choice process is envisioned as an alternative-reducing process followed by a sequential final single choice from the remaining alternatives.

Constraining Attributes

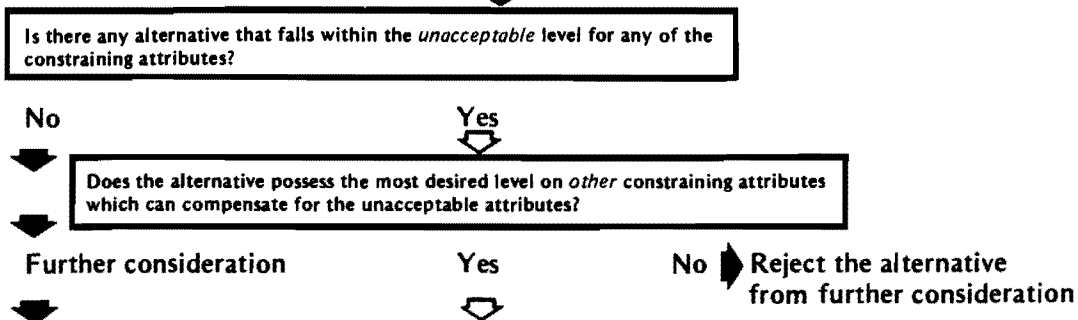
For any recreation choice a recreationist must consider both constraining and facilitating attributes. Constraining attributes are those that have a minimum threshold level for acceptance below which rejection of the alternative would occur. Park (1978) has called these rejection-inducing dimensions. Constraining attributes for a set of recreation alternatives might include such things as time requirements, costs, skill levels, equipment requirements, climatic conditions, distance, knowledge levels, requirements for companions, risk, peer approval, or personal physical conditions. For example, in selecting a backcountry route the attribute of distance between campsites might be unacceptable if greater than 15 miles, acceptable if from 10 to 15 miles, and excellent if less than 10 miles. Thus, a constraining attribute may be valued either negatively or positively, depending on the situation and the amount or level of the constraining attribute perceived to be present.

THE RECREATION DECISION MODEL
CONSTRAINT DRIVEN CONDITIONAL
SEQUENTIAL ELIMINATION BY ATTRIBUTES MODEL

STAGE ONE:

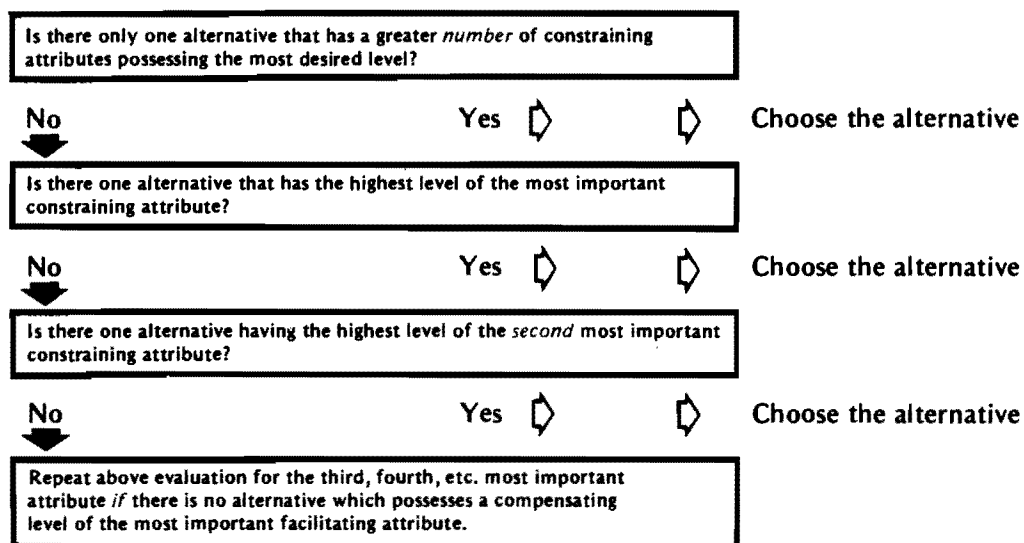
Conditional Elimination Process

START



STAGE TWO:

Evaluation based on amount and importance of constraining attributes



STAGE THREE:

Evaluation based on facilitating attributes

No Yes Choose the alternative

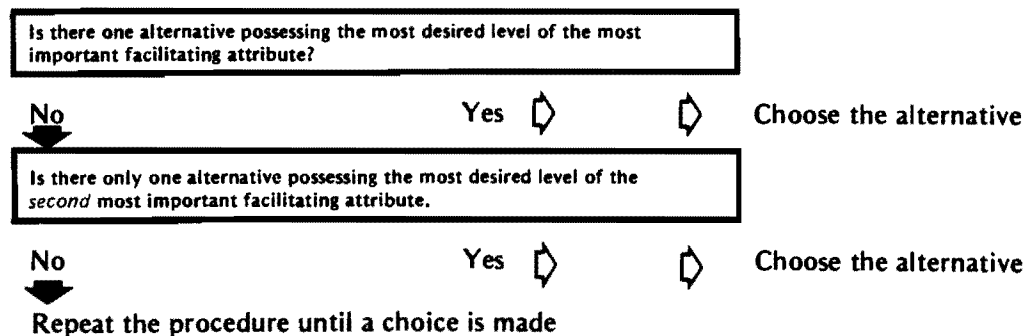


Figure 1. The Recreation Decision Model.

Facilitating Attributes

Facilitating attributes, on the other hand, are those highly desirable attributes that the decision maker seeks to maximize because of their net positive contribution to the chosen recreation experience. Such things as scenery, change from routine, solitude or privacy, and undisturbed natural settings are often viewed as bonuses of one alternative over another. Park (1978) refers to these as relative preference dimensions. Facilitating attributes do not have an unacceptable level that would be sufficient to cause an alternative to be rejected.

Stage One:

Conditional Elimination Process

Given a number of possible recreation alternatives, the decision maker first goes through an alternative reduction process and then pursues a single final choice from the reduced set of alternatives (fig. 1). In the first stage a conditional elimination process is used to reach this reduced set of acceptable alternatives. This is done by eliminating any alternative that (1) falls within the unacceptable level for any of the constraining attributes, and at the same time (2) does not possess the most desired level on other constraining attributes that can compensate for the unacceptable attribute. Thus, this first stage is conditional because an alternative is not automatically eliminated if it falls below the cut-off level on one attribute. It is retained for further consideration if some of its other attributes can compensate. For example, a person choosing a fishing lake may eliminate all lakes that are more than 50 miles away (an unacceptable level for distance, the constraining attribute). A lake 65 miles away may be retained for consideration, however, if it is believed to have really big fish (a positively compensating constraining attribute).

Stage Two:

Evaluation Based on Amount and Importance of Constraining Attributes

The second stage is to evaluate remaining alternatives to determine which have the greatest number of constraining attributes possessing the most desired level. If only one alternative has a higher number of constraining attributes at the most desired level, it will be selected as a final choice. If more than one alternative has the same number of constraining attributes at the most desired level, the decision maker will next consider the most important constraining attribute. The alternative that has the highest level of the most important constraining attribute will be chosen. If necessary, the alternatives will

sequentially be compared on the second, third (and so on) most important constraining attributes.

Stage Three:

Evaluation Based on Facilitating Attributes

The final stage is undertaken only if a choice cannot be reached at the second stage. At this point the decision maker selects the most important facilitating attribute and searches for the alternative that is superior on this most important attribute. This will be repeated, if necessary, on the second or third most important ones.

This three-step process is actually a simplified strategy for the decision maker because it quickly narrows down the range of alternatives to only ones that meet minimum cut-off levels (Stage 1). The decision maker then selects the alternative with the highest number of the most important constraining and facilitating attributes, each of which possesses the most desired levels (Stages 2 and 3).

EXAMPLE APPLICATION AND SUPPORTING EVIDENCE FOR THE MODEL

To return to our example of selecting a fishing lake, suppose that: (1st) distance, (2nd) size of fish, (3rd) attractive camping places, and (4th) ease of access were all desirable attributes but could have unacceptable or constraining levels. In addition, beautiful scenery and clear water may be desirable but would not have an unacceptable level that would constrain the choice. First, all lakes more than 50 miles away would be eliminated (except for one 65 miles away that had very big fish). If four lakes remained, they would be compared to see which ones had big fish, attractive campsites, and paved access roads and launch ramps. If two of the lakes had all three of these, they would be compared on the next most important attribute, big fish. If they both had equally big fish, the lakes would be compared on the next most important attribute to see which one had the most attractive campsites. By this process a final decision could quickly be made. The last two attributes, beautiful scenery and clear water, do not have a lower constraining level that would cause rejection of an alternative. They would be used only as a tie-breaker if it were necessary to invoke the third stage.

In 1978 an experiment was conducted to redistribute backpackers to less used trails in Yellowstone National Park (Krumpe 1979). To gain further insight into the decision process of backpackers, questions were asked about the

importance of various attributes of the trail and the sequence of considering these attributes. Users were asked first to rate how important each of 25 decision factors were to the selection of their backcountry travel routes. These 25 decision factors described various possible attributes of the trails the people may have considered when selecting their backcountry routes. They were also asked which of the items checked as important they normally considered first, second, and third when deciding on which trail to take.

The result was that almost none of the items attained a clear majority as being considered very important. Only two items exceeded 50 percent on the "very important" response (52 percent for "a trail that took only the number of days I had available", and 51 percent for "a trail with campsites well isolated from other users"). Similarly, only three exceeded 50 percent on the "not at all important" response (75 percent for "a trail where several others would be seen", 57 percent for "a trail without rivers or streams that must be waded", and 51 percent for "a trail with little elevation gain"). The remaining 22 trail attributes had a surprisingly even distribution over the four response categories. All of the above could be considered constraining attributes in the model because if they were perceived to be at a sufficiently low level, they would cause an alternative to be rejected.

Knowing the importance people place on selected attributes does not adequately describe the process or sequence of steps they used to reach a decision. Therefore, the backcountry visitors to Yellowstone were also asked which of the trail attributes they checked as important they would normally consider first, second, or third when deciding on which trail to take. The trail attribute considered first by the greatest number of people was, "a trail that took only the number of days I had available". Thus, all trails that take too many days to hike would immediately be eliminated. This represents the STAGE ONE conditional elimination process. As was the case with the importance scores, there was a wide spread of trail attributes ranked as being considered first, second, and third. Only four trail attributes were listed by more than 10 percent of the visitors. These four attributes in rank order were: (1) "a trail that took only the number of days I had available", (2) "a trail with campsites well isolated from other users", (3) "a trail where encountering others was highly unlikely", and (4) "a trail along a river or stream". Each of these items can be viewed as a constraining attribute. Because each was used as the first step in the decision process, each could serve as the conditional elimination step.

SUMMARY

The recreation decision process has been modeled as constraint driven. Although people may seek in their recreation decisions to maximize their enjoyment, they must first narrow down their range of choices. We propose that this most often occurs in the beginning stages of decision making. By depicting the first stage as conditional, our model does not require the blind elimination of an alternative because of an unacceptable level on only one attribute. Rather, high performance on other attributes could compensate and retain the alternative for further consideration. In the second stage the model allows the decision maker to maximize the choice by selecting the alternative with the "most" of the desirable attributes. If further comparison is necessary, it is done on the basis of what is most important to the decision maker.

The model should be able to function for a wide variety of recreation decisions. For repetitive events, prior experience will enable the decision maker to quickly evaluate alternatives on few attributes. For more complicated recreation experiences (e.g. choosing a 6-day wilderness trip) the model would accommodate a more lengthy sequence of comparisons. We intend to apply this model to floaters of the Wild, Scenic, and Recreational sections of the Flathead River System. The diversity of this river system and the variety of recreation experiences available should prove fertile ground for investigating its merits.

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THE ROLE OF INFORMATION IN RECREATION SITE SELECTION

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Most models of recreation activity or site choice assume that potential consumers have perfect information about the numbers and kinds of recreation opportunities available. Both common sense and empirical evidence indicate that most recreationists select from a limited (perhaps fuzzy) subset of known opportunities. Violating "economic man" assumptions of a well-informed consumer may result in significant distortions in use prediction models and, in turn, inappropriate recreation planning and management decisions.

Research is needed to measure consumer knowledge of park opportunities and to assess the effects of consumer awareness/ knowledge on recreation choices. If information variables are incorporated into park visitation models, information can become an important management and planning tool. This paper reports the results of initial efforts to contribute to this research area and recommends some research directions.

RECREATION CHOICE MODELS AND CONSUMER KNOWLEDGE

Although consumers' lack of information about recreation opportunities has been identified in several studies of research needs (e.g. National Academy of Sciences 1969, USDI, HCRS 1978), little research has directly addressed the problem. In the most recent nationwide recreation survey, 32 percent of the respondents cited a lack of information as a barrier to outdoor recreation participation (Robinson 1979). This perceived barrier was exceeded only by lack of time (52 percent), crowded facilities (43 percent), and lack of money (37 percent). The fact that people who were most active in outdoor recreation and most highly educated had the greatest tendency to cite lack of information suggests that these figures give a conservative estimate of the magnitude of the problem. Of the four most frequently cited barriers, lack of information is the one managers can most easily control through appropriate programs of information dissemination.

A step toward better understanding of information and its role in recreation activity and site selection decisions would be to incorporate information or knowledge variables into recreation choice models. A host of information diffusion, learning, information processing, and

decisionmaking models have been successfully applied in settings other than outdoor recreation. (see for example, Lave and March 1975, Luce and Raiffa 1957, and Golledge and Rushton 1976). Future testing of these models within outdoor recreation is encouraged. However, in this paper the focus is restricted to refinements of models commonly used in outdoor recreation planning. These include linear gravity, and related models for predicting recreation activity and site choices of either individuals or population aggregates. These models are reviewed in Cicchetti (1973, Stynes *et al.* (1980), and Ewing (1980).

Our purpose is to examine the importance of assumptions of perfect knowledge in these models and to identify possible approaches to relaxing them. The gravity model captures the basic relations inherent in recreation site choice models. The number of visits to a site or probability of visiting a site is related to socioeconomic variables describing the individual or population subgroup, to measures of site attractiveness or quality, and to distance or cost of participating. More complex models also include substitutes through refinements to simple gravity models and regional or systems models.

We hypothesize that some of the same variables used in park visitation models will also predict the consumer's awareness or knowledge of particular park opportunities. We would expect certain socioeconomic groups to be more knowledgeable about park opportunities and would expect greater awareness of larger parks, those with unique features, and those closer to populations.

MEASURING PARK AWARENESS

To obtain data to test these hypotheses, we included park knowledge questions in a recent county park user survey in Ingham County, Michigan (Fritschen *et al.* 1979). The Ingham County park system consists of six parks surrounding the city of Lansing. Because interviews were conducted in the parks, subjects were asked if they had heard of or visited other parks in the system. For each park, individuals were classified into one of three mutually exclusive groups:

- 1) UNAWARE - those who had not heard of the park,

parcs in the system. For each park, individuals were classified into one of three mutually exclusive groups:

- 1) UNAWARE - those who had not heard of the park,
- 2) AWARE - those who had heard of but never visited the park, and
- 3) VISITOR - those having heard of and visited the park. It was assumed that those subjects unaware of a park had not visited the park, although ignorance of park names may have resulted in some confusion for some subjects.

Averaging results across all subjects and parks, excluding the park in which the subject was interviewed, the sample consisted of 45 percent UNAWARE, 23 percent AWARE, and 33 percent VISITORS (table 1). Thus, in a sample of park

system users, the largest percentage had not heard of other parks in the system. One might expect even lower levels of park awareness in the general population.

Differences among the parks in awareness levels and visitation suggest several hypotheses for further testing, for example:

1. Subjects were more aware of parks near the one in which they were interviewed, suggesting that park awareness decreases with distance.
2. The three parks with swimming facilities were the most well known (LLS, LLN, and GR). Larger parks located on major highways with a variety of facilities had the highest recognition levels. The one natural area (RB) and a small park in the southwestern corner of the county (B) were the least recognized parks. These results suggest the hypothesis

Table 1.--Awareness and visitation of Ingham County parks by park at which subject was interviewed.
(In percent)

Unaware aware visitors	Respondents aware of and/or visiting						All parks
	L.L.South	L.L.North	Gr.River	Riverbend	Rayner	Baldwin	
Park interviewed at							
Lake Lansing South LLS (N=153)	---	23 ^{1/}	35	78	56	80	55
		22	21	16	21	16	19
		55	44	5	23	4	26
Lake Lansing North LLN (N=53)	11	---	28	77	75	77	54
	25		28	15	11	15	19
	64		43	7	13	7	27
Grand River GR (N=197)	19	18	---	65	50	71	44
	35	43		19	14	11	25
	45	39		16	36	18	31
Riverbend RB (N=60)	20	13	5	---	35	63	27
	33	37	10		20	23	25
	47	50	85		45	13	57
Rayner R (N=88)	22	23	9	66	---	67	37
	34	36	21	17		17	25
	44	41	71	17		16	38
Baldwin B (N=24)	42	37	21	79	29	---	42
	25	29	25	13	17		22
	33	33	54	8	54		37
All Subjects (N=575)	20	21	22	71	52	72	45
	33	34	20	17	17	15	23
	47	45	57	12	31	12	33

^{1/} Interpretation: Of the 153 subjects interviewed at Lake Lansing South, 23 percent have not heard of Lake Lansing North, 22 percent have heard of it but never visited it, and 55 percent have visited it.

that park awareness is positively related to the degree of development of the park, popularity of activities that are offered, and location.

3. Visitors to the least known parks (RB, R, and B) had the highest awareness levels of other parks in the county system. This suggests a hierarchy of awareness and visitation patterns within park systems.

These data recommend testing a general model to predict park awareness levels of population aggregates based upon population characteristics, distance from population to the park, and variables describing the park (degree of development, number or types of facilities, access from major highway, park visibility in local media, years of operation, etc.). A sample of six parks is not sufficient to estimate such an equation, but additional data are being collected. The sample does, however, permit testing models to predict park awareness and visitation for individuals.

LINEAR MODELS OF PARK AWARENESS AND VISITATION FOR INDIVIDUALS

Using the individual as the unit of analysis, we carried out multiple regression and discriminant analyses on the Ingham County data to test the ability of linear models to predict the individual's park awareness and visitation. The similarity of models for each of the six parks suggested development of a general "all parks" model. Space limitations require that we restrict our discussion to the "all parks" model and summarize the results.

Stepwise Linear Regression

Hierarchical stepwise linear regression methods were used to estimate models of park awareness (heard of the park or not) and park visitation (visited the park or not). Distance

and a set of 10 socioeconomic variables were permitted to enter the equations first. Then a set of 12 recreation activity participation indicators were permitted to enter, followed by indicators for each of the six parks. Finally, a park awareness indicator was added to the visitation model to explore the contribution of awareness to park visitation (table 2).

Almost identical sets of variables enter the park awareness and park visitation equations in roughly the same order. Distance enters both equations first and explains about 15 percent of the variation in the dependent variable. The strongest socioeconomic predictor in both equations is years of residence in the county. The variables tested performed similarly in predicting awareness and in predicting visitation. Adding a park awareness indicator in the final step of the visitation equation roughly doubles the explained variation from 26 percent to fifty percent.

The order of inclusion of variables affects their contribution to R^2 . Because awareness and visitation are highly intercorrelated ($R=0.687$), awareness by itself explains 47 percent of the variation in visitation. By entering awareness last in the stepwise procedure, we observe that it explains an additional 25 percent variation in visitation not explained by socioeconomic, activity, and park variables. Conversely, if awareness is entered first in the visitation equation, all other variables only contribute an additional 3 percent to R^2 .

We draw two preliminary conclusions from these results. First, awareness or knowledge variables could significantly improve park visitation models. Second, to do so would require independent variables other than the types tested here. The fact that park indicator variables add more to explanation of park awareness than visitation suggests devoting more attention to variables describing the park (degree of development, size, number and types

TABLE 2.--Hierarchical stepwise linear regression models of park awareness and visitation, all parks model

Variables included ^{1/}	Visitation model variables entering	R^2 (cum.)	Awareness model variables entering	R^2 (cum.)
1. Distance, socio-economic	Distance, years, age, sex, single	0.174	Distance, years, sex	0.162
2. Twelve recreation activity participation	Hike, boat swim	0.178	Hike, boat swim	0.170
3. Six park indicators	RB,GR,LLS,LLN	0.259	RB,GR,LLS	0.293
4. Park awareness indicator	Entered	0.509	-----	

^{1/}Distance is distance from home to the park, Years is years living in the county, park indicators are abbreviations for park names, (See table 1), taking on the value 1 when predicting awareness or visitation for the given park and 0 otherwise.

of activities/facilities, media exposure, years of operation, location, etc.). This was also recommended by the analysis in table 1 for aggregate models. Variables describing the consumer should include years of residence in the area and measures of interest in the types of activities offered at the park.

Discriminant Analysis

One would expect park awareness to be a good predictor of park visitation. To predict visitation solely on the basis of awareness, the optimal decision rule would be to predict that the subject has visited the park if aware of it and has not visited the park if unaware of it. This decision rule correctly predicts visitation for 81 percent of the cases. Only the 650 instances of a subject being aware of a park and not visiting it yield errors using this rule (table 3).

Table 3.--Ingham county park awareness by park visitation

	Visited the park				
	No		Yes		
	No.	Percent	No.	Percent	
Heard of the park	No	1,296	37	0	0
	Yes	650	19	1,531 ^{1/}	44

^{1/}Table includes data for the park in which subject was interviewed. This adds 575 cases to the heard of and visited category that were not included in table 1.

Discriminant analysis provides an easily interpretable measure of the predictive ability of linear models with dichotomous dependent variables. Using the same sets of independent variables as in the multiple linear regression models, we estimated linear discriminant functions to predict whether or not an individual had visited each park. Stepwise procedures comparable to the multiple linear regression approach were used in a general all parks model. Table 4 summarizes the results of discriminant classification analysis with distinct sets of independent variables.

Distance, socioeconomic, activity, and park variables successfully classify 72 percent of the sample as park visitors or non-visitors. Adding an awareness variable increases this to 82 percent. This improvement comes from the almost perfect classification of visitors; no improvement is made in identifying non-visitors. That is, a portion of non-visitors are impro-

Table 4.--Discriminant classification analyses of park visitation

(In percent)

Variables included	Cases correctly classified		
	Visitors	Non-visitors	Total
Park awareness indicator	100	67	81
Distance, socioeconomic, activity, park indicators	75	70	72
Distance, socioeconomic, activity, park indicators, park awareness indicator	99	69	82

perly classified as visitors. Most of these will be individuals who have heard of a park but have chosen not to visit it. The regression and discriminant analyses suggest that variables other than socioeconomic and recreation activity variables will be needed to discriminate between aware subjects who visit or do not visit parks.

The 18 percent error rate with all variables is only 1 percent better than predicting on the basis of awareness alone. Predicting awareness based upon socioeconomic, activity, and park variables yields an overall correct classification rate of 76 percent, correctly placing 77 percent of the unaware subjects and 75 percent of the aware subjects. Just as in the multiple linear regression, the independent variables predict park awareness and park visitation with roughly equal accuracy.

CONCLUSIONS AND RECOMMENDATIONS

Analysis of Ingham County park users supports the hypothesis that consumers are poorly informed about park opportunities. Park awareness decreases with distance from the park and generally exhibits relations similar to those found in park visitation models. This suggests that park visitation models may be explaining more about park awareness than about site choice decisions.

Most of our research has studied park visitors. More attention should be given to the UNAWARE and AWARE groups defined above. More research is needed to explore the extent of the information barrier to park visitation, to identify target groups for information campaigns, to identify which parks require more or less publicity, to study how consumers process park information, and to test the effectiveness of alternative techniques of information dissemination. Predicting consumer choices requires

first identifying those aware of the park and then distinguishing those aware of the park from those who visit it. We recommend development of park knowledge measures more powerful than the simple dichotomous awareness indicator used here. Park recognition indices should be added to park attractiveness measures in aggregate models.

We recommend that future efforts take a stepwise approach to exploring park visitation by first estimating awareness levels and then estimating site choices or visitation patterns among "known" park opportunities. This approach is feasible in either models of individual or aggregate behavior using either the individual or the park as the unit of analysis.

Both use and nonuse of parks can be better understood by clearly separating potential consumers on the basis of park awareness or knowledge. If visitation can be predicted using the two-step approach recommended above, models can be used to test the effects of information dissemination campaigns on park awareness and park visitation patterns. Information could become a powerful tool for modifying use patterns to reduce congestion and to maximize benefits from park resources.

A focus upon park awareness and communications processes is also of theoretical interest. Perhaps the two most troublesome issues in recreation demand analysis are the supply and substitution effects (Ewing 1980). Current efforts to incorporate these effects into use prediction models generally work from observed choices or inventory data. They almost universally assume perfect knowledge. An information approach suggests developing measures of supply and substitutability from the consumer's perspective. What effective supply does the consumer select from and what opportunities are deemed substitutes?

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USING DESIRED RECREATION EXPERIENCES TO PREDICT SETTING PREFERENCES

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A basic assumption underlying recreation opportunity spectrum (ROS) planning is that recreationists engage in activities in specific settings to realize desired recreation experiences (Driver and Brown 1978a). Because planners and managers accepting ROS planning actually allocate land and manipulate settings to increase the probability that certain experiences will be realized, it is important that they know which types of settings are perceived by recreationists to deliver different desired experiences. The purpose of that research was to investigate the relation between desired experiences and setting preferences, and between activity, desired experiences, and setting preferences.

Our assumption about where and why recreationists engage in recreation activities comes from two fundamental concepts. First, recreation has been described by Driver and Tocher (1970) as a type of human experience with its source in intrinsically rewarding voluntary engagements during nonobligated time. Their focus is on the experience obtained from participating in particular recreation activities rather than on the activities themselves. This approach emphasizes what is realized by engagement in recreation rather than simply describing overt behavior.

Second, expectancy-value theory of social psychology (Lawler 1973) has been used to hypothesize and describe relations between recreation activities, settings, experiences, and benefits (Driver and Brown 1978a). Basically, expectancy-value theory postulates that people engage in a behavior because they expect valued outcomes from participating (or to avoid negative outcomes from not participating). The theory suggests, other things being equal, that people will engage in those behaviors that they expect have the greatest probability of leading to highest valued outcomes. In the case of recreation, activities are the behaviors, settings are the environments where activities occur, experiences are the immediate outcomes of participation in activities, and individual benefits are subsequent outcomes resulting from experiences. One might hypothesize, therefore, that choice of activities and settings will depend on the degree to which certain valued experiences and benefits are perceived to come from engaging in specific settings.

Within this general model one could investigate relations among any combination of the factors. For instance, one could investigate the relation between activities and settings, experiences, or benefits, or between settings and experiences or benefits. Most useful for ROS planning, however, are relations among settings and experiences, and among activities, settings, and experiences. What we need to know is how recreationists perceive these relations so that in manipulating settings we can increase the chance that recreationists will realize desired experiences. The desired experiences we have in mind are the immediate outcomes of recreation engagement such as experiencing nature, affiliating with others, taking risks, and developing skills.

Several studies provide insight into the experience preferences of recreationists. For instance, among others Potter *et al.* (1973) identified desired hunting experiences, Haas *et al.* (1980) identified desired cross-country skiing experiences, Schreyer *et al.* (1976) identified desired river running experiences, Driver and Knopf (1976) identified desired fishing experiences, and Brown and Haas (1980) identified desired backpacking experiences. Other studies provide information about setting preferences for persons engaging in specific activities, usually within specific settings. For instance, Peterson (1974) identified many desirable attributes of the physical, social, and managerial components of the Boundary Waters Canoe Area Wilderness, Knopp *et al.* (1979) identified desirable attributes of river recreation settings, Lime (1971) identified desirable attributes of developed campgrounds in northern Minnesota, and Manfredi (1979) identified desirable managerial attributes of three Wyoming wilderness areas.

Although each of these studies links activities to either experiences or settings, none of them uses desired experiences to predict preferences for settings. Yet, that is the fundamental linkage hypothesized to describe choice of a place to recreate if one follows the Driver and Tocher (1970) definition of recreation, the tenets of expectancy-values theory, or the logic underlying ROS planning (Driver and Brown 1978a). Therefore, in the research described here we begin to set out this linkage by identifying the desired experiences pertinent to preferences for different recreation settings.

METHODS

Data in this paper are from a study of users of the Glenwood Springs Resource Area in Colorado. This area is administered by the Bureau of Land Management (BLM), and offers many types of recreation. It encompasses about 260,000 hectares of land in west-central Colorado along the Colorado River and tributaries such as Eagle and Roaring Fork Rivers. Some important communities within the resource area are Aspen, Glenwood Springs, Rifle, and Vail. Major recreation activity opportunities provided by the BLM are river kayaking and rafting, off-road vehicle driving, hunting, fishing, camping, and hiking.

Multiple regression analysis was used to determine which specific experiences (independent variables). This form of analysis has been used for identifying the importance of several independent variables influencing decisions (Hammond et al. 1975). The standardized partial regression coefficients resulting from this procedure provide the best indication of the importance among the independent variables and only those coefficients significantly different from zero are considered relevant.

Data for the analysis were collected using a mail questionnaire distributed to area users who previously had been contacted by an interviewer in the field during the summer of 1979. The study area was divided into 30 zones and each zone was visited by the interviewer 8 times during the summer. The field interviewer was instructed to interview all recreationists encountered in the zones that were randomly selected for each day.

Following the field contact recreationists were mailed a questionnaire that contained questions about desired experiences, preferred settings, and engaged-in activities, among other things. The experience questions asked the respondent to rate on a nine point scale whether a specific experience (i.e., risk taking, affiliating with others, introspecting, relating to nature, etc.) would add to or detract from a future visit to the area for the same type of recreation. The 69 experience items were from the Driver and Brown (1978b) item pool and were designed to tap desires for 18 different types of specific experiences. A setting question asked the respondent to use a seven point scale to indicate, for the activity, overall favorableness or unfavorableness toward five recreation settings from the primitive to the rural along the recreation opportunity spectrum. Respondents were instructed to think about the

recreation activity they engaged-in the most in the Glenwood Springs Resource Area when they answered the experience and setting questions.

Mail questionnaires were sent to 212 recreationists and 168 usable ones were returned. Individual experience items were grouped into a priori clusters indicated by Driver and Brown (1978b) and a mean for each cluster was calculated. These data were then input into the Statistical Package for the Social Sciences (Nie et al. 1975) step-wise selection multiple regression program. For this exploratory study an acceptable significance level of 0.10 was set for both the individual variable correlation coefficients and the entire regression equation.

RESULTS

One analysis was made with all respondents grouped together and another with stream fishermen only. Stream fishermen preferences were examined because we wanted to see the effect of recreation activity on the experience-setting relation and because data for that activity group were most complete. Both analyses show that experiences differ between settings and that the experiences differentially contribute to preferences for the different settings. The stream fishermen analysis shows that recreation activity influences the experience-setting relations.

Exercise/physical fitness is salient for two types of settings, semiprimitive non-motorized and roaded natural, but with opposite signs (table 1). Experiencing physical rest is salient for three settings, but it is negative for primitive and positive for the two semiprimitive settings. Escaping personal-social pressure is salient for three settings--it is positive for primitive and roaded natural and negative for semiprimitive nonmotorized. Escaping physical pressure is negative for the semiprimitive motorized and roaded natural settings. Leadership/autonomy and taking risks each occur positively for one settings, roaded natural and rural, and relating with nature occurs negatively for the rural setting.

Because the analysis done with the sub-population of stream fishermen includes a more homogeneous group than the inclusive one, the amount of explained variance is higher for each setting type except roaded natural (table 2). Escape personal-social pressure was positive for the primitive and two semiprimitive settings and it was the most important variable for all three settings. Relating with nature was negative for the semiprimitive nonmotorized setting.

Table 1--Desired experiences associated with recreation setting preferences for all Glenwood Springs Resource Area recreationists

Experience	B ^{1/}	B ^{2/}	Sig. of B	R	R ²	Sig. of Eq.
<u>Primitive Setting</u>						
Exercise/physical fitness	+1.13	+0.38	0.183	0.38	0.14	
Physical rest	-1.19	-.83	.037	.46	.21	
Escape personal-social pressure	+1.70	+.75	.065	.62	.39	.069
Constant	-7.60					
<u>Semiprimitive Nonmotorized Setting</u>						
Physical rest	+2.03	+1.03	0.005	0.40	0.16	
Escape personal/social pressure	-3.39	-1.10	.004	.66	.44	
Exercise/physical fitness	+1.78	+.44	.079	.74	.55	0.009
Constant	-2.77					
<u>Semiprimitive Motorized Setting</u>						
Physical rest	+2.66	+1.14	0.004	0.38	0.15	
Escape physical pressure	-4.71	-1.29	.009	.63	.40	
Relate with nature	+2.35	+.49	.133	.70	.49	0.021
Constant	-2.51					
<u>Roaded Natural Setting</u>						
Leadership/autonomy	+4.62	+1.07	0.000	0.70	0.49	
Exercise/physical fitness	-4.13	-.64	.003	.85	.72	
Escape Personal-social pressure	+1.19	+.24	.280	.86	.74	
Escape physical pressure	-3.04	-.51	.063	.88	.78	
Relate with nature	+1.99	+.31	.226	.90	.81	0.001
Constant	-3.45					
<u>Rural Setting</u>						
Take risks	+3.12	+0.97	0.000	0.79	0.63	
Relate with nature	-3.89	-.40	.011	.87	.76	0.000

^{1/}B--Partial regression coefficient for each independent variable.
^{2/}B--Standard partial regression coefficient.

Table 2.--Desired experiences associated with recreation setting preferences
for Glenwood Springs Resource Area stream fishermen

Experience	$\frac{1}{B}$	$\frac{2}{B}$	Sig. of B	R	R ²	Sig. of Eq.
<u>Primitive Setting</u>						
Escape physical pressure	+0.86	+0.26	0.28	0.63	0.40	
Escape personal-social pressure	+3.39	+7.78	.02	.69	.48	
Physical rest	-.54	-.54	.03	.80	.65	0.005
Constant	-15.78					
<u>Semiprimitive Nonmotorized Setting</u>						
Escape personal/social pressure	+4.54	+1.10	0.00	0.91	0.83	
Relate with nature	-1.09	-.36	.05	.96	.92	0.001
Constant	-14.72					
<u>Semiprimitive Motorized Setting</u>						
Escape personal-social pressure	+3.11	+0.74	0.000	0.92	0.85	
Leadership/autonomy	.13	+.42	.001	.99	.99	.000
Constant	-17.91					
<u>Roaded Natural Setting</u>						
Physical rest	+3.58	+.57	0.05	0.75	0.56	
Leadership/autonomy	+1.52	+.52	.06	.89	.80	0.019
Constant	-21.46					
<u>Rural Setting</u>						
Leadership/autonomy	+16.50	1.36	0.06	0.86	0.75	
Achievement	-10.67	-.70	.11	.99	.99	0.090
Constant	-24.58					

$\frac{1}{B}$ --Partial regression coefficient for each independent variable.
 $\frac{2}{B}$ --Standard partial regression coefficient.

Leadership/autonomy was positive for the semiprimitive motorized, roaded natural, and rural settings.

DISCUSSION

Our findings suggest that different desired experiences are relevant in formulating preferences for different recreation settings. This was shown for both the overall group and the stream fishermen subgroup. It is consistent with the notion that different settings would be used to realize different recreation experiences, thus supporting the way recreation opportunity spectrum planning is formulated.

Our findings also indicate that salient desired experiences for any one setting preference are not equally weighted, suggesting that some experiences are more important to the preference than other experiences. For instance, the experience of escaping personal-social pressure has about three times the influence of escaping physical pressure on the stream fishermen preference for the primitive setting.

The findings for stream fishermen, when compared to all recreationists, suggest that activities affect the experience-setting relation and lead to better equations relating experiences to settings. It is apparent that some different specific experiences are significant in the equations for each setting (tables 1 and 2). Also, the fit of the activity-specific equations usually accounts for more explanation of variance. Both of these findings are reasonable because we would expect activities to be related to specific experiences if expectancy-value theory has merit, and we would expect more homogeneous groups of recreationists (e.g., stream fishermen) to have a more uniform experience--setting preference relation than all recreationists considered together.

Our findings, although suggestive, are not definitive regarding relations among specific experiences, settings, and activities. We are unable to explain some of the relations but they might be due to the compounding of recreationists from different activity groups in the inclusive group and to nonmeasured factors. Also, we only studied people recreating in one area and participating in a limited number of activities. Nevertheless, our findings suggest some hypotheses for future research on the relation of desired specific experiences to preferences for recreation settings. These hypotheses, stated generally, are:

1. Desired experiences salient to preferences for recreation settings will differ among settings.

2. Desired experiences salient to any one setting preference will not be equally important in influencing the preference.
3. Desired experiences salient to any one setting preference will differ among recreation activities.
4. When relations among desired experiences and setting preferences are examined by recreation activity, the resulting regression equations will account for more of the variance than if participants in all activities were analyzed together.

Our findings also do not tell us the process of decision making, but only about some of the factors that might be relevant to forming setting preferences. There are some indications, however, of what we might look for in studying decision making about recreation settings. First, we need to identify those specific experiences that influence the decision about a setting because different experiences appear to be salient to different settings. Second, we might examine different decision making models, such as the compensatory and non-compensatory models. Compensatory models assume that salient factors are added in decision making and that factors can be traded-off among each other. Noncompensatory models, on the other hand, do not permit such trade-offs between factors. They indicate that some factors are absolute and that some minimal or threshold level of the factor must be available for the alternative to be acceptable. Because different specific experiences seem to be salient for different settings, and because the salient experiences seem to have differential importance in setting preferences, it is plausible that noncompensatory decision making is operative. However, unless both models are studied, possibly with additional variables (e.g., substitutional variables), one cannot be certain which of those forms of decision making is used.

The results of this study showing that desires for specific experiences are associated with preferences for recreation settings provide rudimentary indication that the expectancy-value rationale underlying recreation opportunity spectrum planning has merit. Much more investigation is needed, however, into different recreational settings and activities and possibly the decision making processes. Information obtained from future investigations would be valuable in finding out what is important to recreationists' preferences and thus some things that might be important to management decisions. Also, understanding salient factors in recreationists' preferences should be helpful for better understanding and measuring recreationists satisfaction and quality of recreation sites and experiences.

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ENERGY CONSERVATION, RECREATION PARTICIPATION, AND ECOLOGICALLY RESPONSIBLE BEHAVIOR

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As so well documented by the Harvard Business School's landmark study (Stobaugh and Yergin 1979), the days of easy energy are over. Although people differ on what to blame for current energy problems, most agree that changes must be made in American patterns and levels of energy consumption. Changes in energy consumption patterns will require new behaviors on the part of Americans as they pursue their lifestyles. Lipsey called these actions, designed to improve relations between people and the environment, "ecologically responsible behavior." Examples would be recycling used materials, participating in cleanup drives, and conserving energy around the home.

A number of researchers have studied ways of encouraging energy conservation behavior. Such studies have generally looked at ways to promote conservation through behavior modification. Littering, noise pollution, recycling, transportation patterns, and energy use have all been modified through various combinations of reinforcement and feedback (Cone and Hayes 1977).

Operant applications to energy conservation or ecologically responsible behavior have a place, of course, and should be pursued vigorously. But parallel studies are needed to discover dispositions or experiences that may motivate conservation behavior--simply for the sake of conserving. Outdoor recreation in natural environments may well be one such experience.

In this paper, we briefly report on three complementary studies examining relations between outdoor recreation participation and energy conservation or ecologically responsible behavior. The purpose in summarizing three studies is to demonstrate some consistency in results across different samples as well as to identify some complexities in these relations.

LITERATURE REVIEW

The notion that outdoor recreation experience can lead to increased environmental awareness has been explored in several studies. Lipsey (n.d.) suggested that participation in recreation activities provides exposure to the

environment and its problems and thus has the potential to facilitate ecologically responsible behavior. Faich and Gale (1971) noted the change in orientation from outdoor recreation to environmental activism among Sierra Club members, who use recreation as a stepping stone to environmental action.

Dunlap and Heffernan (1975) concluded that participation in outdoor recreation was indeed related to environmental concern in their Washington State sample. They suggested that recreation preceded concern, pointing to a causal relation. A similar study, however, seriously questioned these findings. Geisler *et al.* (1977) found that the relation between outdoor recreation experience and environmental concern disappeared when controlling for age, education, and place of residence, posing obvious problems to interpretation.

Methodological and conceptual shortcomings common to both studies, however, obscured comparisons. No one can deny the nearly universal public concern over environment (Lipsey 1977). Yet coupled with this concern are far lower levels of actual behavior aimed at conserving resources and reducing pollution. Discrepancies between attitudes and behavior have been found regarding air pollution, (Swan 1972), water resource use (Bruvold 1972), litter cleanup (Bickman 1972), paying for pollution abatement (Chaney 1970), and commitment to environmental movements (Hine and Gerlach 1970). This research suggests that actual behavior, not attitudes or concern, should be the focus in research designed to improve relations between people and the environment.

STUDY ONE

In the spring of 1978, 170 southern Californians completed a questionnaire on participation in 16 outdoor recreation activities, levels of participation in 20 household conservation activities (recycling, restricting water use, insulating the house, donating time or money to conservation efforts or organizations, and so forth), and environmental attitudes. The sample involved people waiting for flights at the Ontario, California Airport. Participation

in outdoor recreation was correlated with conservation behaviors and with willingness to increase present levels of those behaviors. The type of recreation influenced this relationship; a low-impact, nature-appreciative factor (loaded by canoeing, backpacking, rock climbing, and others) was much more highly related to conservation behavior than a high-impact, consumptive factor (loaded by dirt biking, snowmobiling, hunting, fishing, and other activities). Recreation participation contributed significantly to the prediction of conservation behavior in a stepwise multiple regression analysis above and beyond the effects of six demographic variables.

The results suggest that people not exposed to natural environments through recreation may find it difficult in a largely urban, technologically dependent society to develop a practical notion of ecology that could inspire ecologically responsible behavior. Individuals' adverse impacts on the environment, hidden in the complexity of urban life where things are promptly flushed or whisked away, become clear in natural settings untrammelled by people. Because it takes so little to disrupt a natural setting, people become aware of their own personal impacts. Perhaps this is then translated into attempts to minimize one's impact not only in natural areas but also at home. Exposure to natural environments may thus contribute to development of a sound environmental ethic. It does seem possible, however, that underlying environmental values and attitudes may motivate both conservation behavior and certain types of outdoor recreation participation.

STUDY TWO

Study Two used a questionnaire similar to the one used for Study One but involved a random sample of Missoula, Montana residents. The mail return questionnaire was sent to 480 households; 54 questionnaires were returned as undeliverable. Of the net sample size of 426, 354 were completed and returned for a response rate of 83 percent.

The Montana sample contained many active outdoor recreation participants, more active than the Californians in backpacking, picnicking, motorboating, hunting, fishing, and canoeing. The Californians had higher rates of driving for pleasure--not a surprising finding! The two samples also differed in types and levels of conservation behavior. Montanans were more likely to keep air conditioners on low, recycle cans, insulate their homes, and buy recyclable containers and low-phosphate detergents. Californians, on the other hand, were more likely to join or donate more to conservation groups, write letters on environmental concerns to congressmen and other elected officials, purchase small cars, and cut down on water use.

These differences were probably based partly on lifestyles, climates, and regional availability of energy and recreational opportunities. The California sample was also more highly educated, had higher incomes, and came from cities in greater proportions than the Montana sample.

As in the previous study, a principle component, varimax rotation factor analysis of recreation participation was conducted. Three factors were extracted: the first, loaded by backpacking, canoeing, day hiking, cross-country skiing, rock climbing, and downhill skiing, was labelled active/low-consumptive; the second, loaded by dirt biking, off-road driving, horse-back riding, snowmobiling, and hunting, was labelled active/consumptive; and the third, loaded by picnicking, bird watching, fishing, and gardening, was labelled appreciative/low-consumptive.

A second factor analysis extracted the following four dimensions of ecologically responsible behavior: (1) political--letter-writing, joining or donating more to conservation groups, and participating in cleanup drives; (2) home modification--weatherstripping, insulating one's home, and installing a wood stove and/or solar device; (3) recycling--recycling cans and/or glass; and (4) consumer--buying products in recyclable containers, purchasing low-phosphate detergents, and avoiding products perceived as polluting. This factor analysis suggests that conservation actions occur in clusters of related behaviors that are independent of each other.

The next step involved correlating the factored ecologically responsible behaviors with recreation participation. The results indicated that activities comprising the appreciative/low-consumptive factor have the highest correlation with these behaviors. What is surprising about this result is that participants in active/low-consumptive activities are often the most vocal environmentalists in a community.

STUDY THREE

In Study Three, participants in two winter recreation activities--snowmobiling and nordic skiing--were queried concerning vacation and recreation travel plans and changes in gasoline consumption patterns. The purpose of this study was to examine in more detail possible differences in energy conservation behaviors between participants in the two widely different activities. Knopp and Tyger (1973) have shown how nordic skiers and snowmobilers differ in environmentalist attitudes. Their results in addition to the first two studies discussed here would suggest that nordic skiers would exhibit more energy conservation behavior than snowmobilers.

The nordic skiers included a net sample of 115 names taken from the visitor register at Lolo Pass during winter 1980. Lolo Pass is a popular winter recreation area about 45 miles southwest of Missoula, Montana. A total of 126 snowmobiler names and addresses were randomly selected from the Missoula County snowmobile registration list. Each individual sampled was sent a mail return questionnaire and one follow-up post card reminder. The response rate was 70 percent for nordic skiers and 44 percent for snowmobilers. Such a differential response rate for winter recreationists in Montana has been noted previously (McCool and Curtis 1980).

The results are interesting and somewhat contradictory to Studies One and Two--suggesting that relationships between recreation participation and ecologically responsible behavior may be more complex than first thought. Nordic skiers in this sample tended to report a lifestyle more centered around leisure--and hence more energy consumptive behavior than snowmobilers. For example, skiers took more vacations than snowmobilers. Skiers also tended to travel further on vacations--14 percent of the snowmobilers planned trips of less than 250 miles in 1980 but only 8 percent of the skiers planned such short trips and 7 percent of the snowmobilers were planning trips of 3,000 miles or more but 26 percent of the skiers reported plans for such long-distance vacations.

Both groups indicated similar responses to energy uncertainty with respect to vacation plans: more than 34 percent of the sample indicated that the planned 1980 vacation was shorter in distance than previous vacations. When asked to compare the 1980 vacation with past vacations in terms of number of days, number of destinations, length of stay at each destination, and travel mode, there were no significant differences between the groups. The majority of the sample indicated that these factors would "remain the same."

Both groups were then asked if their use of automobiles for shopping and errands, work or school, and recreation purposes had changed during the last year. Each type of recreationist reported major changes in automobile use. Although there were no differences between groups, 51 percent of the respondents reported reductions in shopping and errand trips. About 42 percent of the nordic skiers reported decreases in automobile use for work or school purposes contrasted to 13 percent of the snowmobilers ($\alpha = 0.001$). Sixty-two percent of the

snowmobilers reduced recreation-related automobile travel compared to less than 40 percent of the nordic skiers ($\alpha = 0.011$). Some of these differences may be attributable to the two different samples--nordic skiers were sampled at a recreation site. Therefore these respondents may be a subset of all skiers that are more likely to travel. However, in an analysis of national data, McCool (1979) reported a greater propensity of mechanized recreationists to reduce travel in light of energy uncertainty.

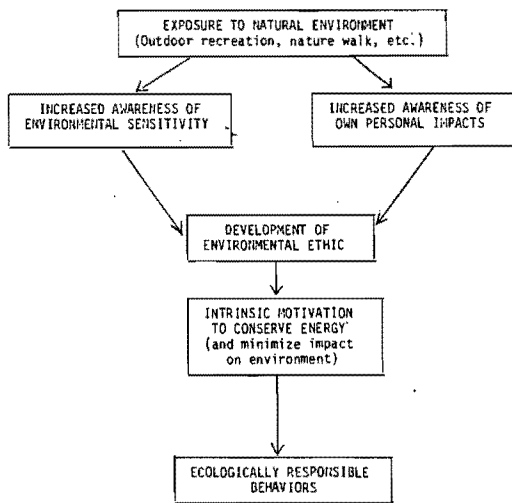
DISCUSSION

Earlier, we suggested that contact with natural environments and the processes evident in them may contribute to development of an environmental ethic. Thus the closer the activity to the land, its intricacies and ecology, the greater the potential for learning. Of course, our data although suggesting associations, do not demonstrate a true cause-effect relation. The studies indicate, however, what direction more powerful investigations should take. The results of Study Two, particularly, pointed out that this relation exists most strongly for the passive/appreciative activities studied. In particular, gardening (with a Pearson's $r = 0.30$) demonstrated the strongest relation with ecologically responsible behavior. Kaplan (1973) has also noted the significance of gardening with respect to understanding natural environments:

"The garden is a miniature, a slice of nature compressed in space and a pattern of information compressed in time. Rarely is so broad a spectrum of nature and natural processes found in so little area. Rarely is so much nature-based action and so full a view of the live cycle so vividly visible...."

After the results of Studies One and Two, we proposed a model to summarize relations between participation in outdoor recreation activities and ecologically responsible behavior (fig. 1). Study Three, however, suggests another variable may be intervening in the process. Based on Study Three, some type of leisure lifestyle factor may interact with conservation behaviors to indicate seemingly contradictory behaviors. For example, in Study Three, respondents were asked to complete a section on attitudes toward the environment. The skier sample had a statistically significant higher score--increased awareness of the environment--than snowmobilers, yet reported greater energy consumptive behavior for vacation plans.

Figure 1.--Preliminary model showing proposed relations between participations in outdoor recreational activities and ecologically responsible behavior.



Light, *et al.* (1979) suggest similarly that higher status individuals (as measured by education and income) show the fewest recreation behavior changes in response to energy problems. Our sample of skiers had a significantly higher level of education than the snowmobilers (we had no measure of income). Thus, what we may be seeing is an interesting interaction--individuals having high socio-economic status pursue their leisure lifestyle while adopting ecologically responsible behaviors at home and work. At the same time, individuals at lower levels of socio-economic status restructure leisure behaviors but maintain traditional patterns of home and work energy consumption. This hypothesis requires more evaluation and testing. If supported, it has major policy implications in an era of energy uncertainty.

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THE ALASKA PUBLIC SURVEY--A COMPREHENSIVE ASSESSMENT OF RECREATIONAL VALUES AND USE PATTERNS
AND NATURAL RESOURCE MANAGEMENT

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Resource managers in all parts of the United States are facing mandates that often conflict. On the one hand, they must develop programs that insure a sustained flow of commodities from a variety of increasingly scarce resources. On the other, they must insure that the programs they develop protect and enhance recreational, aesthetic, and lifestyle values. Comprehensive information on recreational use patterns and aesthetic and lifestyle values is necessary to formulate and evaluate the consequences of alternative management programs.

Information needs on social issues in Alaska are apparent to an even greater degree. Land exchanges under the Alaska Native Claims Settlement Act (Public Law Number 92-203, 1971) and the Alaska National Interest Lands Conservation Act (Public Law Number 96-487, 1980), have resulted in reallocation of millions of acres of public lands. Much of this land (as well as the rest of Alaska) is in a relatively natural condition compared with other places in the United States. As this land changes ownership, new or modified resource management programs follow, resulting in a changing relationship between people, social institutions, and the environment. Perhaps long-range planning in Alaska more than elsewhere, can benefit from a comprehensive, coordinated, and standard information base for forecasting and monitoring outcomes of alternative land use programs.

The current changeable situation in Alaska makes the need for such baseline information a high priority. In this paper, we describe a recent response by agency and university research personnel to fulfill some of these needs.

THE ALASKA PUBLIC SURVEY

Background

The extensiveness of ongoing decision making in Alaska and the need for information planning (outlined above) resulted in several

independent research efforts. These were initiated concurrently by the USDA Forest Service, USDI National Park Service, USDI Bureau of Land Management, and State of Alaska. A great deal of overlap was evident in the independent research interests, and these commonalities pointed to numerous possible benefits of cooperation.

The first benefit was cost: Survey research extensive enough to provide reliable information is expensive, and recreation research funding was limited. Second, a combined approach results in a standard data base badly needed for the comprehensive planning efforts underway in Alaska. Third, a cooperative study could result in baseline data extensive enough to guide future interagency research, planning, and management (unique by national standards). Fourth, the joint study greatly reduced the potential impact on Alaska residents, because they were sampled once (with smaller total sample) rather than four or more times. Finally, the cooperative effort examined the complete social system, cutting across artificial agency boundaries that would have confined independent research efforts.

To realize these benefits and accomplish a holistic understanding of relations between resources, recreation, and livelihood in Alaska, a comprehensive design was created that focused on two major users of these resource systems. The first component, the "Alaska Public Survey" (APS), provides a broad view of residents' interactions with resources in both work and leisure. The second component, the "Alaska Cruiseship Passenger Study," focused on recreational use by major non-resident clientele in southeast Alaska. Both components, though contrasting in methodology and content, provide complementary information that makes up a major overview of use of important resources in Alaska. The studies of Alaska residents and cruiseship passengers provide the basis for extensive analysis of recreation and related human values and natural resource management.

In the following description of methods and selected potential uses of the APS, we emphasize the sections of the survey relating to marine recreation.

Objectives

The objectives reflected the information needs of the participating agencies and guided the development of the survey:

1. Assess the extent and nature of recreational activity and travel patterns in the coastal marine recreation system in southeast and southcentral Alaska.
2. Determine how characteristics of different locations affect the nature and extent of use of sites, shown by the types of activities and perceived attractions at each area.
3. Determine the availability of alternative locations for marine recreation and how closely substitute sites provide the attractions of recreationists' favorite places.
4. Determine the extent of participation by regional residents in a variety of outdoor recreation activities--travel patterns, general location or participation, use of locations administered by different agencies, unfulfilled desires of participants, and constraints on participation.
5. Determine the extent of subsistence hunting and fishing as it contributes to both livelihood and recreational enjoyment.
6. Assess residents' motives for and satisfactions from living in Alaska.
7. Assess responses to National Forest policy issues and attitudes about various forest outputs.
8. Determine how socio-demographic background characteristics are related to attitudes about resources, lifestyle, and recreational activity.

Methodology

The Alaska Public Survey consists of 2,888 interviews with householders in the southeast, south-central and interior regions of Alaska from June through December of 1979. The interviews (comprised of three versions designed to allow many questions) were completed in about 1 hour. A multi-stage cluster sampling design was constructed for each region to select households from which individuals over 18 were randomly chosen to interview. Prior to analysis the data were weighted, based on community sampling fractions, to accurately profile the communities and regions included in the survey. The sampling design and data collection were the primary responsibility of personnel at the Institute of Social and Economic Research, University of Alaska.

Coding of data for keypunching (involving more than 1,000 variables and 25 cards of data per case) was completed by the University of Washington under supervision of employees of the Cooperative Park Studies Unit, College of Forest Resources. A rigid process of review, designed to minimize coding errors, was used. Intensive computer editing of the data was completed before data analysis.

Types of Data Collected

Reflecting the objectives of the survey, two types of information were obtained in the APS. First, data that are typically sought in surveys (preferences, attitudes, activity patterns) were the main focus of the interview. It was organized in the following sections: food gathering activities; salt-water related recreation activities; general (non-marine) recreation activities; state recreation programs and issues; National Forest use, programs, and issues; employment-related concerns; community perceptions; and background characteristics of respondents.

Second, for the marine recreation portion of the survey, specific data related to sites were obtained. Each respondent was asked to indicate on a map actual places visited during the 12 months before the interview. Up to 6 overnight sites and 8 day sites were allowed. Further, respondents were asked to identify the sites they visited most often, as well as their favorite site. The location of these sites has been digitized, allowing analysis of geographical data in relation to other things known about these places (e.g., physical and biological attributes). For each site that respondents identified as their most often visited or favorite place, information was obtained identifying activities engaged in, travel mode, and seasons in which the sites were visited. For favorite sites, the potential consequences of various resource management activities on continued use were also examined.

There are undoubtedly many places used by Alaska residents that were not mentioned. This situation is a particular concern in trying to judge the importance of areas for recreation where sites were not indicated. The fact that an area was not indicated or visited does not mean that it is not used or that it does not have important recreation qualities. Through the analysis we are conducting, attributes associated with favorite recreation sites and various activities will be identified. Then the areas throughout coastal Alaska can be examined to ascertain if they have these qualities. We believe the information about actual sites will be valuable in helping to better understand the relationships between recreation activities,

site qualities, and other resource uses. Some of these data are briefly summarized in the next section.

SELECTED RESULTS RELATED TO RECREATION

Preliminary analysis of the data allows us to make the following generalizations about some recreation activities and issues in southeast and south-central Alaska. The conclusions we draw here are tentative and subject to revision. More intensive analysis is currently underway.

1. Alaska is noted for its wilderness, abundant coastline (particularly in southeastern Alaska), and array of recreational attractions and opportunities. It is not surprising that most people list these reasons for coming to Alaska. Living near water, being close to a wilderness environment, good hunting and fishing, and recreation opportunities were identified by most residents as important reasons for their decision to live in Alaska.

2. Use of public lands by residents is extensive. About a third of all respondents visited one or more National Parks in Alaska during the year preceding the survey, with use much higher in locations close to areas managed by the National Park Service. For example, in Sitka 92 percent had visited Sitka National Historical Park. Most respondents (95 percent in southeast Alaska, 73 percent in south-central) have visited a National Forest in Alaska at some time. While in the National Forests, many types of areas have been used by residents:

Recreation areas used	Southeast	South-central
	Alaska	Alaska
	(Percent)	
Trails	76	42
Picnic sites	74	49
Hunting and fishing areas	63	27
Logging roads for recreation	43	12
Public recreation cabins	41	12

Differences between the two regions reflect, in part, unequal access to the types of opportunities mentioned.

3. Use of flora and fauna for food is a major activity. About three-quarters of all respondents indicated they engaged in food-gathering activities of some kind, with fishing and berry picking the most popular. In light of subsistence versus recreation concerns, the results show that many people classified their favorite foodgathering activity as subsistence or mostly subsistence (30 percent in southeast

Alaska, 19 percent in south-central). To what extent subsistence activities are a part of resident recreation and vice versa is an issue for further analysis.

4. Coastal recreation is a major activity. Slightly less than half the respondents went on an overnight trip to coastal areas the preceding year. Given the relatively more intimate association of southeastern communities with marine environments, it is not surprising that a higher proportion of those residents reportedly engage in marine activities (particularly on day trips) compared with residents in south-central Alaska.

5. The same types of activity patterns occur at places people identify as their "favorite" and "most often visited" places. However, the reasons they give for why a site is favorite differ in subtle but important ways from reasons given for places visited most often. Although the whole range of possible reasons show up for both types of sites, reasons for favorite place are remoteness, and various land characteristics, such as beaches. Reasons given for most often visited place are distinguished by qualities of access, convenience, facilities, and particular activities.

6. A variety of influences would make residents favorite sites less attractive:

Possible influences at favorite site	Southeast	South-central
	Alaska	Alaska
	(Percent indicating less attractive)	
Clearcuts	80	77
New houses or buildings	80	56
New logging	77	67
Mine tailings	77	69
New roads	77	44
Log storage	76	54
More recreationists	73	70
Offshore drilling	72	55
Airplanes and helicopters	45	34
Shipping traffic	43	35
Commercial fishing boats and gear	22	19

But there are also people who do not perceive negative effects, and even some who believe that such changes would make their favorite sites more attractive.

7. Although many people indicate that their favorite sites would be less attractive with certain changes, a smaller percentage indicated they would stop going there if those things occurred. Just what the "threshold of disruption" has to be before people choose not to use a site cannot readily be determined. But for many people it seems that although they may lose the "icing on the cake" if changes occur,

they still will have the cake. Others would find the "cake without the icing" unpalatable. It is the latter group that will be most disenfranchised if appropriate substitutes are not readily available. Further analysis should provide guidance for managers about how to recognize such problems and plan for an equitable resolution in light of the diversity inherent in the use patterns and preferences of residents.

These data and other data not mentioned here point out that planning for and choosing between various types of recreation opportunities in Alaska is not an either/or situation. Although at the political level there has been a polarization of views about use of Alaska's resources (that is, preservation versus development), results from the APS indicate a desire for recreational diversity across a wide range of opportunities and settings, a situation little different from that found in the "lower 48" States (Clark and Stankey 1979).

RELEVANCE OF FINDINGS FOR RESOURCE PLANNING AND MANAGEMENT

Most of the information the APS provides is useful to federal and state agencies and to private land owners in Alaska whose programs may affect recreation opportunities or other values related to lifestyle. The survey data allow comparison of different segments of the population and different geographic regions. As a baseline, assuming proper monitoring, these data will allow the determination of trends and the projection of possible shifts in recreation patterns, jobs, etc., as the population in Alaska changes and as resource management programs are implemented. Some of the specific uses of the APS findings related to recreation are briefly described below.

1. The baseline data will allow resource managers to better determine possible consequences of alternative management strategies and will allow researchers to link results of future studies to a comprehensive data base. Furthermore, because the APS was conducted near the 1980 census, future adjustment can be made to key variables in the survey in conjunction with census updates.

2. The APS data base allows resource managers the opportunity to evaluate the possible effects of resource management and ownership changes on existing recreation sites and activities. Planners and managers will be able to ascertain the consequences of changes on recreationists early in the planning process.

3. Managers of coastal recreation resources can benefit from knowing which types of locations receive greater or less recreational

use, which receive differing types of recreation activities, and which are particularly sensitive to various human-caused impacts. Important characteristics of sites and activities that are related to choices people make about where to recreate will be identified. Geographical areas not included in the survey can then be examined to determine if they have any of these attributes. Managers will then be in a better position to determine locations that might require special management consideration to protect important physical, biological, or social qualities of concern to users.

4. The ability to ascertain place-specific changes caused by resource management actions will allow managers to: predict changes in use patterns and user satisfaction as a result of management; identify reasonable substitutes if and when important sites are destroyed; plan for a range of recreation opportunities (Clark and Stankey 1979) to facilitate residents' recreation choices within reasonable distances from communities; and locate, schedule, and design timber harvest activities (as well as mining, oil development, etc.) with better knowledge of the consequences on recreation settings, activities, and users. The important "favorite" and "most often visited" sites may require special attention, and although effects of resource management on such places are not necessarily bad, having information available makes it possible to mitigate negative and maximize positive effects of multiple use management programs.

5. Much of the information in the APS will be useful in sensitizing managers about recreation issues and areas of concern: facilitating users' choices about where to recreate to fulfill their needs; designing public involvement and information programs that are sensitive to certain uses or issues of local or regional populations; developing visitor profiles (who are the clientele for specific areas? where do they come from and why do they choose one place instead of another?); assessing the relative importance respondents place on foodgathering activities and whether they perceive such use as recreation, subsistence, or a combination of both.

6. The survey results will be useful in planning and management of wilderness (or other special areas). Specifically, the place-specific nature of the study will allow managers to: assess existing uses and users just prior to designation of areas under the Alaska National Interest Lands Conservation Act; ascertain attitudes toward various management issues from area users; determine likely consequences of area designation and proposed actions both within and outside the area, and whatever internal or external influences may

exist or emerge that may affect use of an area. For example, will plans result in displacing certain uses from one location to another?

REPORTS IN PROGRESS

Efforts continue to prepare a variety of reports on specific recreation issues and data from the Alaska Public Survey--an examination of the interrelationship between outer continental shelf oil development and marine recreation; a detailed analysis of the relationship between marine recreation activities and timber management activities; an analysis of the variability of marine recreation activities within communities, agency management areas, and specific geographic regions; a description of recreation activities along the Inside Passage, with special emphasis on how existing recreational uses may be affected by resource extraction activities such as logging and mining; an analysis of recreational use patterns in specific National Monuments or wilderness areas in southeast Alaska; a description of attributes of favorite recreation sites in coastal forests of Alaska including availability of suitable substitutes; and an assessment of site-specific upland and marine recreation activities for the Chugach National Forest and the Kenai National Moose Range.

We would like to encourage our research and management colleagues to contact us about areas of interest related to the survey. This data

base presents an opportunity to conduct comparative analyses where other similar data sets are available. We will be happy to discuss possible studies.

This report is based on the study of residents and resources in southeast, southcentral, and interior Alaska. A comprehensive interagency analysis of recreation quality of life, and related issues. Cooperating agencies are: USDA Forest Service, Alaska Region and Pacific Northwest Forest and Range Experiment Station; USDI Bureau of Land Management, Outer Continental Shelf Office; USDA National Park Service, Pacific Northwest Region and Cooperative Park Studies Unit, University of Washington; State of Alaska, Division of Parks; University of Alaska, Institute of Social and Economic Research; and University of Washington College of Forest Resources.

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THE INFLUENCE OF PLACE ON RECREATION BEHAVIOR: AN ECOLOGICAL PERSPECTIVE

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AN ECOLOGICAL PERSPECTIVE

Recreation behavior is a product of the simultaneous interaction of individual, social, cultural, and environmental variables (Cheek and Burch 1976). Four different but related approaches have been used to examine this interaction. (1) Field developed the concept of leisure settings in which the central hypothesis is that humans differentially define similar recreation places in terms of their particular recreation outing. (2) Clark and Stankey (1979) use the term "opportunities" to describe recreation places in terms of natural, social, and managerial characteristics. These aspects interact to create a spectrum of recreation locations from which people can choose for a particular outing. (3) Driver and Brown (1978) use the term "experiences" and add the psychological element of personal/social benefits. (4) Devall's (1973) approach to settings is as leisure social worlds in which level of specialization in an activity, activity norms, and recreation activities interact to produce unique recreation behaviors.

All four approaches suggest that recreation behavior is based on a system of interrelations between people, recreation activities, and recreation places. This is a distinctly ecological view. An ecological model of human behavior suggests that behavior is a product of interaction between people and their environment where environment and behavior are closely intertwined and where cultural mechanisms mediate the interaction and influence resulting behavior (for an elaboration of this perspective see Altman 1976 and the human ecology literature).

The most intensively studied aspects of the recreation behavior system have been the influence of characteristics of participants and cultural attributes associated with activities on recreation participation. The influence of recreation places generally has been treated broadly or conceptually (Kreimer 1977). The objective of this research effort was to examine the relation between recreation place characteristics and recreation behavior.

RESEARCH QUESTIONS

Every recreation outing consists of people with certain characteristics participating in activities at specific sites. An ecological perspective would predict that as these components of specific outings change, the degree of importance of place characteristics in choosing a recreation site for that outing would change. Specific research questions addressed in this paper are:

1. Is the relative importance of individual place characteristics in choosing a location different for different activities?
2. Is the relative importance of individual place characteristics in choosing a location different for different age groups, sexes, social group types, and repeat/new visitors?

STUDY DESIGN

Data were collected through the use of a telephone interview and follow-up mail questionnaire in northeast Washington. The proportionate random sample based on census subdivisions was computer generated and the initial contact with potential respondents was by telephone (for additional details see McDonough 1980). The telephone interview was brief and consisted primarily of questions about participation in specific outdoor recreation activities during the previous 12 months as well as requesting sociodemographic information.

The telephone interview served as a filter because the mail questionnaire was modular in nature. Respondents received different activity-oriented modules based on their responses during the telephone interview. Telephone interviews were completed with 994 persons. A mail questionnaire was sent within 1 week after the telephone interview, and it solicited more detailed information about the most frequent activities identified in the telephone interview. Respondents were asked to consider specific outings for each activity rather than the general case of participation in that

activity. Of the 994 questionnaires mailed, 656 (66 percent) were returned after 3 reminders were sent. Tests for nonresponse bias were conducted based on information from the telephone interview, and no significant differences appeared to exist between respondents and nonrespondents that would introduce bias into the data.

VARIABLES

The independent variables were activities and participant characteristics and were defined as components of a specific recreation outing based on previous research. Activities were operationalized as the three most frequent activities engaged in during the previous 12 months. Participant characteristics examined were social group type, age, sex, and repeat visitation.

The dependent variable was respondent ratings of the importance of place characteristics in choosing the site for a specific recreation outing. A Likert scale format was used. The set of Likert scale items used here were actually composed of nine sets of subscales dealing with place characteristics: tradition/familiarity, presence of water, degree of management control, proximity to home, degree of solitude, size, presence of other people, perceived vegetation, and facilities.

ANALYSIS

The joint influence of outing components as mediating influences was examined by considering them simultaneously in a multivariate analysis to account for and control interactive effects.

Because recreation outing components were all nominal in nature, they had to be entered into any multivariate analysis as dummy variables. Multiple analysis of variance based on a multiple regression approach that allows for unequal cell sizes was utilized (for additional detail see Nie et al. 1975). Multiple classification analysis was also utilized to generate explained variance. Recreation outing components were only entered into the analysis of variance if the amount of variance explained by the component was 1 percent or greater when considered individually (one-way analysis of variance). A maximum of five components were entered into the analysis for each mean because interpretation of results from analysis with greater than five nominal independent variables becomes problematic. It must be stressed that relative amounts of explained variance are being examined here.

RESULTS

The basic proposition being examined was that the degree of importance of place charac-

teristics in choosing a recreation site changes as the components of a recreation outing change. Results of this analysis indicated that recreation outing components are considered simultaneously (i.e., the effect of outing components on the importance of degree of management control) (table 1). But the amount of variation in importance explained by recreation outings differs with the place characteristic being considered ranging from 22 percent for tradition/familiarity characteristics to 3 percent for facilities characteristics.

The three specific research questions asked whether the importance of place characteristics in choosing a recreation location would change as the activities, participants, and actual location characteristics of specific recreation outings changed. All three questions were answered 'yes'.

Activities had a significant effect on the variation in importance of all place characteristics with the exception of facilities and perceived vegetation (table 2). As the activity component of outings changed, the mean level of importance of place characteristics in choosing a location for the activity changed. For example, the mean level of importance of solitude was greater for outings involving walking and camping and lowest for outings involving power boating.

Participant characteristics also had significant effects on the importance of place characteristics. Social group type had an effect on the importance of management control and facilities (table 3). Age also had a significant effect on the importance of presence of other people, tradition/familiarity, management control, size, and vegetation. Sex had a significant effect on the importance of facilities. Repeat visitation had a significant effect on the importance of tradition/familiarity and proximity.

Table 1.--Amount of variance in the importance of place characteristics explained by all recreation outing components

Place characteristic	Explained variance		
	F		df
Tradition/familiarity	22	22.128	15* ^{1/}
Presence of water	14	9.373	19*
Management control	12	10.671	15*
Proximity	9	6.880	17*
Solitude	8	4.993	19*
Size	8	8.626	14*
Other people	7	5.367	17*
Vegetation	6	3.916	12*
Facilities	3	2.988	16*

^{1/} *Indicates a significant relation.

Table 2.--Variance in the importance of place characteristics explained by activities

Place characteristic	Explained variance		
		F	df
Tradition/familiarity	3	6.830	5* ^{1/}
Presence of water	1	3.156	5*
Management control	3	6.104	5*
Proximity	2	4.5260	5*
Solitude	6	11.913	5*
Size	4	13.061	5*
Other people	2	3.246	5*
Vegetation	<1	.993	3
Facilities	1	2.122	5

^{1/} *Indicates a significant relation.

DISCUSSION AND CONCLUSIONS

This paper demonstrates an attempt to apply an ecological perspective to recreation behavior. Although amounts of explained variance were small, as the components making up particular recreation outings varied so did the degree of importance of place characteristics in choosing a location for that outing. This result seems almost intuitive, but there is a range in the amount of variation in importance explained by the elements of a recreation outing. The mediating influence of individual outing components on importance levels for each place characteristic were not the same when the effects of other components were controlled.

The activity component influenced the importance of seven of the nine place characteristics (all except facilities and vegetation). It was most influential on the importance of solitude and size of the place, which reflects on the differing nature, and hence, requirements of activities. Age of participants influenced five of the nine characteristics, being most influen-

tial in degree of management control. Older persons placed a greater importance on higher levels of management control. Social groups and sex, while influencing several place characteristics, did not account for much explained variance. Repeat visitation, however, strongly influenced the importance of familiarity characteristics of a place. Those who had visited a site before placed a higher importance on a sense of ownership and being familiar with that site when choosing it for another trip. All of these relations have important implications for managing sites to meet visitor needs. Although several social/cultural factors have been identified here as influencing the importance of site characteristics, it is likely that other factors also influence the importance of place characteristics. The results described here support further investigation of these factors.

Although no statistically significant interaction effects were found in the multiple analysis of variance, more detailed examination of adjusted mean deviations suggested that the nature of certain outing components (i.e., older age groups) influenced the importance of several place characteristics. For example, when an outing involved older persons 60 years and older, degree of management control, familiarity with the site, and the presence of similar people become more important in choosing a site. These trends support the ecological framework of the study and suggest a complexity in the way recreation outing components influence choice of recreation locations that needs to be examined further.

One of the recurring problems in recreation research has been the lack of a unifying perspective or framework from which to view recreation behavior. The results of this study suggest that an ecological perspective with its emphasis on human/environment interrelations may provide some direction in this regard.

Table 3.--Variance in the importance of place characteristics explained by participant characteristics in percent

Place characteristics	Social group			Age			Sex			Repeat visitation		
	EV	F	df	EV	F	df	EV	F	df	EV	F	df
Tradition/familiarity				3.2	17.575	2		XX		15	17.761	1
Presence of water								XX			XX	
Management control	1.7	3.646	3	7.8	44.653	2		XX			XX	
Proximity								XX		1.00	13.329	1
Solitude								XX			XX	
Size				2.9	20.50	2		XX			XX	
Other people				3.2	17.174	2		XX			XX	
Vegetation				3.6	14.488	2		XX			XX	
Facilities	1.4	5.424	3					.36	3.991	1		XX

^{1/} XX indicates a nonsignificant relation.

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HOW SATISFYING IS SATISFACTION RESEARCH?
A LOOK AT WHERE WE ARE GOING

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During the past 15 years, outdoor recreation researchers have focused much attention on defining and measuring visitor satisfaction. There is a practical reason for pursuing this line of inquiry. In conjunction with protecting the resource, outdoor recreation managers attempt to provide visitors with a variety of opportunities in a variety of outdoor settings. Researchers are attempting to help managers achieve this formidable goal by providing information on the types of physical resource and social characteristics that influence visitor satisfaction. In doing so, researchers are seeking to identify (1) those characteristics that are the most important for pleasing experiences in various activities and outdoor settings and (2) the types of physical and social characteristics that management practices can influence.

Managerial relevance is not the only criterion for justifying studies of visitor satisfaction. Outdoor recreation is an excellent area in which to investigate the results of interactions between humans and their environment. Because these interactions are prevalent in recreation environments and have significant planning and management implications, it is necessary to study outdoor recreation as a behavioral phenomenon and hence a complex social activity. Visitor satisfaction or dissatisfaction is one manifestation of human/environmental relations. Thus, visitor satisfaction research also is important from a behavioral science standpoint.

A major barrier facing researchers is the lack of consensus concerning the meaning of visitor satisfaction and how it should be studied. Dictionaries underscore this lack of consensus with definitions of satisfaction ranging from "the fulfillment of a need or want" to "the achievement of expectations." Thus, satisfaction is an elusive and difficult concept to define in general, not just in outdoor recreation.

In this paper we illustrate the diversity of meanings by pointing out the various approaches researchers have used to define and measure visitor satisfaction. In addition, we summarize some of the conceptual and methodological

problems that researchers must face. A general conclusion of this paper is that to address some of these conceptual issues, we may first need to define the role that satisfaction plays in outdoor recreation behavior.

A VARIETY OF APPROACHES

Many different techniques, operational definitions, theories, and hypotheses have been used on a wide variety of respondents to assess the psychological processes and determinants of satisfaction (table 1). Empirically derived determinants of satisfaction range from those that managers can influence (beautiful campsite views, absence of crowding, chance for thrills, etc.) to those they cannot (insects, weather, etc.) as well as the underlying dimensions of satisfaction (achievement, power, intellection, etc.).

In some studies researchers test the same theory but operationalize and measure satisfaction in different ways. Replication and other validation studies are noticeably lacking.

How does one begin to bring order out of this chaos and elucidate what this abundance of results means? One way is to examine some of the recurring conceptual and methodological issues and findings.

CONCEPTUAL ISSUES AND FINDINGS

Conceptual models used to study user satisfaction include: (1) discrepancy theory, (2) cognitive dissonance theory, (3) economic theory of marginal utility, (4) satisfaction as a general feeling or as a summation of satisfaction with separate elements in the environment, and (5) social and psychological need fulfillment.

Discrepancy Theory

One of the most frequently tested models in recreation satisfaction research is discrepancy theory, which suggests that expectations about an event heavily influence the amount of satisfaction derived from actual participation in that event (Lawler 1973, Peterson 1974, Roggenbuck and Schreyer 1977). Expectations not

Table 1.--Summary of models, methods, and determinants of recreation satisfaction

Author(s)	Study location and population	Theory/conceptualization tested	Operationalization of satisfaction	Measurement technique(s)	Elements, factors, or dimensions of	
					Satisfaction	Dissatisfaction
1. Stankey, Lucas, and Ream, (1973)	Montana deer and elk hunters	Satisfaction as a sum of separate components	Success is the dominant source of satisfaction, or success is but one of many satisfactions from hunting	Questionnaires mailed to hunters. Open-ended global evaluation of what hunting quality means	Success (game bagged or seen) the most dominant. Also important: opportunity to escape, appeal of the natural environment	
2. Peterson (1974)	Wilderness paddle canoe campers	Discrepancy theory	Total satisfaction a function of perceived degree of presence and desired degree of presence	Interviewed and asked to rate (1) desirability and (2) perceived degree of prevalence of 90 specific conditions	Able to drink from lake, crystal clear lakes and streams, natural noises, mature virgin forests, campsites with view of sunset, portage signs with name of lake and length of portage, canoe rests at convenient intervals on portages, beaver dams and lodges, campsites in big pine groves, permanent fire grates at campsites	Litter, biting insects, vandalized birch trees, motors or other mechanized equipment, poor fishing, initials or names painted on lock or carved in trees, murky or discolored water
3. Dorfman et al. (1976)	Montana Forest Service campground users, psychology students, general population adults	None preconceived due to method used	Satisfaction composed of critical elements	"Critical incident" approach. Open-ended question. Subjects asked to describe highly satisfying and highly dissatisfying camping experience	Participation in other recreational activities, scenery, absence of crowding, enjoying self in outdoors, good weather, wildlife, peace and quiet, rest and relaxation, wilderness, camaraderie, flora	Bad weather, crowding, annoying neighbors, pollution, self in outdoors, good weather, wildlife, insects, absence of conveniences
4. Roggenbuck and Schreyer (1977)	Green and Yampa River users (Dinosaur National Monument)	Discrepancy theory	Satisfaction determined by difference between desired and perceived outcomes	Questionnaire given to users at end of trip. 38-item scale factor analyzed to determine trip motives. Global evaluation of satisfaction	Motives: action/excitement; learning about nature (most important); stress release/solitude	

(Table 1 continued on next page)

Author(s)	Study location and population	Theory/conceptualization tested	Operationalization of satisfaction	Measurement technique(s)	Elements, factors, or dimensions of	
					Satisfaction	Dissatisfaction
5. Becker et al. (1981)	Upper Mississippi river users Lower St. Croix river users	Satisfaction as a sum of separate components	Total satisfaction a function of perceived density and satisfaction with specific elements	Questionnaires distributed at selected sites along rivers. Global evaluation of satisfaction. Ss asked why they no longer visited a previously visited river (open-ended question)		<u>Upper Miss. River:</u> too crowded, too few public beach areas, unsafe boat operation, too few public facilities <u>Lower St. Croix River:</u> water polluted, unsafe swimming, litter and debris, barge traffic
6. Ditton et al. (1981)	Buffalo National River floaters (Arkansas)	Discrepancy theory	Total satisfaction a function of satisfaction with specific elements	Questionnaire administered after river trip. 5-item scale for overall satisfaction as the dependent variable	<u>For overall satisfaction:</u> scenery, chance for thrills, good job done by river managers, chance to escape from demands of life, wild country, river and surroundings in good condition	<u>For overall dissatisfaction:</u> number of people seen, to few rapids
7. Dorfman (1979)	Montana Forest Service campground users, psychology students, general population, adults	Discrepancy theory; satisfaction as a sum of separate components	8 different definitions based on summing various combinations of satisfaction with separate elements, importance ratings, perceptions, preferences, and expectations	On-site interviews. 1-item global evaluation of satisfaction. Also mean ratings of separate satisfactions with 34 elements identified from literature review and Dorfman et al. (1976)	<u>Students:</u> absence of negative conditions (crowding, pollution, bad neighbors, cost, etc.), social-interpersonal relations	<u>All 3 samples:</u> presence of negative conditions
8. Beard and Ragheb (1980)	Students; professional, technical, and skilled employees, retirees	Fulfillment of needs	Degree to which leisure activities satisfy specific needs	59 items rated on 5-point scale measuring how often each statement is true for the individual	6 dimensions upheld: psychological, educational, social, relaxational, physiological, and aesthetic with 4 to 13 items per dimension	

(Table 1 continued on next page)

(Table 1 continued)

Author(s)	Study location and population	Theory/conceptualization tested	Operationalization of satisfaction	Measurement technique(s)	Elements, factors, or dimensions of	
					Satisfaction	Dissatisfaction
9. Manning and Ciali (1980)	Recreationists from 4 Vermont rivers	Cognitive dissonance theory	Overall satisfaction negatively related to user density	Mail-back questionnaire distributed on-site. Global satisfaction evaluation		User density but only when perceived as crowding and as a function of activity, setting, and personal characteristics (expectations and previous experience)
10. Pierce (1980)	Individuals identified via "snowball" method (n=97). Random block cluster sample from San Francisco Bay Area SMSA (n=259)	Fulfillment of needs	Degree to which needs are fulfilled through leisure and work	Final study: 68 items rated on 5-point scale measuring how much needs were fulfilled last time activity was performed	6 strongest dimensions: intimacy, relaxation, achievement, power, time filling, and intellection with 4 to 7 items per dimension	
11. Walsh (1980) and Walsh and Gilliam (1980)	High mountain reservoir and river fishermen (Colorado); wilderness users and developed Forest Service campground users (Colorado)	Economic theory of marginal utility	Beyond some point, congestion negatively affects satisfaction	On-site interviews. Asked subjects amount they would be willing to pay under hypothetical use levels		Number of users encountered beyond some optional level

met result in dissatisfaction (Anderson 1980, Becker *et al.* 1981).

Empirical support for this theory thus far has been weak. Peterson (1974) reasoned that satisfaction depends on the amount of congruence between people's desires and their expectations ("perceived commonness") of site characteristics and managerial practices. After surveying a small sample of paddle canoe-campers in Minnesota's Boundary Waters Canoe Area, Peterson developed a utility function (satisfaction index) that illustrates his reasoning. Yet Peterson strongly warns that the function only exemplifies the methodology and must be validated by using larger sample sizes across various sites and populations. Thus, Peterson's results do not strongly support discrepancy theory.

In another study, Roggenbuck and Schreyer (1977) found that nearly all of the river recreationists in Dinosaur National Monument were highly satisfied regardless of their expectations.

Dorfman (1979) discovered that overall satisfaction depended most upon the individual actually observing conditions that he or she considered most valuable. The second largest influence on satisfaction in the Dorfman study was the difference between people's desires and what they actually observed; the least influential factor was the difference between people's expectations and what they actually observed. Thus, discrepancy theory was the least likely candidate for explaining variations in satisfaction.

These three investigations lead to two conclusions: (1) expectations do play a role in determining satisfaction, and (2) factors other than expectations also are influential in determining recreation satisfaction. Schreyer and Roggenbuck (1978) have attempted to modify discrepancy theory to help explain what this role is. The following papers by Cockrell and McLaughlin, Harris, and Schreyer also attempt to clarify this issue.

Cognitive Dissonance Theory

Because discrepancy theory has thus far received only weak support in accounting for recreation satisfaction, some researchers (Heberlein 1977, Heberlein and Vaske 1977) have suggested cognitive dissonance as an alternative. The argument offered by cognitive dissonance theory is as follows: most people spend much time and money in recreational pursuits that they have freely chosen. To reduce internal conflicts, visitors tend to rate their recreation experience highly even under high density levels ("I spent the money, so I must

like what I'm doing"). In other words, visitors are satisfied in spite of the discrepancy between their expectations of use pressures and what they actually encounter.

However, this theory has been disputed by at least one publication. Manning and Ciali (1980) found little support for cognitive dissonance theory in their study of Vermont river users. They suggest that cognitive dissonance may apply in such places as the Grand Canyon National Park where a float trip on the Colorado River is a one-time-only experience for most users. On Vermont rivers, however, where most people take day trips and invest little, the theory does not hold. Vermont river users did not hesitate to indicate dissatisfaction with increased use levels (Manning and Ciali 1980).

Economic Theory of Marginal Utility

The economic model of satisfaction, or so-called "satisfaction model" (Fisher and Krutilla 1972), has received limited support in the recreation satisfaction literature. Briefly, this model assumes a negative relation between satisfaction and visitation rates (number of users present at a given location and time). At the point where the marginal satisfaction of the next visitor no longer exceeds the decrease in satisfaction of remaining visitors, total satisfaction begins to decrease and social carrying capacity is reached. For examples of how this model is defined and tested, interested readers should review Walsh (1980) and Walsh and Gilliam (1980). The objective of these studies was not to test the satisfaction model *per se*, but to show how calculations of recreation benefits can be biased by the failure to consider congestion.

The predominant finding from studies examining this model is that the correlation between satisfaction and actual user density is weak to non-existent (Shelby and Nielson 1976, Cheek and Burch 1976, Shelby 1976, Heberlein 1977, Manning and Ciali 1980, Becker *et al.* 1981). The cognitive dissonance explanation presented above is one way of accounting for this consistent finding. The normative hypotheses presented by Heberlein (1977) also help explain these weak correlations.

Heberlein's normative explanations distinguish between density and crowding. Crowding is a negative evaluation, not just the number or density of people present (Altman 1975). Thus, the acceptable number and distribution of people in a recreational setting and the behaviors deemed acceptable are normative evaluations. The negative impacts of density (e.g., dissatisfaction) occur only when density is perceived as crowding (Becker *et al.* 1981). Because many recreation satisfaction studies are carried out in low density backcountry areas,

perhaps the high density levels needed for negative evaluations to occur have not yet been reached.

General Feeling or Sum of Separate Components?

One important but unresolved issue concerns the degree to which total satisfaction can be explained in terms of a summation of satisfaction with separate elements in the environment. Like pleasure, satisfaction may be a general feeling that varies significantly from time to time, place to place, and according to user characteristics (moods, age, experience, etc.). There is empirical and intuitive evidence that certain groups of recreationists have no prior expectations about how satisfied they will be with an experience or that they have expectations that change as they gather more information (Cheek and Burch 1976; Heberlein 1977; Schreyer, p.154 in this report). As Miller(1976) notes, the consumer's standard is being adjusted even while measurement is taking place.

This sliding scale and other measurement problems confound the researcher's ability to assess satisfaction. For example, Dorfman (1979) obtained different results when using a single item measure of overall satisfaction instead of a summation of satisfaction with separate components. However, this difference could be the result of a measurement artifact that may be overcome by using a multiple-item scale for the dependent variable (Ditton *et al.* 1981). Using a multiple-item scale, Ditton *et al.* found weak support for the hypothesis that overall satisfaction is a function of specific components. However, the low amount of variance explained suggests that their models or measurement techniques need improvement.

Research reported in this section by Harris clarifies some of the more salient attributes of satisfaction. Nonetheless, the general feeling versus sum of components issue is far from resolved. Furthermore, even if satisfaction is defined as an overall feeling, managers still need to be aware of the specific components that recreationists believe are necessary for quality experiences. This information enables managers to know which important variables they can manipulate and which they cannot. These findings also help identify those components that might become sources of satisfaction or dissatisfaction if their amounts are varied by management practices (Peterson 1974).

Need Fulfillment

Researchers pursuing this line of inquiry are interested in determining the extent to which leisure activities in general fulfill cer-

tain social and psychological needs (Beard and Ragheb 1980, Pierce 1980). They factor-analyze or cluster need statements into several broad categories of satisfactions that leisure pursuits provide. Standardized scales that result from such analyses may be particularly useful in the area of leisure counseling (Pierce 1980). Managers also benefit from these findings by becoming aware of the needs that users expect to be fulfilled (e.g., "I prefer leisure activities in which I am among others in a group."). Both the dimensions identified and the scales developed need further testing, replication, and other methods of validation.

Discussion

As outdoor recreation researchers, we often look to other disciplines for help in solving conceptual problems. Thus, researchers investigating recreation satisfaction have borrowed from such related areas of inquiry as economics (Walsh 1980) and job satisfaction (Roggenbuck and Schreyer 1977). As the preceding discussion has suggested, however, the results obtained by using concepts and methods from these related fields have been mixed. Another section of this report (p. 89), underscores the potential contributions of marketing and consumer research to an understanding of the recreationist's decisionmaking process. To explain more fully the psychological processes involved in evaluating what constitutes a satisfying recreation experience, perhaps we should begin to place more emphasis on using concepts and methods derived from marketing and consumer satisfaction research (Locker and Dunt 1978, Miller 1976).

The lack of a theory or model(s) of outdoor recreation satisfaction is another possible reason for the conceptual problems. Without such a model(s) it is difficult to set the parameters of the research problem and thereby specify the appropriate variables to measure. Furthermore, it may be extremely difficult and inefficient to develop such theory without first having some idea of the role that satisfaction plays in outdoor recreation. Thus, some researchers have expressed the need for and have found evidence supporting an "ecological approach" to outdoor recreation (see McDonough's paper in this report, p.120). The basic premise of the ecological approach is that outdoor recreation behavior is based on a system of interactions among people, recreation activities, and recreation environments (McDonough 1980).

Recreation satisfaction research is concerned with explaining variations in levels of satisfaction with different outdoor recreation opportunities (e.g., whitewater rafting). According to the ecological approach, each opportunity is made up of three types of

factors: (1) site characteristics, (2) managerial actions, and (3) individual, social, and cultural characteristics of users. As these factors change, so does the opportunity and ultimately the experience itself. The ecological approach provides a paradigm that allows researchers to account for variations in levels of satisfaction as the factors that make up the recreation opportunity change.

This approach is taken by many of the studies previously reviewed and by all of the authors of the papers in this section. The major advantage of tying these studies to an ecological paradigm, however, is that we likely will find that many of the factors that influence recreation satisfaction also influence other outdoor recreation behaviors such as choice of place, choice of activity, landscape preference, and vandalism. And, future research designs related to such a paradigm may help specify some of the key variables to measure and hence allow needed comparisons of results across studies. The ultimate result of such research would be not only a model of satisfaction but also an organized theory of outdoor recreation in general.

METHODOLOGICAL CONCERNS

To assess satisfaction, researchers must contend with several important methodological issues. The following issues represent some of the most crucial concerns.

We realize that some of these methodological issues depend on the manner in which recreation satisfaction is conceptualized. Our dichotomy is for organizational purposes only and is not intended to imply that concepts and methods should be considered separately.

Miller (1976) suggests that researchers should look at differences in evaluations of an event immediately after the event (on-site) and sometime later (e.g., mail-back questionnaire). If dissonance theory holds, negative evaluations should be more acute immediately after the event than at some future date when recreationists have had the opportunity to reduce dissonance by enhancing the characteristics of the chosen alternative. A study of wilderness visitors by Peterson and Lime (1973) revealed that attitude differences exist between visitors interviewed in the wilderness and the same people contacted later by mail questionnaire at home. Because there is evidence that people's norms or expectations are fluid and changeable, the issue of timing is particularly important. The paper in this section by Harris (p.160) addresses this issue by using a pre-trip/post-trip research design.

Open-ended or Structured Instruments?

In their review of consumer satisfaction literature, Locker and Dunt (1978) emphasize that consumers themselves should define their own priorities and criteria for satisfaction. This is an important issue because independent variables predetermined by researchers and managers may not be the most salient from a visitor viewpoint. Lime (1976), Soloman and Hansen (1972), and Dorfman *et al.* (1976) illustrate this concept in a recreational setting by asking recreationists for behavioral descriptions of highly satisfying and highly dissatisfying outings. The results of such open-ended surveys can be used to develop more structured instruments (Ditton *et al.* 1981, Dorfman 1979).

Single Item or Multiple Item Scale?

Ditton *et al.* (1981) found that when the wording in a single item satisfaction scale is changed, there are differences in the independent variables that recreationists view as important to total satisfaction. They conclude that a multiple-item scale is an improved measurement device, especially if satisfaction is thought of as a general disposition. The findings of Dorfman (1979) support this conclusion.

Replication and Validation Studies Needed

As mentioned earlier, there have been very few attempts at replicating methodologies in recreation satisfaction research. Such replication studies are needed because there is some evidence that the amount of explained variance in total satisfaction differs according to the operational definition and measurement procedure used (Dorfman 1979). One byproduct of replication studies is a standard measurement scale of visitor satisfaction. Such a scale is needed for comparisons across studies (Locker and Dunt 1978). Some progress has been made in developing standardized scales that measure satisfaction with river recreation opportunities (Schomaker and Knopf 1982) and satisfaction with leisure activities in general (Beard and Ragheb 1980), but more work is needed in this area.

Questionnaire context

Schomaker and Knopf (1982), using a multiple-item satisfaction scale, found evidence supporting the hypothesis that various questionnaire contexts lead to various ratings of satisfaction even when the same scale is used. Thus, to compare results across studies, not only must the same scale be used, but the same questionnaire as well. If the study purpose is to

measure satisfaction for only one river, for example, questionnaire context effects are probably too small to cause alarm. But, if the purpose is to detect differences across environments over time, using the same scale in different contexts probably would yield misleading results. Interpretation of those results could lead to conclusions concerning differences between rivers or changes in time, when differences are really a measurement artifact.

Do Respondents Play Games?

Dorfman (1979) notes that respondents often are inconsistent in saying there should be more of a particular component of the recreation setting present even if they rate highly the amount that is present. This type of bargaining or gaming strategy also has been observed in consumer satisfaction research (Miller 1976) and studies using the willingness-to-pay (contingent valuation) procedure (Dwyer *et al.* 1977). To measure expectations, merely asking a respondent what ought to be provided may stimulate a bargaining response. The respondent tries to outguess the study purpose and protect his or her own position. Possible solutions to this potentially large source of bias include using more complex research designs (Campbell and Stanley 1963), putting the respondents in a realistic decisionmaking framework simulating the actual situation (Dwyer *et al.* 1977, Miller 1976), and making the respondent aware of the range of substitute sites and recreation activities available (Dwyer *et al.* 1977).

Understanding the Relationship Between Visitor Density/Encounters and Satisfaction

Much research has explored the relations of visitor density and satisfaction. How much of what kind of visitor use can an area sustain before the quality of the experience is significantly impaired? How do various aspects of visitor use influence satisfaction?

Products of such research provide many different answers depending on types of settings studied and methodologies employed. Studies in designated wilderness and other dispersed recreation environments, for example, have found direct relations between visitor satisfaction and actual or perceived densities of use (Lucas 1964, Stankey 1973, Lime 1977, Becker 1978, Schreyer and Roggenbuck 1978, Ditton *et al.* 1981). On the other hand, research conducted in seemingly less wildland settings have found very little correlation between satisfaction and user densities (Nielsen and Shelby 1977, Heberlein and Vaske 1977). But, in most of this research, aggregate or overall trip satisfaction was the dependent variable.

These results have indicated, however, that the types of encounters and specific behaviors associated with encounters often are of even more significance in explaining how recreation use affects satisfaction. It also is recognized that the interrelations of satisfaction and use densities are complicated by visitor preferences, experience, and expectations. Clearly, further research is needed to crystallize the nature of personal and group norms associated with encounters/visitor density, not only for specific activities in various environmental settings but among activities as well.

At least one methodological problem exists in studying relations between visitor density/encounters and satisfaction. The manner in which users are asked to evaluate use density levels probably has a strong influence on the type of user density/satisfaction relation derived. Manning and Cialli (1980), for instance, present evidence to support this contention. When users were asked to respond to hypothetical use levels, negative relations between density and satisfaction were revealed, similar to those found by Stankey (1973) and Walsh (1980). However, when users were asked to respond to actual numbers of encounters, no relations or slightly positive relations were found. Conversely, studies of wilderness canoe campers in Minnesota revealed strongly negative correlations between actual encounters and satisfaction (Stankey *et al.* 1976, Lime 1977). Canoeists were not responding to aggregate or trip satisfaction, but rather to daily encounters on individual lakes. Titre and Mills (p.146 in this section) explore this issue and suggest that instead of asking users to report actual encounters only, researchers should also ask them to evaluate specific behaviors or types of encounters.

CONCLUSIONS

Research on visitor satisfaction is an important area of scientific inquiry. Intuitively, satisfaction and dissatisfaction are affected by the entire range of management and planning procedures, from establishing appropriate management objectives to implementing maintenance standards.

Nonetheless, there has been a noticeable lack of consistency in operational definitions and methods used to measure recreation satisfaction. Many serious conceptual and methodological problems remain to be solved. The papers in this section address these problems by underscoring the need to continually question our concepts and methods.

Perhaps now is the time to begin using the contributions of other disciplines (marketing, consumer satisfaction, etc.) to help solve some of our conceptual and measurement problems. An equally important need is to begin seeking answers to some very fundamental questions. For example, is it time to step back and ask what purpose recreation satisfaction research serves? If we are truly interested in applied research, should we not be asking how our results can benefit managers and planners? In this line of research, should we even be interested in studying satisfaction as a general feeling. Instead, should we not concentrate on exploring attributes of settings and how these attributes affect people's behaviors in social groups? If the answer is "yes", is it not time for hypothesis testing, theory building, and less emphasis on trying to measure something that can never be measured completely? How does visitor satisfaction fit into the whole phenomenon we call outdoor recreation behavior? Is an ecological approach the appropriate paradigm for studying outdoor recreation behavior and, as a manifestation of that behavior, visitor satisfaction? These issues must be addressed if we are to help practitioners and other decisionmakers, not confuse or alienate them.

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ASSESSING RECREATIONAL SATISFACTION AMONG DIVERSE PARTICIPANT GROUPS

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Recreational satisfaction has been an important but elusive research topic during recent years. This paper examines current understanding of the satisfaction concept and attempts to extend this understanding by identifying diverse satisfaction patterns among groups of participants in the single activity of river floating.

Studies in a variety of settings have consistently found that recreationists are generally well satisfied with their recreational experiences (USDI, 1979). This, however, has not diminished the need to identify the mechanisms of satisfaction and what variables contribute to it (Schreyer 1979, Heberlein 1977). Most existing treatments of satisfaction in outdoor activities revolve around discrepancy theory (Lawler 1973) and converge on the following explanation. Participants engage in recreational activities with the expectation of obtaining certain rewards (Driver and Tocher 1970). Further, most people engage in recreation to satisfy multiple expectations (Schreyer and Roggenbuck 1978). In evaluating their experience, they compare the outcome they received with the rewards they expected or wanted to receive. Overall satisfaction in any situation, then, refers to the degree to which the actual experience agrees with each expected reward (Peterson 1974).

Previous research has provided some support for this approach but has left some questions unanswered. Peterson (1974), for example, developed procedures for measuring the "relative congruence" between people's aspirations and their perceived actual experiences, but he also raised two important questions for further consideration: (1) how adequately can satisfaction be explained in terms of separable and identifiable components? and (2) how meaningful are the results when used to describe the average responses of a group?

Considering the first question, studies to date have typically left most of the variance in overall satisfaction unexplained by potential predictor variables. Shelby (1980) and Ditton *et al.* (1981) explained 37 percent and 39 percent of the variance in overall satisfaction, respectively, from a combination of social, personal, and situational variables. Ditton *et al.* (1981) showed that explanation improved when

a multiple-item scale was used to measure overall satisfaction, but 61 percent of the variance still remained unexplained.

Peterson's (1974) second question may provide a clue to the incomplete explanation of satisfaction. Predictive models in each of the previous studies were developed for aggregate samples of recreationists. Because many authors have suggested that satisfaction means different things to different people, we can hypothesize that explanation of satisfaction will be enhanced by identifying and formulating separate predictive models for more homogeneous groups of recreationists. This hypothesis is consistent with recent research demonstrating wide diversity in "types" of participants within single recreation activities (Bryan 1979, Haas *et al.* 1980). Further, Tryon and Bailey (1970) and Hautaluoma and Brown (1978) show that "types" within activities are more effective than the aggregate population for predicting recreationist's characteristics or attitudes.

This paper examines satisfaction among river floaters at Buffalo National River (Arkansas). The thesis of this paper is that individual float trip satisfaction should be better predicted for homogeneous subgroups of floaters than for the entire population. Types of floaters are identified on the basis of similar patterns of outcomes or rewards sought through the float trip experience. For each type derived, a predictive model is developed explaining overall satisfaction from a set of independent variables.

METHODS

Data were obtained through a survey of Buffalo National River (BNR) floaters conducted during the summer of 1979. Eleven 3-day interview periods were selected between May 15 and August 15. Each day of the week was uniformly covered during the 3-month interview period. Upon completion of the river trip, one member from each float group sampled (n=805) was asked to complete a questionnaire. Each respondent answered questions designed to measure both overall satisfaction (I thoroughly enjoyed the trip) and satisfaction with specific aspects (I wish there had been more rapids) of his, or her, river float trip. Satisfaction statements were

derived from a 14-item satisfaction scale developed by the River Recreation Research Project of the North Central Forest Experiment Station for use in their 1979 National River Recreation Study. A 5-item overall satisfaction scale, composed of statements selected from the 14 items used in the National River Recreation Study, was used as the dependent variable in this study (see table 1 for actual scale statements). These five items were combined into a summated rating scale with a reliability (Cronbach alpha) of 0.70 (see Ditton *et al.* 1981 for more details concerning development of this scale).

Data Analysis

Following previous studies that have identified subgroups of recreationists within an activity (Hautaluoma and Brown 1978, Haas *et al.* 1980), commonalities in outcomes sought from the recreation experience provided the basis for identifying subgroups. A hierarchical cluster analytic procedure (Rohlf *et al.* 1972) was used to group floaters according to similarities in the importance they attached to eight outcomes sought from the river trip. The eight outcomes were selected as representative of various "domains" (e.g., relationships with nature, in-

group relations, risk taking) from a larger group of outcomes developed by Driver (1977) and his associates (e.g., Driver and Cooksey 1977). The importance of these outcomes was measured on a 5-point response format ranging from (1) strongly disagree to (5) strongly agree.

To group respondents with the clustering procedure used in this study, it was necessary to reduce the number of respondents to stay within program capabilities. Thus, we drew a systematic random sample of the 805 Buffalo National River respondents to yield 202 cases for use in meeting the objectives of this study.

One way analysis of variance was conducted to examine differences between subgroups of floaters for each of the eight psychological outcomes. The Student-Newman-Keuls multiple range test was used to determine which subgroup means were significantly different ($p < 0.05$). Thus a posteriori test was used instead of other similar tests because of its exactness when group sizes are unequal (Nie *et al.* 1975).

To understand how well overall float trip satisfaction could be explained in terms of its identifiable components, multiple regression was used with the overall satisfaction scale value

Table 1--Psychological outcome means and results of oneway ANOVAS and Student-Newman-Keuls multiple comparison tests for seven subgroups of Buffalo National River floaters

Psychological outcome ^{1/}	Aggregate Sample (n=202)	Subgroups of floaters ^{2/}							Maximum Difference	ANOVA F VALUE
		G1 (n=30)	G2 (n=42)	G3 (n=25)	G4 (n=31)	G5 (n=26)	G6 (n=33)	G7 (n=15)		
To be close to nature	4.2	3.6 ^a	4.6 ^c	4.0 ^{ab}	4.3 ^{bc}	4.2 ^{bc}	4.2 ^{bc}	4.7 ^c	1.1	6.65*
To get away from other people	3.4	4.1 ^d	4.0 ^d	4.0 ^d	3.5 ^{cd}	2.2 ^a	2.7 ^b	3.0 ^{bc}	1.9	19.86*
To have thrills and excitement	4.0	4.1 ^b	4.0 ^b	4.1 ^b	3.3 ^a	4.4 ^b	4.3 ^b	3.0 ^a	1.4	10.29*
To have a change from daily routine	4.3	4.5 ^{bc}	4.7 ^c	4.0 ^b	3.5 ^a	4.5 ^{bc}	4.4 ^{bc}	4.5 ^{bc}	1.1	11.86*
To be with friends	4.0	4.3 ^{bcd}	2.8 ^a	4.1 ^{bc}	3.9 ^b	4.4 ^{cd}	4.5 ^{cd}	4.8 ^d	2.0	31.47*
To learn more about things here	3.8	3.3 ^a	3.9 ^b	3.7 ^{ab}	3.9 ^b	3.8 ^b	4.1 ^b	3.7 ^b	.8	3.41*
To keep physically fit	3.6	3.7 ^{bc}	3.6 ^{bc}	4.1 ^c	3.5 ^b	4.0 ^{bc}	2.8 ^a	3.3 ^{ab}	1.3	8.15*
To test my abilities	3.4	2.9 ^{ab}	3.5 ^c	4.0 ^d	3.7 ^{cd}	4.1 ^d	2.5 ^a	3.3 ^{bc}	1.6	14.87*
Satisfaction scale mean ^{3/}	3.9	3.8	4.0	4.0	3.8	4.2	4.0	3.8	.4	1.99ns

^{1/}Response format ranges from (1) strongly disagree to (5) strongly agree that, "I took this river trip because I wanted...."

^{2/}Means with similar superscripts are not significantly different at the 0.05 level.

^{3/}Scale items included: I thoroughly enjoyed the trip; I cannot imagine a better river trip; the river trip was well worth the money I spent to take it; I do not want to run any more rivers like this one; and I was disappointed with some aspects of my trip.

* $p < 0.01$

as the dependent variable. The independent variable item pool consisted of: (1) statements concerning satisfaction with specific elements of the float trip; (2) statements concerning how well the river trip fulfilled the respondents' expectations; and (3) situational variables. The selection of these potential independent variables as indicators of satisfaction follows the discrepancy theory approach outlined earlier. Separate stepwise regressions were run for the aggregate sample and for each subgroup of floaters. The regressions identified elements of the river trip that contributed to overall satisfaction and the extent to which overall satisfaction could be explained for each subgroup.

RESULTS

Responses to the eight psychological outcomes were used to cluster river floaters. The most important outcomes when averaged over the entire sample were to have a change from the daily routine and to be close to nature, followed closely by to have thrills and excitement and to be with friends (table 1). The cluster analysis identified seven groups of floaters whose members' response patterns were similar to each other but different from the other groups. For each of the psychological outcomes, significant differences ($p < 0.01$) were found between some of the groups. The greatest differences between group means occurred for the items to be with my friends and to get away from other people. All but one of the outcomes, to learn more about things here, had maximum mean differences greater than 1.0, a large difference given the 5-point response format.

Close inspection of the cluster analysis reveals the unique aspects of each floater subgroup (table 1). Group 1 expressed the strongest desire to get away from other people but was the least concerned with getting close to nature and learning. Group 2 also attached high importance to escaping other people but differed from Group 1 in its high value for getting close to nature and its exceptionally low value for being with friends. Group 3 represents a third group seeking to get away from other people but also attached above-average importance to keeping physically fit and testing abilities. Thus, the first three groups were all escape oriented but differed in the other outcomes they sought. Group 1 perhaps sought escape among friends while Group 2 expressed strong interest in escaping and getting close to nature alone and Group 3 sought escape from people but wanted a physical challenge.

Group 4 was unique in its low ratings for thrills and excitement and change from the daily routine. Group 5 expressed very little concern for getting away from other people. This group also gave comparatively high ratings for keeping physically fit and testing abilities and was above average on thrills and excitement and being with friends. Group 5 might be described as seeking challenge and thrills in a crowd. Group 6 gave high ratings for learning and being with friends and was the least concerned with physical fitness and testing abilities. Group 7 rated to be with friends higher than any other group and as its top-rated outcome. This group also gave the highest rating for getting close to nature and the lowest rating for thrills and excitement.

Each of the seven groups sought a somewhat different type of float trip experience. Although individual outcomes were typically important to more than one group, the package of outcomes sought was unique for each group. On the other hand, the overall satisfaction reported by the seven groups was not significantly different (table 1). Overall satisfaction ranged from a low of 3.8 to a high of 4.2 on a 5-point response scale. Apparently, Buffalo National River floaters seeking diverse types of experience were equally well satisfied.

We used regression analyses to identify the variables that are useful in predicting overall satisfaction levels. For the aggregate sample, eight variables accounted for 46 percent of the variance in overall satisfaction (table 2). Pleasure with the scenery and fulfillment of the desire for thrills and excitement were the most important contributors to the regression model for the entire sample.

Regression results for the seven subgroups show an increased extent of explanation and some diverse patterns of contributing variables. Coefficients of determination (R^2) for the subgroups ranged from 0.52 to 0.82, higher in all cases than for the aggregate sample (0.46). Consistent with the aggregate sample, the scenery variable made a significant contribution for five of the seven groups. No other single independent variable was significant for more than two of the groups. In four of the groups, variables not included in the aggregate model were found to significantly contribute to the explanation of overall satisfaction.

Regression results for Group 1 were most similar to the aggregate model. Scenery and fulfillment of thrills were the most important variance in both models. However, for Group 1, half as many variables accounted for more of the variable (82 percent) when compared to the aggregate model.

Table 2.--Significant^{1/} standardized regression coefficients and summary statistics for regressions on overall trip satisfaction

Independent variable	Aggregate	Subgroups of floaters						
	Sample (n=202)	G1 (n=30)	G2 (n=42)	G3 (n=25)	G4 (n=31)	G5 (n=26)	G6 (n=33)	G7 (n=15)
Specific satisfaction statements ^{2/}	0.42	0.66	0.44		0.97		0.52	0.39
I was very pleased with the scenery								
I was pleased by the job being done by river managers	.16			.55				
The number of people I saw on the river bothered me	-.16				-.49			
The river went through some wild country	.13	.30				.23		
I did not see the types of wildlife I had hoped to				-.30				
How did the number of people you saw affect your overall enjoyment ^{3/}	.12							
Motive fulfillment items ^{4/}								
Opportunity to have thrills and excitement	.21	.33					.37	
Opportunity to get away from people	-.14	-.19					-.38	
Opportunity to develop skills and abilities	.11			.35				
Opportunity to share what I have learned with others			.35					
Opportunity to get away from the usual demands of life					-.42	.41		
Opportunity to test my abilities					.24	.75		
Opportunity to experience peace and solitude						-.34		.96
Opportunity to think about my personal values								-.55
Situational variables								
Reported number of canoes passing respondent			.35					
Coefficient of Determination (R ²)	.46	.82	.52	.58	.74	.71	.54	.80
Overall Equation F Value ^a	20.12	26.46	8.86	15.18	18.78	11.40	10.85	14.97

^{1/} p < .01

^{2/} Response format ranges from strongly disagree (1) to strongly agree (5).

^{3/} Response format ranges from greatly reduced (1) to greatly increased (7).

^{4/} Response format ranges from terrible (1) to excellent (6).

Group 2 was perhaps the most divergent in terms of the variables that explained satisfaction and the level of explanation. Consistent with this group's interest in being close to nature (table 1), the opportunity to see wildlife contributed uniquely to satisfaction for Group 2. The other two significant variables (sharing learning with others and number of canoes passed) are more puzzling in view of the desire within this group to get away from other people. Only 52 percent of the variance in satisfaction was explained for Group 2.

For Group 3, two variables accounted for 58 percent of the variance in satisfaction. The contribution of the opportunity to develop skills and abilities is consistent with this group's above-average desire to keep physically fit and test abilities.

Scenery was very important in the regression model for Group 4. The negative coefficient for escaping the usual demands of life underscores the low importance attached to this outcome by this group. Seventy-four percent of the variance in overall satisfaction was explained for Group 4.

For Group 5, fulfillment of the opportunity to test abilities and get away from usual demands were most important. The negative coefficient for peace and solitude seems surprising, but this group was unique in its lack of concern for getting away from other people.

Regression results for Group 6 are similar to those for Group 1 and the aggregate sample. Scenery, the opportunity for thrills, and a negative coefficient for the opportunity to get away from people accounted for 54 percent of the variance in overall satisfaction.

For Group 7, 80 percent of the variance was explained by three variables. The most important contribution was made by fulfillment of the opportunity to experience peace and solitude.

DISCUSSION

In a previous paper (Ditton et al. 1981), we showed that predictive models of satisfaction improved if measurement of overall satisfaction more accurately reflected a full range in satisfaction levels. This paper reports additional improvements in the explanation of overall satisfaction. Returning to Peterson's (1974) research questions, results of the study support discrepancy theory by suggesting that satisfaction can be explained to a high degree by examining separable components of the experience. However, models developed for aggregate samples of participants may be ineffective because they "average out" important diversity inherent among such populations. Different people achieve similar levels of satisfaction for different reasons. This paper shows that this diversity can be organized and used to identify major variables that contribute to satisfaction for different groups or types of participants.

The results need to be considered simultaneously. For several groups, the resultant predictive models made more sense when the unique packages of outcomes sought by the groups were taken into consideration. The significance of developing skills and abilities for Group 3, for example, was consistent with this group's desire to achieve this outcome. In other cases, certain regression coefficients were more paradoxical, as in the model for the strongly escape-oriented Group 2 predicting higher satisfaction when higher numbers of passing canoes were reported. Several reasons could account for unexpected findings of this type. Sample sizes for subgroups were small and some of the independent variables were moderately intercorrelated. Both of these factors could produce unstable regression coefficients. Consequently the regression coefficients should be interpreted with caution and replicate studies should be conducted to verify these results.

From a management standpoint, results tend to confirm the idea that satisfaction means different things to different people. But the findings also provide the type of information that can help managers provide recreation opportunities consistent with the types of experience people are seeking. The particular package of outcomes sought by the various groups coupled with the sizes of the groups could provide useful inputs for park communications about the types of experiences available as well as for decisions regarding the level of development or services to be provided in any particular area.

Further research should continue to examine various subgroups of participants within recreational activities. The cluster analysis approach used in this paper is only one means for deriving homogeneous groups or types of recreationists. Future efforts might examine other means of identifying groups, such as the conceptual typology suggested by Bryan (1979). Usefulness of the results may be greatest if the groups identified are recognizable or correspond to some managerial criterion such as length of stay or frequency of participation.

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SOCIAL INFLUENCES ON WILD RIVER RECREATIONISTS

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Efforts to influence the behavior of outdoor recreationists are part of the daily responsibilities of most recreation managers. Whether it be through distributing an interpretive brochure or making a personal contact at a launch site, most wild-river managers assume that the information or message they provide influences visitor behavior. Often, considerable care goes into designing effective messages.

Managers currently base the design of messages on intuitive estimates of users' receptivity to social influence because the role of management messages in the larger pattern of motivations of a recreationist is not well understood. Knowing recreationists' receptivity to influence could lead to more influential messages for specific groups. However, determining a recreationist's susceptibility to management influence is a difficult task involving many complex questions. How may social influence be quantified? Are some recreationists more susceptible than others? What determines how susceptible a given person may be? What are the sources and forms of social influence on recreationists and when does influence occur? This paper presents the results of an exploratory effort to define and characterize the social group influences on individuals who float wild rivers.

Many of these questions echo longstanding debates in social psychology and recreation behavior. Sociologists studying recreation have acknowledged the social nature of most recreation experiences for many years (Etzkorn 1964, Burch 1969). Crandall (1979) reviewed a large selection of empirical studies that documented social interaction as a significant motivator of leisure participation. Most sociologists go farther, however, claiming that the social group is the fundamental unit for analysis of leisure behavior (Cheek 1971). Cheek and Burch (1976), for example, saw leisure as a primary social institution for reaffirming social bonds. Individual preferences for certain aspects of leisure experiences were seen as expressions of group norms. More recent research (Christensen 1980, Dottavio *et al.* 1980) has further clarified the concept of the social group and refined its use somewhat in predicting recreation behavior.

In reviewing current research issues, however, Dottavio *et al.* (1980) pointed to the need for more work examining power structures, leadership patterns, communication linkages, and friendship networks within groups. Individual recreationists are often simultaneously influenced by a number of significant others and social groups--both participant and nonparticipant reference groups. Social group theorists rarely concede such multiple influences, perhaps because they have seldom studied the mechanics of social influence. At some level an individual human organism must receive information from a social group, process it, and utilize it before we may say he has been influenced by the group. When the individual is viewed as the fundamental unit of analysis, the simultaneous (and sometimes conflicting) influences of, for example, family, river trip companions, and river managers can be more easily seen.

The difficulty of sorting out social influences is illustrated in a comparison of studies by Lee (1972) and Aveni (1976). Lee (1972) found that recreation behavior in remote outdoor places was characterized by norms imported from nonparticipant upper middle class reference groups. On the other hand, Aveni (1976) found autocross racers' respect for other participants to correlate more highly with measures of the participant norms for driving ability and commitment to the activity than with such nonparticipant norms as occupation, education, or income. Some recreation behaviors thus appear to be influenced by the immediate participant reference groups while other behaviors reflect the norms of important nonparticipant groups. Finally, some behaviors may not reflect strong social influences at all but may be largely determined by more internalized or individual motivations such as the expected and desired outcomes proposed by Driver and Knopf (1977).

A THEORETICAL FRAMEWORK

Martin Fishbein's (1963) behavioral prediction model provides a concise theoretical framework for assessing social influences on recreation behaviors. The model proposes that a person's intention (and ultimately, his behavior) is determined by his attitude toward the behavior and his subjective norm about the

behavior. Attitude and norms, in turn, are seen as partially determined by beliefs about outcomes of the behavior. Social influences may affect the variables of this model in three distinct ways.

First, social influence may affect belief formation. Fishbein and Ajzen (1975, p. 132) defined three types of personal beliefs: descriptive, inferential, and informational beliefs. A descriptive belief is a perceived link between two aspects of an individual's world based on direct observation of that link. An inferential belief establishes a perceived link using previously learned relationships or logic. An informational belief establishes the link based on information provided by an outside source. If, for example, a recreationist formed a belief about a river trip being dangerous based on information provided by managers, he would hold an informational belief. If this belief then influenced his decision to run the river, his behavior would be socially influenced.

Second, social influence may act through the content of beliefs. That is, some expected outcomes appear to be social in nature. For example, a river runner may believe that his proposed river trip will result in close friendships with his companions, introduction into a prestigious group of river runners, and an opportunity to observe other parties on the river more closely. If the person finds these expected outcomes to be desirable and is thereby motivated to participate in the proposed trip, his behavior would be socially influenced.

Third, social influence can be direct. A recreationist may run a river because someone important to him thinks he should. The social norm component of the Fishbein model provides a means for looking at this influence. Two variables, normative beliefs and motivation to comply, make up the social norm component. Normative beliefs are the person's perceived expectations of specific referents concerning the proposed behavior (Fishbein and Ajzen 1975, p. 302). Motivation to comply is the person's general motivation to comply with a particular referent's demands. When normative beliefs and motivation to comply strongly influence intentions, social influence on behavior is clearly present.

Because managers can closely control the information they provide, the greatest opportunity for managers to influence recreation behavior is through the first of the above processes, the development of informational beliefs. Our study first attempted to identify recreationists who might be more receptive to management information. Subjects listing informational belief sources for both of their two

most important belief sources were therefore categorized as an informational belief group. The informational belief group was compared with the descriptive/inferential belief group on the two additional forms of social influence identified through the Fishbein model and on a number of descriptive variables.

METHODS

Data collection for the study occurred in two stages. In stage 1, 87 randomly selected permittees using the Middle Fork of the Salmon River in 1978 were contacted by telephone. The telephone interviews elicited open-ended responses to questions concerning expected and desired outcomes of trips, reference groups considered in choosing a river, and information sources consulted. The data collection procedures recommended by Dillman (1978) were followed, and no significant differences were found between interviewers. Responses were then conceptually grouped by independent judges, and one item reflecting the most common wording of responses in a particular group was selected. Desired outcomes, referents, and information sources elicited in stage 1 constituted the close-ended stimuli used in stage 2.

Subjects

The sample for stage 2 consisted of 425 1979 river runners from four Northwest wild rivers. The study rivers were the Upper Selway, the Middle Fork of the Salmon, the Main Salmon from Corn Creek to Riggins, and the Snake in Hell's Canyon. Of the 425 subjects 328 were private party members whose names and addresses appeared on river permits and were made available to us by the USDA Forest Service river managers. The other 97 subjects were commercial trip passengers whose names and addresses were obtained from reservations made with licensed outfitters operating on the rivers. The private trip sample constituted a 15-percent probability sample for the 1979 population of 5,690. The commercial sample was not large enough to assure accurate representation of the population of 10,839 commercial river runners.

Procedures

A stage 2 mail questionnaire was designed using the precise wording of questions specified by Fishbein and Ajzen (1975). Overall format, organization, and length conformed to the guidelines of Dillman's (1978) Total Design Method. The questionnaire was pretested with 19 river runners at Hell's Canyon Dam. Questionnaires were mailed to subjects approximately 3 weeks before their launch dates, and two follow-up mailings were employed. Return rates for private and commercial subsamples on the four separate rivers ranged from 0 percent

to 67 percent with an overall return rate of 48 percent. Only six names of commercial passengers on the Selway were obtained, and none of their questionnaires were returned. Nonresponse bias was evaluated through telephone interviews with 95 stage 2 nonrespondents. No significant differences were found between respondents and nonrespondents in river running experience, number of previous recreation studies participated in, expected and desired outcomes, or trip satisfaction. The low response rate was attributed to incorrect mailing addresses on permit lists, cancelled trips of nonrespondents, and questionnaires received after trips had been completed. A complete description of data collection procedures is provided by Cockrell (1981).

Variables

By having subjects respond to two questions, we were able to categorize their beliefs as descriptive, inferential, or informational. The first question asked:

How did you learn about the rivers you chose among for this particular trip?
(Circle the number of each source used.)

This question was followed by the list of sources elicited in the stage 1 telephone interviews. The list included a descriptive belief source ("previous experience on the river"), two inferential belief sources ("previous experience with other activities in the same area" and "previous experience on other similar rivers"), and 12 informational belief sources. The second question asked:

Which of the information sources that you circled above was most influential when selecting among your first, second, and third choice rivers?

Subjects then identified first, second, and third most influential sources for each of their three choice rivers.

To assess social influence on the content of beliefs, respondents were asked to rate the desirability of 25 outcomes that had been elicited in the stage 1 interviews. Desirability was measured using a 7-point bipolar scale ranging from "extremely desirable" to "extremely undesirable." Subjects responded to the question: Generally, for river trips, how desirable or undesirable is each of the following items?

To assess the direct influence of social norms, normative beliefs were measured as the subject's perception of his referents' attitudes toward his upcoming trip. Subjects were asked:

Below are listed some people mentioned by river runners as having had some influence on their selection of trips. How would each of the following people feel

about your participation in a trip on the (e.g.) Middle Fork?

Subjects rated 12 referents identified as important in the stage 1 interviews on a 7-point bipolar scale ranging from "extremely enthusiastic" to "extremely unenthusiastic."

Motivation to comply was measured by asking: How important is it in choosing a river to run to do things that each of the following people would like?

The same 12 referents used to measure normative beliefs were again rated on a 7-point bipolar scale ranging from "extremely important" to "extremely important no to."

Additional variables measured in stage 2 included roles in the planned river trip (i.e. trip leader, boatman, passenger), previous experience in river running, and preferred means of exchanging ideas between users and managers.

RESULTS

The informational belief group contained 284 of the subjects (67 percent). "Friends, family and working companions" was the most frequently mentioned source of expectations for this group, followed by "other river runners you know," "river running books," and "magazines and newspapers" in that order. Subjects listing previous experience or inference processes for at least one of the two most important belief sources were put in the descriptive/inferential belief group. "Previous experience on the river" was the most frequently mentioned source for this group, followed by "other river runners you know," "previous experience with other activities in the same area," and "friends, family and working companions." Social influences on beliefs were thus important even for subjects in the descriptive/inferential belief group, as we defined the categories.

The informational belief group contained significantly smaller proportions of subjects reporting to be trip leaders and boatmen, and a significantly larger proportion of commercial customers (table 1). In addition, the informational belief group was significantly less experienced. Thus, for our sample, novice river runners with less leadership responsibility relied more on socially provided information than experienced river runners did.

Median desirability ratings for 12 modal salient trip outcomes are summarized in table 2. Because of space limitations, only outcomes dealing with social interaction are compared. Although 11 of the 12 social outcomes were rated as more desirable by the informational belief group, only two differences achieved significance at $p < .05$. For 13 nonsocial outcomes, none of the differences between groups were

Table 1.--Descriptive characteristics of two social influence groups

Characteristic	Informational belief group	Descriptive/Inferential belief group
Trip leaders	14.2%	38.0% ^{1/}
Boatmen	36.7%	59.0% ^{1/}
Passangers	39.5%	36.1%
Kayakers	1.5%	3.6%
Commercial passengers	30.1%	14.5% ^{1/}
Mean number of previous river trips	12.7	25.7 ^{2/}

^{1/}Chi-square significant at $\alpha = 0.05$.
^{2/}T-test significant at $\alpha = 0.05$.

significant. In general, those whose beliefs about trip outcomes were derived from socially provided information did not rate social outcomes as significantly more desirable. Moreover most of the trip outcomes leading to social contacts received median ratings of undesirable by both groups.

Only one perceived norm differed significantly between the informational and descriptive/inferential groups, and no significant differences in motivation to comply occurred (table 3). Motivations to comply with family and working companions were among the lowest ratings in spite of the frequent mention

of "friends, family, and working companions" as important information sources for both groups. Aside from "society in general," Forest Service officials were perceived to hold lower norms about subjects' trips than any other referents.

Finally, the frequency of mention of various techniques for communication between managers and users was almost identical for the two groups. The three most frequently mentioned techniques for both groups were "through surveys such as this," "talking with Forest Service rangers while using this river," and "writing to the Forest Service."

DISCUSSION

The principal conclusion from these data is that river runners who are most likely to be influenced by socially provided information are those who are inexperienced. Social norms and social comparisons have also been found to be more influential for inexperienced subjects in other settings (Devries and Ajzen 1971, Brickman and Bulman 1977). It is not surprising that an additional type of social influence, socially provided information, would be more influential for the inexperienced.

While the informational belief group was significantly different from the descriptive/inferential belief group in river running experience, the two groups did not differ in their desire for social outcomes, their perceptions of norms, or their motivation to comply with referents. When the influence of

Table 2.--Desirability of trip outcomes for two social influence groups

Desired trip outcomes (median scores ^{1/})	Informational belief group	Descriptive/Inferential belief group
Camping near other parties who enjoy different things than you	-1.94	-1.91
Doing something you can tell your friends about	1.11	.77 ^{2/}
Experiencing solitude	2.25	2.19
Doing something that most people don't get to do	1.37	1.03
Camping near other parties who enjoy the same things you do	- .17	- .43
Seeing other boats make it through the rapids	.92	.80
Seeing brightly colored gear	- .10	-.23 ^{2/}
Hearing manmade noise	-2.52	-2.59
Talking to other parties on the river	.43	.31
Observing other parties on the river	- .38	- .39
Having time to be completely alone	2.08	2.07
Seeing evidence of previous visitors	-2.72	-2.73

^{1/}Desirability scores ranged from -3 to +3.
^{2/}Mann-Whitney U test significant at $p \leq 0.05$.

Table 3.--Perceived norms and motivation to comply for two social influence groups

Referents	Perceived norms of referents (median score ^{1/})		Motivation to comply with referents (median scores ^{1/})	
	Informational belief group	Descriptive/ inferential belief group	Informational belief group	Descriptive/ Inferential belief group
Other members of my party	2.54	2.71 ^{2/}	2.03	2.12
Seasoned river runners that I know	2.40	2.43	1.11	1.08
Other river runners on the river but not in my party	.67	.60	.83	.67
People I know who would like to run rivers but haven't tried it yet	2.15	2.11	.39	.39
The Forest Service officials who manage the river	.42	.42	1.23	1.04
My parents	1.05	1.00	.26	.24
My children	1.70	1.84	.36	.60
My spouse	1.92	2.09	1.25	1.66
Other family members	1.57	1.55	.32	.46
Me, myself	2.82	2.82	2.77	2.83
Society, in general	.39	.28	.13	.10

^{1/}Perceived norms and motivation to comply scores ranged from -3 to +3.

^{2/}Mann-Whitney U test significant at $p \leq 0.05$.

social information is strong, there is no indication in this data that other types of social influence will also be strong.

The prominence of "other river runners you know" as a belief source for the informational belief group and their strong motivation to comply with "other members of my party" may indicate that novices look to more experienced river runners for information and thus develop similar desires and norms. Similar responses to desired outcome scales in the two groups may reflect strong reaffirmation of participant group norms. Such norms may disapprove of most social outcomes (e.g. "hearing manmade noise"), but approve of certain specific others (e.g. "seeing other boats make it through the rapids"). Thus, a strong normative structure may be active in this social group, but it may not be evident simply through measures of desired outcomes.

Indeed, the importance of other river runners as belief sources and referents was strong for the descriptive/inferential group as well. It appears that as a river runner gains experience the primary reliance on nonparticipant reference groups (e.g. "friends, family, and working companions") shifts to reliance on personal experience as a belief source. The secondary influence of participant referents, however, remains strong and constant as experience increases. The consistent influence

of participant referents in this study supports the views of Cheek (1971) and Aveni (1976) that the participant group is an important source of definition for the recreation experience. Support offered by our study is important because the individual was the basic unit of analysis rather than the social group.

Finally, while 67 percent of the total sample listed socially provided information as the two most important influences on beliefs, only 17 percent used Forest Service information at all. Information provided by river managers and designed to bring expectations in line with available river trip experiences and management philosophies could probably play a much larger role in assisting recreationists than it presently plays. Forest Service officials were also perceived as holding less positive attitudes toward river runners' impending trips than other referents. Janis and Hovland (1959) suggested that communications will be more effective when the source is perceived as holding a positive attitude toward the receiver. River managers might enhance the effectiveness of communications by exhibiting a positive "host" attitude toward visitors. This study has suggested that communications somehow channeled through the existing networks of river recreationists might be highly effective. Informal discussions with organized user groups, an informal periodic newsletter, or notes in outfitters' brochures are examples of potentially effective channels.

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EFFECT OF ENCOUNTERS ON PERCEIVED CROWDING AND SATISFACTION

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River recreation settings have provided field locations for empirically testing the relations between density, crowding, and satisfaction. Expected increases in river recreation use in the next 10 years (Brown 1977) have prompted managers to begin to collect the data needed to determine recreation carrying capacities (Chilman *et al.* 1981). However, failure to document a strong relation between density and satisfaction has raised serious doubts about the adequacy of the satisfaction model for setting use level limits to maintain recreation quality (Ditton *et al.* 1981, Heberlein 1977, Lee 1977, Manning and Ciali 1980, Shelby 1980, Wagar 1974). Absher (1979) suggested that variables such as prior expectations for number of people encountered and perceptions of inappropriate behavior by others may intervene to elaborate the simple bivariate model. McDonald and Hammitt (1981) conceptualized such an elaborated model in the following linear form: Density, visual encounters, perceived crowding, user satisfaction.

It is important to recognize that in this model density is not synonymous with perceived crowding. Density is the number of people per unit of space whereas crowding is a subjective reaction to that condition (Altman 1975). Furthermore, density is a necessary condition for crowding to occur; however it is not by itself a sufficient cause to produce the experience of crowding (Schaeffer and Patterson 1980). Depending on the type of interaction, the physical setting, and other factors, social density may elicit a positive or negative emotional state (Patterson 1977).

Measurement of interaction has presented difficult problems for river recreation researchers. Colvin and Shelby (1979) found that users only recall about one-half of their encounters with other parties. Thus, instead of asking respondents to recall how many other floaters they saw, in our study we operationalized interaction as a "never to very often" scaled item to measure the intensity of visual and physical types of encounters with other floaters. These are defined as measures of perceived frequency of contacts. Each of these types of encounters or contacts was divided into three separate user contact evaluations: (1)

negative contacts that disrupt the floating experience, (2) positive contacts that enhance the experience, and (3) neutral contacts that neither add to nor detract from the experience. Measuring these three separate components for both visual and physical encounters provided the basis for comparing the effects of encounters on user perceptions of crowding and overall trip satisfaction.

The idea of taking encounters into consideration in crowding and satisfaction models is not new. It has been suggested that the behavior of persons in wilderness settings might be more significant for determining the impact of use on experience than such things as total use (Hendee *et al.* 1978). Lucas (1964) found that the type of craft encountered by paddle canoeists in the Boundary Waters Canoe Area made a difference in the degree to which these encounters detracted from the experience. Driver and Bassett (1975) found that fishermen on the Au Sable River in Michigan objected to seeing canoeists, but this was due to the canoeists' inconsiderate behavior rather than their numbers. Shelby (1981) found that users' perceptions of appropriate encounter levels differed for different river settings and for differently defined types of experiences. Heberlein and Vaske (1977) studied floaters on the Bois Brule River in Wisconsin and found that reported contacts explained 33 percent of the variance in perceived crowding. Use level (density) only accounted for 11 percent of the variance (Heberlein and Vaske 1977). They also found that satisfaction was not related to density. Despite weak empirical support for these relations, West (1981) cautions against discarding social carrying capacity measures and suggests greater care in analyzing the results. This may require information on specific types of encounters at certain locations that can affect floater experiences and possibly explain variation in perceptions of crowding and satisfaction.

Individual behavior is guided by some perception of control over the events that will lead to desired outcomes that have value to the individual (Bandura 1977). These outcomes may in turn be differentially affected by types of encounters under certain density level conditions.

Floating down a river may be regarded as performing a task for the goal-seeking river user. Craft mobility and river confinement force visual and physical interaction as more users are added to the same linear space. Under experimental conditions, Klein and Harris (1979) found that high density settings may disrupt task performance depending on how people anticipate the social density conditions. Heller *et al.* (1977) report that under high density, high physical interaction conditions, greater "goal block-ing" interferes with an individual's information processing capacity. Jacob and Schreyer (1980) define conflict as "goal interference attributed to another's behavior". They further specify social contact as a necessary condition for conflict to occur. Therefore, certain kinds of contacts with other crafts while floating may interrupt the goal-oriented individual. Behavior of others that inhibits goal facilitation could then be considered a source of perceived crowding which could in turn diminish overall satisfaction with the floating experience.

The present study hypothesized that no strong direct relation would be found between perceived frequency of contacts and crowding or satisfaction, but that intervening visual and physical contact variables would be differentially associated with crowding and satisfaction. It was expected that the more disruptive to their goal floaters found visual or physical encounters to be, the more crowded they would perceive conditions, and the less satisfied they would be with their overall floating experience. It was also expected that the more encounters enhanced the floating experience, the less crowded and more satisfied floaters would feel. No relations with crowding or satisfaction were expected for encounters that floaters rated as neither adding to nor detracting from their experience. The effects of disruptive and enhancing encounters on crowding and satisfaction were expected to be stronger for high density river conditions than for low density conditions. This was tested by including floaters from both the low use density Upper Guadalupe River and the high use density Lower Guadalupe River.

STUDY SITE

The Guadalupe River in south-central Texas provided an ideal field setting for study of crowding components and their effects on recreational river floaters' experience. The Guadalupe is divided into floatable upper and lower sections by Canyon Lake reservoir. Both sections of the river have similar stretches of rapids and slow water, but they differ in other respects. The lower section extends approximately 22 miles downstream from the reservoir, has noticeable development by homeowners and con-

cessionaires, and receives high spring and summer use. The floatable upper section of the Guadalupe extends approximately 40 miles upstream from the reservoir, is minimally affected by development, and has much lower average use than the lower section of the river. Old growth cypress trees and limestone cliffs constitute the principal scenic features on both sections of the river.

METHODS

A questionnaire survey of canoeists and kayakers was carried out on the upper and lower sections of the Guadalupe River during the spring of 1981. A total of 315 respondents were given a self-administered questionnaire at 3 principal takeout points on 6 weekend days selected between May 9 and June 8. All weekend days in this period were to be sampled but four were omitted due to abnormally high water and flooding conditions. Only weekend days were sampled because weekday use was judged to be minimal. All canoeists and kayakers leaving the river at a takeout point on a given sampling day were asked to fill out the questionnaire. The response rate was 82 percent.

On a five-item scale (fig. 1, part A), users were first asked how often they encountered floaters in tubes, kayaks, rubber rafts, and canoes. Making physical contact and slowing down or speeding up to avoid physical contact constituted a measure of perceived frequency of physical contacts ($\alpha = .85$). The responses were summed vertically to yield a score for each frequency of contact, resulting in the column score. Subsequently, the column scores were added horizontally to yield a total physical contact score. A floater's total score could range from a minimum of 0 to a maximum of 32.

A similar five-item scale was included in the questionnaire for perceived frequency of visual contacts ($\alpha = .90$), by asking how often respondents had been within talking distance of each of the four types of crafts when floating in slow water and when approaching the rapids. Observer counts of total numbers of floaters on the upper and lower river on sampling days provided evidence for validity of the two perceived frequency of contacts measures and also confirmed expected density differences between these two river sections. Average physical and visual perceived frequency of contact scores were both much lower on the upper section where the number of floaters per day ranged from 125 to 183, than on the lower section where the number of floaters per day ranged from 1,633 to 3,116.

Then users were asked to indicate how encounters with other floaters affected their enjoyment of the trip (fig. 1)--added to

IN THIS SECTION WE WOULD LIKE TO KNOW HOW CERTAIN EXPERIENCES AFFECTED YOUR ENJOYMENT OF THIS TRIP.

In Part A), please mark the box that best describes your encounters with floaters in tubes, kayaks, rubber rafts, and canoes. Then go straight across to part B), and mark the box that best describes how that experience affected your enjoyment.

A) While your canoe was going through the average rapids, did it make physical contact with?

	never	seldom	occasionally	often	very often
a tube(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
a kayak(s)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a rubber raft(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a canoe(s)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Did you slow down or speed up in order to avoid physical contact with:

	never	seldom	occasionally	often	very often
a tube(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
a kayak(s)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a rubber raft(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a canoe(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	(0)	(1)	(2)	(3)	(4)

Column Scores:
0 2 2 6 4=14

B) Did making physical contact?

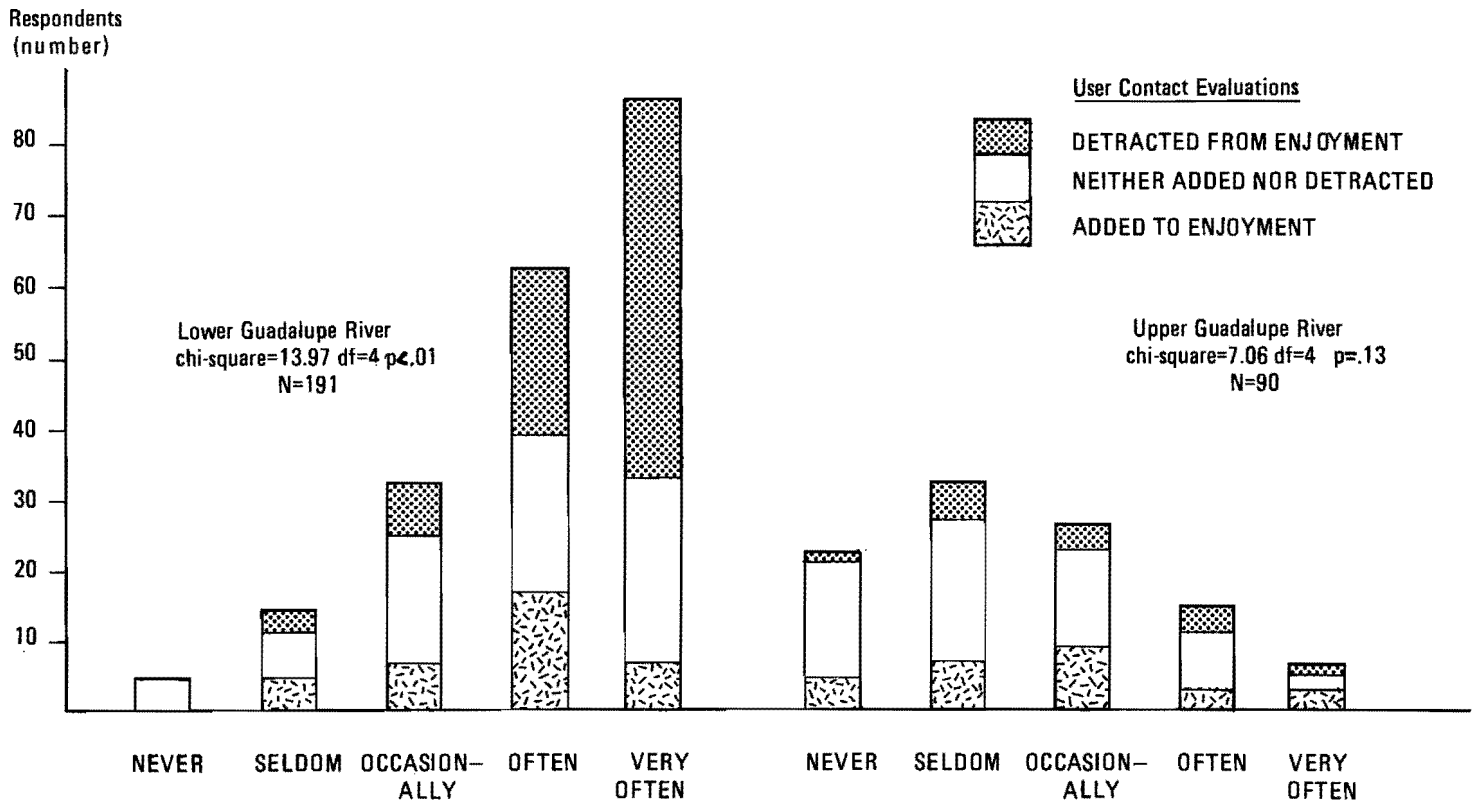
	add to your enjoyment	neither added nor detracted	detract from your enjoyment
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Did slowing down or speeding up?

	add to your enjoyment	neither added nor detracted	detract from your enjoyment
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Column Count:
3 2 3

Figure 1: An example of completed questionnaire measures.



Response to: While approaching the rapids, how often were you within talking distance of tubes?

Figure 2.--Comparison between floaters on the Upper and Lower Guadalupe River of different perceived frequencies of contacts and user evaluations of those contacts.

enjoyment, neither added nor detracted, or detracted from enjoyment. These responses were used to construct three different types of physical contact indices by summing down each of the three response columns. The number of checks in the "add to your enjoyment" column constituted a measure of experience-enhancing contacts, the "neither added nor detracted" column was used to measure the number of neutral contacts, and the "detract from your enjoyment" column was used to measure the number of disruptive contacts for each respondent. A floaters column count could range from a minimum of 0 to a maximum of 8.

One-way analysis of variance was used to test for differences in means for perceived frequency of contact scores and mean scores of each of the three contact evaluation measures for different categories of perceived crowding and users' overall trip satisfaction. Perceived crowding was measured using a scaled seven-point response format to the question: How did the number of people you saw affect the overall enjoyment of your float trip? Overall trip satisfaction was measured using a scaled five-point response format to the question: Overall, how would you rate this trip on the Guadalupe River today? Response categories for the crowding and satisfaction variable were each collapsed into three groups for the analysis of variance procedures.

RESULTS

The results of the analysis of variance between perceived frequency of contacts and both perceived crowding and overall trip satisfaction showed no statistically significant differences for satisfaction (table 1). For perceived crowding, significant differences were found for the high use Lower Guadalupe River, but not for

the low use upper section of the river. The mean visual encounters score for lower Guadalupe floaters was significantly higher for those users classified as crowded than for the neutral or not crowded categories. The mean physical encounters score for lower section floaters was lower for crowding-neutral respondents than for those classified as crowded, though not significantly lower than for the not crowded classification.

These results indicate that perceived frequency of visual contacts are only associated with perceived crowding under very high use conditions such as those on the Lower Guadalupe River. Other findings indicate that the same may be true for relations between perceived frequency of contacts and user evaluations of those contacts for some types of crafts and conditions. A statistically significant relation (for the Lower Guadalupe River sample) was found between respondents' perceived frequency of visual contacts with tubers and their evaluation of those contacts made when approaching the rapids (fig. 2). The number of disruptive contacts appears to increase in direct proportion to increasing levels of perceived frequency for these visual contacts. In contrast, no association existed between these variables for the Upper Guadalupe River.

Disruptive Contacts

Of the three types of user evaluations of visual and physical encounters with others, the disruptive contacts measure predicted perceived crowding most consistently. For both visual and physical contacts with others and on both sections of the river, those users classified as crowded had significantly higher mean numbers of disruptive contacts than did the crowding-neutral or not crowded users (table 2).

Table 1.--Mean scores for perceived frequency of visual and physical contacts for different categories of perceived crowding and overall trip satisfaction of floaters on the upper and lower sections of the Guadalupe River.

Perceived contact	Crowding perceptions ^{1/}			Overall trip satisfaction ^{1/}		
	Crowded	Neutral	Not crowded	Fair/ good	Very good	Excellent/ perfect
Visual						
High density (N=185)	19.5a	17.3b	17.0b	(N=177) 18.8a	18.4a	18.8a
Low density (N= 94)	12.5a	10.2a	11.1a	(N= 91) 10.6a	12.0a	11.3a
Physical						
High density (N=192)	13.9a	10.6b	12.6ab	(N=184) 13.4a	12.9a	12.5a
Low density (N= 97)	6.0a	4.3a	5.4a	(N= 94) 6.6a	5.2a	4.6a

^{1/}Means with different letters are significantly different across each of the 3 categories for crowding perceptions and overall trip satisfaction. ($p < 0.05$), as determined by a one-way analysis of variance and Duncan's multiple range test.

Table 2.—Mean numbers of disruptive, experience-enhancing, and experience-neutral types of visual and physical contacts for different categories of perceived crowding and overall trip satisfaction of floaters using upper and lower sections of the Guadalupe River.

Perceived contact		DISRUPTIVE			Overall trip satisfaction ^{1/}			
		Crowding perceptions			Fair/ good	Very good	Excellent/ perfect	
		Crowded	Neutral	Not crowded				
Visual								
Lower Guadalupe River	(N=205)	3.5 ^a	0.9 ^b	0.6 ^b	(N=197)	3.1 ^a	2.8 ^a	1.3 ^b
Upper Guadalupe River	(N=108)	1.9 ^a	0.3 ^b	0.1 ^b	(N=103)	0.6 ^a	0.7 ^a	0.5 ^a
Physical								
Lower Guadalupe River	(N=205)	4.2 ^a	1.4 ^b	1.4 ^b	(N=197)	3.7 ^a	3.2 ^{ab}	2.3 ^b
Upper Guadalupe River	(N=108)	2.1 ^a	0.4 ^b	0.2 ^b	(N=103)	1.2 ^a	1.0 ^a	0.5 ^a
EXPERIENCE-ENHANCING								
Visual								
Lower Guadalupe River	(N=205)	0.9 ^a	1.6 ^a	2.9 ^b	(N=197)	1.1 ^a	1.3 ^a	1.9 ^a
Upper Guadalupe River	(N=108)	0.8 ^a	1.7 ^a	3.2 ^b	(N=103)	1.5 ^a	2.1 ^a	2.1 ^a
Physical								
Lower Guadalupe River	(N=205)	0.2 ^a	0.6 ^b	0.7 ^b	(N=197)	0.2 ^a	0.5 ^a	0.5 ^a
Upper Guadalupe River	(N=108)	0.6 ^a	0.4 ^a	0.9 ^a	(N=103)	0.8 ^a	0.3 ^a	0.7 ^a
EXPERIENCE-NEUTRAL								
Visual								
Lower Guadalupe River	(N=205)	3.5 ^a	4.6 ^b	3.3 ^a	(N=197)	3.4 ^a	3.8 ^{ab}	5.3 ^b
Upper Guadalupe River	(N=108)	4.6 ^a	4.8 ^a	3.6 ^a	(N=103)	4.2 ^a	4.5 ^a	4.9 ^a
Physical								
Lower Guadalupe River	(N=205)	3.0 ^a	5.1 ^b	5.0 ^b	(N=197)	3.4 ^a	4.3 ^{ab}	5.6 ^b
Upper Guadalupe River	(N=108)	4.3 ^a	5.8 ^a	5.5 ^a	(N=103)	5.8 ^a	5.0 ^a	6.0 ^a

^{1/}Means with different letters are significantly different across each of the 3 categories for crowding perceptions and overall trip satisfaction, ($p < 0.05$), as determined by a one-way analysis of variance and Duncan's multiple range test.

Disruptive contacts was also associated with user satisfaction, but only for physical encounters and only on the high use Lower Guadalupe River. Lower river floaters classified as having fair to good overall trip satisfaction had a significantly higher mean number of disruptive contacts than floaters whose overall trip satisfactions were excellent or perfect. Mean number of disruptive contacts for floaters in the "very good" satisfaction class did not significantly differ from means for floaters in either of the other two satisfaction classifications.

Experience-Enhancing Contacts

Expected relations were not found between the visual and physical forms of experience-enhancing contacts and overall satisfaction on either section of the river (table 2). Visual experience-enhancing contacts did consistently predict perceived crowding on both sections of the river. Upper and Lower Guadalupe floaters classified as not crowded had a significantly higher mean number of disruptive contacts than floaters classified as crowded or crowding-neutral.

The physical measure of experience-enhancing contacts was also associated with perceived crowding on the Lower Guadalupe. Floaters classified as crowded had a lower mean number of

these contacts than either crowded or crowding-neutral floaters. No significant association with perceived crowding was found for floaters on the Upper Guadalupe.

Experience-Neutral Contacts

Contrary to what was expected, associations were found between both visual and physical measures of experience-neutral contacts and the perceived crowding and overall trip satisfaction variables. The associations were for the high use lower section of the river in all cases. No associations were found for the upper river sample.

The most consistent associations were with the satisfaction variable. The mean number of "experience neutral" contacts for lower river users classified as having either excellent or perfect overall trip satisfaction was significantly higher than for those with only fair to good trip satisfaction. Mean numbers of visual and physical contacts for those in the "very good" satisfaction classification did not differ significantly from means in either of the other two satisfaction classifications.

The physical measure of experience-neutral contacts was associated with perceived crowding in the same direction as with satisfaction.

Lower river floaters who were not crowded or crowding-neutral had significantly higher mean numbers of experience-neutral contacts with others than floaters who were classified as crowded. In contrast, the visual measure of experience-neutral contacts was apparently related to crowding perceptions in a curvilinear manner. Floaters who were classified as crowding-neutral had a higher mean number of these types of contacts than both those who felt crowded and those who did not.

DISCUSSION

Our results provide evidence that in addition to density it is important to consider the different types of encounters that occur among river users when attempting to predict their perceptions of crowding or overall satisfaction. Consistent with the results of many previous field studies on social carrying capacity, we found no relation between our perceived frequency of contacts measure and satisfaction. And, although relations were found between perceived frequency of contacts and perceptions of crowding, they were only found for floaters on the high use lower section of the river and were not meaningfully consistent for visual and physical forms of the perceived frequency of contact measure.

By contrast, the three intervening types of user evaluations of visual and physical contacts with others produced better results. They were each differentially associated with either perceived crowding and/or user satisfactions, though not exactly as hypothesized. Disruptive contacts seems to be the best of the three measures for predicting crowding perceptions--it consistently discriminated crowded floaters from other river users for visual as well as physical contacts and on both sections of the river. This is consistent with theory on goal blocking and conflict for settings in which users visually and physically interact. Contacts evaluated by users as detracting from their enjoyment are logical contributors to their perceptions of crowding. They should also logically contribute to user satisfaction, but the expected relation between disruptive contacts and satisfaction was confirmed only for physical encounters on the high use lower section of the river.

Experience-enhancing contacts appear to be no better than the perceived density measure for predicting user satisfaction. Contrary to what we expected, no significant relations were found with overall trip satisfaction. However, the

visual version of the experience-enhancing contacts measure did consistently predict perceived of disruptive contacts. The physical form of the experience-enhancing contacts measure simi-

larly discriminated crowded floaters from other lower river floaters, but this appears to be a less sensitive form of the measure because of the low variation in these types of contacts--an average of less than one per floater.

The most unexpected results from this research were the relations found between experience-neutral contacts and both satisfaction and perceived crowding. Although it seemed counter intuitive, relations were found in all cases for Lower Guadalupe River users, and no relations were found for upper river users. Surprisingly, the consistent relations of both visual and physical forms of this measure with satisfaction indicated that floaters who were excellently or perfectly satisfied, had, on the average, more of these types of contacts than less satisfied floaters. A similar relation was found between the physical form of this measure and perceived crowding. These findings suggest that when users evaluate contacts as neither disruptive nor enhancing, increasing numbers of these kinds of contacts under certain conditions may actually decrease their perceptions of crowding and increase their overall trip satisfaction.

In conclusion, floaters' disruptive, neutral, and enhancing evaluations of physical and visual contacts with others are generally more sensitive predictors of perceived crowding and satisfaction than is perceived frequency of contacts. They tend to best predict perceived crowding and satisfaction in very high use river settings. All three contact evaluation measures should be taken into account when assessing perceived crowding and satisfaction. Floaters tend to evaluate some contacts with others as disruptive to their floating experience, some contacts as experience-enhancing, and others as neither disruptive nor enhancing but nevertheless contributing to satisfaction and mitigating perceptions of crowding. If the differential effects of these contact evaluations are not considered in crowding and satisfactions research, some existing relations will likely be masked. Accurate assessment of the component effects of the intervening dimension of encounters could provide river resource managers with valuable information about which types of contacts have a negative impact on user experiences and which contacts contribute to a higher quality floating experience.

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EXPERIENCE LEVEL AFFECTS EXPECTATIONS FOR RECREATION PARTICIPATION

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The presence of conflict among recreationists in a given environment suggests the needs of certain segments of the recreating public are not being met. While the public provision of recreational opportunities is intended to be an egalitarian process, such conflicts suggest that seemingly democratic management practices may in fact be selectively working against the interests of some recreationists (Schreyer 1976). As conflict becomes a political issue, concern increases for the kinds of variation in the recreating public that result in such dissatisfaction. Systematic disenfranchisement of specific identifiable segments of the recreating public may suggest a revision in the assumptions upon which administrators base managerial actions.

Considerable conflict has been observed in whitewater river recreation (Lime 1977, Royer 1977). As a result, research has been pointed toward elaborating the differences among various segments of the river recreation public. Such differences have been explored between commercial and private river trips (Schreyer et al. 1976, Schreyer and Nielsen 1978, Graefe 1977, Shelby and Nielsen 1976b), day and overnight trips (Roggenbuck 1975), and motorized and non-motorized trips (Shelby and Nielsen 1976a).

One distinction deserving further study is that between experienced and inexperienced users. A person's amount of experience relates directly to his amount of information and may influence strongly the frame of reference by which he will evaluate recreation participation. The concept of experience may be expressed in various ways and each can affect on-site behavior in a different manner. A person may be a novice when participating in a given environment but have a large amount of experience in the activity elsewhere. Further, a person may be new to a particular pursuit but have a wide range of experience in related activities. For instance, one may have knowledge about wildland recreation from considerable experience in a range of activities but be a novice to running whitewater rivers. The previous knowledge would likely cause the person to act different from someone who had no previous wildland experience. Several aspects of the concept of experience may affect behavior. Amount of previous participation will be related to knowledge of the range of conditions likely to prevail and outcomes that are realistically attainable. Length of participation, regardless of the total amount

of participation, will give a broader frame of reference concerning the nature of change and development within the activity and recreation environments. Skill level represents how experience has been used to develop proficiency and relates to the control a person has over the conditions of his participation.

Experience level is obviously a complex representation. The main concern is to understand its impact on participation and satisfaction. It has been hypothesized that increasing experience results in a qualitative change in the subjective interpretation of recreation participation. Such changes have been characterized in terms of overt behaviors a person exhibits while participating. Distinctive patterns of behavior have been described as activity "specializations", which have been linked to increasing experience (Bryan 1977, 1979). Psychological aspects of participation such as self-awareness, perceptual focusing, and personal control have also been linked to experience (Schreyer and White 1979). To the extent that increasing experience may result in differing interpretations of a given recreational opportunity, this could be an important means of segmenting user populations to more clearly understand the nature of user conflict.

The purpose of the present study is to begin exploring some of the influences of experience on the perceptions of whitewater river recreation participation. The specific dimension of experience selected for analysis in this paper is the amount of participation on a given river stretch. Further reference to experience in this paper will refer to this application only. Of interest are variables dealing with user satisfactions, particularly as related to expectations for what would be encountered and obtained through participation. This study examines the relation of experience to the types of psychological outcomes desired from recreational participation and the requirements for attaining satisfaction through that participation.

The extent to which amount of recreational experience is tied to personal criteria for satisfaction has implications for understanding the dynamics of recreational conflict. The more aware a person is of alternative conditions and opportunities from which to choose, the more likely that specific participation will be

couched in detailed expectations for what will be encountered. As discussed in Jacob and Schreyer (1981), the more detailed such expectations, the more likely persons will encounter conditions counter to them and the more likely conflict will be experienced. It was hypothesized that although the types of outcomes desired would not differ (that is, both experienced and inexperienced users would be seeking essentially the same general types of desired psychological outcomes), experienced users would be more specific in what they would be seeking. Further, it was hypothesized that more experienced users would state more detailed requirements for satisfaction.

METHODOLOGY

During the summer of 1976 we interviewed 203 persons about to embark on whitewater float trips through Desolation Canyon on the Green River or Westwater Canyon on the Colorado River. Both rivers are in Utah, both are administered by the U.S. Bureau of Land Management, and both are representative of whitewater rivers through deeply entrenched sandstone canyons in undeveloped environments. The separate samples were combined for this study. Recreationists were interviewed before their trip so that the actual experience (use history) would not influence responses concerning sought outcomes.

Recreationists were asked how many times they had run this particular stretch of river previously. Given time restraints for the interview, it was not possible to establish overall river recreation participation, general wildland recreation experience, or skill level. Rather, the focus was on participation experience in this environment. It is possible to argue that first-time floaters on the river may have considerable experience elsewhere and will more resemble experienced floaters on the given river. However, regardless of previous experience elsewhere, we wanted to explore the effects of amount of experience within the environment on expectations for the specific participation. We agree that other types of experience influences need to be explored but felt this more restricted application would be a useful beginning.

For purposes of analysis, the sample was divided into three experience levels: (1) "first-time floaters"--those who had never run the stretch before; (2) "moderate experience floaters"--those who had made from one to five previous trips; and (3) "high experience floaters"--those who had made more than five previous trips. The distinction between the moderate and high experience categories was somewhat arbitrary. The break was made at five trips to allow for sufficient numbers in the

higher category, while still keeping the number of trips relatively high.

Few persons were highly experienced on the given river stretch. Most users, 48 percent of the sample, were first-time floaters. Slightly less than 30 percent were floaters with moderate experience and 22 percent were classified as high in experience.

The types of desired psychological outcomes being sought were asked in an open-ended format to allow for an evaluation not only of the types of outcomes mentioned but also to rate the specificity of the outcomes named. All interviews were tape recorded with the permission of the subject. Very few people refused to have the conversations recorded. Transcripts of the conversations were typed, and assignments to categories of outcomes were made from these. Respondents could identify up to five different types of outcomes (e.g., escape, experience nature, excitement, affiliation, etc) they desired from this particular recreational participation. Virtually no one mentioned more than three outcomes. Classification of outcomes followed categories identified by Driver (1977). The range of outcomes volunteered by respondents was narrowed to general categories to allow for sufficient numbers of analysis. Ten different groups of outcomes were identified.

The degree of specificity of identified outcomes was rated through a judgment process. The transcripts were read through, and criteria were developed that could identify relative specificity. The goal was to establish useful classes of distinctions; thus, categories did not represent fine lines of discrimination across a large number of levels. The transcripts were coded using the following four levels of specificity: (1) high--details were given describing actual behaviors and parts of the river (e.g., "I want to camp at Rock Creek and see the old ranch" or "I want to run Skull Rapid on the left side and avoid the Room of Doom"); (2) somewhat--outcomes were described but not behaviors or locations (e.g., "I wanted to get away from it all for awhile and be out in nature"); (3) nonspecific--general attitudes were mentioned rather than types of outcomes (e.g., "I just want to have a good time"); and (4) none--no desired outcomes were identified.

Respondents were then asked which of the outcomes named were required for them to feel they were satisfied on the trip. These responses were coded for type and for specificity in the same manner described above for desired outcomes. This distinction between outcomes desired and outcomes necessary for satisfaction was made in order to study more closely the link between outcome and satisfaction.

RESULTS

User Characteristics

The amount of experience a person had running the river was compared with certain other attributes of the individual and the group involved. No relation was found between age and experience, a factor likely due to the recent evolution of river running (i.e., "old timers" really need not be old). As might be expected, experienced users were significantly (Chi square=12.4, $p < 0.02$) more likely to live nearby in the states of Utah and Colorado. Sixty-three percent of floaters with moderate experience and 73 percent of those with high experience came from these two States, while nearly 54 percent of the first-time floaters came from elsewhere.

Experienced users were much more likely than first-time floaters to be on nonoutfitted trips (Chi square=43.3, $p < 0.0001$)--91 percent of the high experience group were on nonoutfitted trips while 61 percent of first-time floaters were with outfitted parties. Related to this, experienced users are more likely floating in a smaller group (Chi square=14.3, $p < 0.05$) and are floating with others who have had previous experience (Chi square 76.8, $p < 0.0001$). Major differences were also noted in group type (Chi square=30.7, $p < 0.0001$). Eighty-six percent of high experience persons were traveling with friends while only 37 percent of first-time floaters were traveling with friends. In contrast, 26 percent of first-timers were traveling with family members and 34 percent were traveling in combined family and friends groups. The respective figures for the highly experienced participants were 4 percent and 7 percent.

Desired Outcomes

To allow for sufficient cell frequencies for statistical analysis, only the five most commonly mentioned psychological outcomes respondents said they desired from the float trip were analyzed (table 1). The other categories involved very few responses, and virtually no trends in differences across experience levels could be discerned. As expected, the types of outcomes mentioned did not differ significantly depending upon amount of experience.

However, considerable differences between experience levels were noted when respondents were compared on the specificity of their descriptions of desired outcomes (table 2). Twenty-nine percent of respondents in the high experience category were highly specific in their descriptions, while none of the first-timers and only 3 percent of moderates were. In contrast, 38 percent of first-time floaters fell

into the lowest two categories of specificity, while only 4 percent of the high experience floaters did. The gamma statistic for this relation was 0.68. These results are somewhat limited because two-thirds of the entire sample fell into the "intermediately specific" category. Thus, the degree of variation was not dramatic, though the directions were as predicted.

Requirements for Satisfaction

When respondents were asked what outcomes were required for satisfaction, they were much more cautious in their statements. Forty-four percent of all respondents stated that no particular outcomes were necessary for them to be satisfied. The most commonly cited outcome was action/excitement (15 percent of responses). When asked for requirements for satisfaction, some of the respondents identified weather or trip conditions rather than types of psychological outcomes. For instance, the next most commonly cited outcome was the desire to avoid accidents. No significant differences emerged when comparing different levels of experience on this question. Further, no differences were observed when different experience levels were compared on the specificity of experiences required for satisfaction. Although experienced floaters are more specific on the outcomes they say they desire, they are not more specific in stating their requirements for satisfaction. It is also worth noting that although two-thirds of the sample was "intermediately specific" in their listing of desired outcomes, more than 81 percent fell into the lowest two categories of specificity when stating what was required for satisfaction.

DISCUSSION AND CONCLUSION

Although persons with differing levels of experience do not differ significantly in the types of outcomes they desire, experienced users tend to be more specific in the way they describe the outcomes. This distinction does not hold, however, when respondents have to commit themselves to what is necessary for satisfaction.

The most immediate question is: does number of trips on a specific river constitute a useful representation of experience? I believe that it does. This complex concept may be developed in many ways and each way may have a somewhat different relation to perceptions of recreational participation. This particular approach was a simple and straight-forward way of examining the concept. Further, there is support for the fact that first-time floaters on this river are first-time floaters in general. Although not recorded formally, the impression of the field interviewer was that first-time floaters on the

Table 1.--Relation between level of experience and psychological outcomes desired from participation

Experience level	Desired outcome										Total	
	Stress release		Affiliation		Action/excite.		Experience nature		Don't know or just to have a good time			
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
First-time floaters	8	7	10	8	40	33	46	38	16	13	120	100
Moderate experience	12	13	12	13	34	36	34	36	3	3	95	100
High experience	6	8	8	11	27	38	28	39	2	3	71	100
Total	26	9	30	10	101	35	108	38	21	7	286	100

Chi square = 13.8, d.f. = 8, not significant at $p < 0.05$.

Table 2.--Relation between level of experience and the degree of specificity of psychological outcomes identified.

Experience level	Level of specificity								Total	
	Highly specific		Somewhat specific		Nonspecific		Don't know any outcomes to expect			
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
First-time floaters	0	0	60	62	23	24	14	14	97	100
Moderate experience	2	3	46	77	10	7	2	3	60	100
High experience	13	29	30	67	2	4	0	0	45	100
Total	15	7	136	67	35	17	16	8	202	100

Chi square = 54.6, d.f.= 6, $p < 0.0001$.

given stretch frequently indicated they were novices to river running. This impression of high numbers of novices on whitewater rivers has also been supported through observations made by field personnel from administering agencies who regularly interact with these people.

Another support for the observation that experience on the river represents a good approximation of overall river running experience comes from a question in which respondents were asked to identify other recreational river stretches in the region. Respondents were classified into categories depending upon whether they could name nearly all of the major stretches or whether they could name some, but not most. Seventy-four percent of those in the high experience group could name most of the river stretches in the region, 89 percent of first-time floaters could name none ($\chi^2=153.4, p < 0.0001$), and 72 percent of the moderate experience group could name some. The gamma statistic for this relation was 0.97. Although it is possible to argue that this relation is the result of the first-time floaters coming from outside the region, (1) 46 percent of first-time floaters came from Utah and Colorado and any other experience they had would allow them to identify other rivers, and (2) a person with a large amount of experience elsewhere who was coming into the region for the first time to float would be more likely to pick one of the better-known stretches rather than Desolation or Westwater Canyons. Finally, if first-time floaters were likely to have experience elsewhere, the effect would be to weaken differences found in this analysis between types of floaters. Thus, controlling for external experience would probably strengthen the relations found here.

A second issue is: Are users with differing levels of experience participating in qualitatively different ways? That is, are first-timers and experts on different "trips"? The similarity of outcomes might suggest not. However, it may be a mistake to assume that generally stated outcomes represent similar subjective psychological experiences. Research on differences across groups in desired outcomes tend to show minor differences within a given activity (Schreyer and Roggenbuck 1978), even across a wide range of environments (Peterson et al. In prep.). Specificity, on the other hand, may represent an attunement to differing attributes within the recreation environment and may be linked to various responses to managerial actions, facilities, and the numbers and distribution of other users. In this sense, users with differing levels of experience may in fact be looking for different things to satisfy similar outcomes.

These "different things" have to do with the psychological dynamics of recreation participation. Increasing experience represents an expanding level of awareness concerning the environment and conditions likely to be present in that environment. In this sense, the concept experience may represent a complex developmental process of cognitive structures pertaining to environment and activity. This process may also result in increased control over recreation participation and a wider range of response to differing conditions and situations.

From the standpoint of the resource recreation manager, these differences have several important implications. If experienced users identify more specific desired outcomes and environmental situations, they may be more sensitive to changes in administration of a given area. Further, they may be most likely to have definite opinions about types of managerial strategies being considered. If first-time floaters are generally willing to accept whatever conditions they encounter, it may be most useful for managers to seek out the opinions of experienced floaters rather than those of the general floating public. Although there may be concern for creating a commercial/private bias in emphasizing experienced floaters, this can be dispelled by listening to commercial outfitters as members of the experienced class. It appears that experienced floaters may counterbalance more specific expectations for outcomes with a greater control over the conditions of attaining them. However, the tendency on the part of managers to increase regulation of river runners in order to solve various problems may reduce the autonomy of experienced floaters. This could increase the extent to which such users express feelings of conflict.

A final issue concerns the nature of the link between outcome and satisfaction. More specific outcomes would appear to lead to more demanding requirements for satisfaction. However, this was not borne out in the data. Such findings may serve to underscore the elusiveness of defining the concept of recreation satisfaction. Experienced users have a stake in being satisfied, just as do first-time floaters. Even though they are more specific in stating what they want, they tend to become elusive in committing themselves to prerequisites for satisfaction. If the more specific outcomes are not to be had, other features may be sought for satisfaction. Participation could be viewed as a general state of satisfaction, with outcomes being elements that can add to that general state. The absence of the outcomes does not necessarily detract from the situation. In this sense, it might be useful to view desired outcomes not so much as criteria by which to assess

satisfaction but as a prioritization of those features of participation that will enhance the level of satisfaction. This suggests some divergence from the expectancy/discrepancy theories of motivation that have often been used to model recreation satisfaction. These models conceive of satisfaction as being a linear additive function of the products of outcome importance times level of attainment. Perhaps a "two-factor" model of satisfaction in which outcomes are "enhancers" and other factors such as safety and weather are "detractors" is more realistic.

Experience level has been shown to affect certain aspects of recreation participation, such as decision related characteristics and the nature of desired outcomes. Although conflict perception was not measured in this study, such a variable would be useful to explore. Further, increased information concerning features of recreation participation, particularly with respect to activity patterns, responses to managerial action, and the environmental attributes sought would provide a clearer picture of the influence of experience level on the subjective nature of recreation.

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RECREATION SATISFACTION:
VISITOR EVALUATION OF FOREST RECREATION EXPERIENCES AS A DECISIONMAKING PROCESS.

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Decision theory has recently surfaced as an area of growing interest to behavioral researchers addressing applied problems such as those raised by outdoor recreation management. Discussions of decision theory include Hansen (1976) and Slovic *et al.* (1977); for an early discussion of the theory's application to recreation behavior, see Krumpal (1979). This paper discusses research that utilized descriptive decision theory (i.e., conceptual models that describe how people make choices) to derive a better understanding of how outdoor recreationists assess their satisfaction with a particular recreation experience. A basic premise of the research was that recreationists evaluate an experience in making that assessment; that is, they experience and then judge the quality of a recreation area. Central to such a judgement is an appraisal of those conditions, or attributes, of the recreation setting that serve as critical inputs to that experience.

The research described here thus conceived of visitor evaluation as a post-hoc decision-making process to which decision theory could be applied. Its purposes were to examine possible processes by which forest recreationists evaluate the recreation setting and to identify those setting attributes most salient to that assessment of satisfaction.

An underlying assumption of the study was that models of multi-attribute decisionmaking can be used to describe the evaluative processes by which recreationists assess their satisfaction with an experience. Rather than choosing among alternative settings on the basis of a comparison of their setting attributes, as is the case with recreation choice behavior, recreationists making a post-experience evaluation of their satisfaction compare the attributes of the experience setting with some standard of comparison, such as expectations or preferences. One hypothesis of this research was that different recreationists use processes described by different types of decisionmaking models, such as compensatory and noncompensatory, to consider setting attributes and to

evaluate the experiences those attributes, among other inputs, produce.

PAST VISITOR EVALUATION RESEARCH AND A
PROPOSED APPLICATION OF DECISION THEORY

A basic conceptual standard for assessing the quality of a recreation experience is that of user satisfaction with the experience (Wagar 1966, Driver and Brown 1975). Research has examined satisfaction both in terms of the influence of social features of a recreation setting (e.g., encountering inconsiderate people) on user satisfaction (Sankey 1973, Heberlein and Shelby 1977, Harris 1978) and in terms of a variety of additional setting attributes, classified as physical (e.g., scenic beauty) and managerial (e.g., rules) that represent a more complete assessment of a setting (Peterson 1974, Dorfman 1979). The underlying conception of satisfaction in all of these studies is that it is a function of the discrepancy between the levels of features actually experienced and the levels of those features set by some standard of comparison such as expectations or preferences.

An implicit assumption of past studies based on psychological theories of satisfaction is that the evaluative process employed in assessing satisfaction with an overall recreation experience reflects a compensatory, multi-attribute model of decisionmaking. Multi-attribute decision models postulate that an individual's decision process involves a consideration of a number of attributes when that individual is choosing among possible alternatives. These models have been categorized as either compensatory or noncompensatory:

Compensatory model. This model is the best known and most widely used and studied category of decisionmaking models; it underlies such common statistical decision techniques as regression and has been used to operationalize attitude and motivation theories. Compensatory models assume that the decisionmaker makes an interattribute comparison, weights the various

setting attributes according to their importance, and then derives a single summated value representing the utility or attractiveness of an alternative.

Noncompensatory model. Unlike compensatory decision models, noncompensatory models do not involve interattribute comparisons. While compensatory models permit the presence of one attribute of an alternative to compensate for the lack of another, noncompensatory models do not permit such trade-offs between attributes to influence choice. Because the decisionmaker considers particular attributes in choosing an alternative, an alternative may be rejected for failing to measure up on one particular attribute, even though the alternative is desirable in terms of all its other attributes. Alternatives are thus compared on an attribute-by-attribute basis.

Two types of noncompensatory models (adopted from Coombs and Kao 1955) were considered in this research. One was a conjunctive model, whereby an individual's perceptions of all setting attributes must meet those minimum thresholds (in the case of positive items) necessary for deriving overall satisfaction. For example, a fairly nondiscriminating hiker might only require being moderately satisfied with all setting attributes to be satisfied overall with his experience. The second type of noncompensatory model was a variation of a dominance-disjunctive model, whereby an individual must be highly satisfied with the attributes that are most important for deriving overall satisfaction. For example, a highly discriminating hiker might be most concerned with experiencing a great deal of scenic beauty and few other people; as long as their hikes are satisfactory on these salient attributes, the hikers will be satisfied overall, regardless of whether any other setting attributes are satisfactory.

RESEARCH METHODS

Two cross-sectional self-report surveys were administered to a sample of 187 forest back-country hikers in three Colorado wildland areas during summer 1980. A pre-trip questionnaire was completed by hikers at a trailhead to obtain their preferences and expectations concerning the levels of 15 setting attributes. These attributes were selected on the basis of past research indicating their importance to hikers' satisfaction with Colorado wildland settings (Allen 1979). The users also indicated the minimum (maximum) amount of each positive (negative) attribute they could experience and still be satisfied with their trip, thereby providing a satisfaction threshold level for each attribute.

DATA ANALYSIS

The data were first used to classify a respondent as a compensatory or noncompensatory decisionmaker. Only the inference that people might be employing one or both of the noncompensatory models under study could be made, however, since data for an individual might meet the conditions for these models even though their decisionmaking process was actually a compensatory one.

To examine the possible use of noncompensatory models, tests were developed that determined if individuals met either or both of two rules based on the conjunctive and dominance-disjunctive models. To meet the rule for the conjunctive model, an individual's levels of perception of all setting attributes had to equal or exceed those threshold levels established in the pre-trip questionnaire, and the individual had to positively rate his satisfaction with the overall experience. To meet the rule for the dominance-disjunctive models, an individual's satisfaction had to be high (i.e., 2, 3, or 4 on a scale from -4 to 4), and the individual had to positively rate his satisfaction with the overall experience. Respondents who failed to meet either of these rules were included in a subsample of individuals who could not be using noncompensatory models and thus were those most likely to be employing a compensatory model.

The compensatory model examined in this study was a linear additive one described with a multiple regression equation. Ordinary least squares regression analyses were performed on both total sample and subsample using respondents' ratings of overall satisfaction as a criterion measure and their ratings of satisfactions with individual setting attributes as predictor scores. The basic logic here was that regression analysis of data from the subsample of hikers employing the compensatory model should result in a better fit of data than would be achieved with data from the total sample if a large number of individuals in that sample were using a noncompensatory decision model. To provide the strictest test possible, the total sample was used for comparison because hikers classified as possible noncompensatory decisionmakers might actually be compensatory decisionmakers.

Since satisfaction ratings on the individual attributes were in some cases moderately to highly intercorrelated, 8 of the 15 original attributes were used as predictor variables: birds, other people, buzzing insects, trail signs, large mammals, steep trail sections, scenic beauty, and rules. To assess the agreement between different measures of attribute salience, the objective weights (regression

coefficients) obtained for these attributes from the regression equation were compared with the means of subjective weights (defined as the importance of setting attributes) given to the attributes by the respondents.

RESULTS

A preliminary analysis of the data provided support for the hypothesis that visitors use different kinds of decision models. While the distribution of all respondents' ratings of overall satisfaction indicated that they generally realized a high level of satisfaction with their recreation experience ($x = 2.65$ on a scale from -4 (very dissatisfied) to 4 (very satisfied)), an application of the classification rules described above indicated that 42 respondents could be identified as compensatory decisionmakers.

The eight setting attributes yielded a statistically significant regression equation (approximate $p < 0.001$) that explained 35 percent of the variation in overall satisfaction ($R^2 = 0.35$; see table 1). A regression of overall satisfaction on the same predictors was run for the compensatory subsample, yielding a statistically significant regression equation (approximate $p < 0.001$) that explained 10 percent more variance than the total sample regression ($R^2 = 0.45$).

An initial analysis of the data also indicated that, contrary to past findings of research on decision processes (Schmitt and Levine 1977, Nysted and Murphy 1978), objective regression weights and subjective importance ratings of the most highly weighted attributes tended to agree, at least on an aggregate level (see table 1). For both types of weights, the greatest relative importance was placed on the scenic beauty attribute ($b = 0.64$ for the total sample regression, $p < 0.1$) with the next greatest on the other people attribute ($b = 0.12$, $p < 0.1$).

DISCUSSION

Results of this initial analysis suggest that different recreationists might use different decisionmaking models when evaluating the influence of setting attributes on satisfaction with a recreation experience. The regression model provides a better fit of the data for those individuals whose survey responses indicate they probably use compensatory decision processes than for those who could be using either noncompensatory or compensatory processes.

Table 1.--Comparison of regression coefficients of setting attributes for total sample and compensatory subsample with means and ranks of importance ratings of those attributes.

Setting Attributes	Total sample coefficient	Compensatory sample coefficient	Importance rating ^{1/} (rank)
Scenic beauty	0.64 ^{2/}	0.62 ^{2/}	5.4(1)
Other people	.12 ^{2/}	.19 ^{2/}	3.6(2)
Trail signs	.09 ^{2/}	.02	3.5(3)
Buzzing insects	.05	.03	3.2(4)
Steep trail sections	.05	.18 ^{2/}	2.8(7)
Large mammals	.03	.02	3.2(5)
Birds	.005	.12	2.5(8)
Rules	.003	.07	2.9(6)

Fraction of Explained Variance (\bar{R}^2)	Total sample	Compensatory sample	Importance rating ^{1/} (rank)
	.35	.45	--

^{1/}On a scale from 0 (not important at all) to 6 (extremely important).

^{2/}Statistically significant differences from 0, approximate $p < 0.1$.

Given that some hikers might be employing noncompensatory evaluation processes, it follows logically that individuals employing such processes may be generally insensitive to certain other setting attributes. Confirming past findings (Allen 1979) that wildland hikers, in the aggregate, are satisfied with their overall experience, but also that scenic beauty and the presence of other people are the two attributes generally most critical to that satisfaction, the present study lends weight to the conclusion that recreationists' evaluations may often be insensitive to other less salient setting attributes.

A tentative management implication of these findings is that managerial efforts should perhaps reflect greater concerns for minimizing the social impacts of visitors and maintaining an area's ecological viability than for considering visitor preferences for less obtrusive site attributes. If most wildland users do use fairly simplistic evaluative processes involving only the most obvious setting attributes, some of which are largely independent of management actions, (scenic beauty), managerial concern over responsiveness to some visitor preferences for setting attributes in recreation planning may be of limited utility, especially if visitor

satisfaction is a valid standard of experiential quality and the high degree of that standard found in this study is widespread.

This generalization, however, reflects an interpretation of aggregated data that warrants qualification. Many forest visitors self-select an area, have expectations based on past experience, and/or may be effective decision-makers who could be expected to be satisfied with their overall recreation experience. However, a more complete accounting of the many antecedent and intervening factors possibly influencing visitors' satisfaction levels is beyond the scope of an initial data analysis and the constraints on the length of this paper. Further analysis of the data is necessary to assess whether evaluative processes and salient attributes differ for different types of users in different types of settings. Additional research is needed to specify more precisely the different evaluative processes that visitors employ and to determine their relation to such factors as visitors' past experiences, processes for choosing a recreation setting, and motives for recreating.

For example, one hypothesis that could be investigated is that hikers who use a conjunctive type of process are less experienced and less able to discriminate among attributes in terms of the importance and amounts of those attributes acceptable to them. These hikers might be more likely to use a "satisficing" type of evaluative process. Instead of evaluating an experience in terms of optimal levels of attributes (and thus seeking to maximize satisfaction), they may base their evaluation on minimal levels, sufficient for experiencing at least some degree of satisfaction. More discriminating evaluators may be experienced hikers, whose evaluative processes are best described by a disjunctive model. If these hikers are not satisfied with attributes particularly salient to their evaluation of an experience, they are dissatisfied with their overall experience.

Examining differences in the evaluation of settings by specific types of users requires a disaggregated and thus more sensitive analysis than that performed here. Nonetheless, the present analysis, in providing a basis for examining evaluative processes, suggests the importance of better understanding user evaluation processes for guiding the use of behavioral inputs in managerial decisionmaking.

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