

RIVER RECREATION EXPERIENCE OPPORTUNITIES IN TWO RECREATION OPPORTUNITY SPECTRUM (ROS) CLASSES¹

Duane C. Wollmuth, John H. Schomaker, and Lawrence C. Merriam, Jr.²

ABSTRACT: The Recreation Opportunity Spectrum (ROS) system is used by the USDA Forest Service and USDI Bureau of Land Management for inventorying, classifying, and managing wildlands for recreation. Different ROS classes from the Colorado and Arkansas Rivers in Colorado were compared, using visitor survey data collected in 1979 and 1981, to see if the different classes offered different recreational experience opportunities. No difference between classes was found. Six possible reasons for not finding a difference are discussed. The usefulness of ROS at the broader levels of planning and the needs at more detailed levels of planning are noted.

(KEY TERMS: river recreation; recreation experience; Recreation Opportunity Spectrum (ROS) system; forest recreation.)

INTRODUCTION

As two of the major federal agencies managing outdoor recreation, the USDA Forest Service and the USDI Bureau of Land Management have adopted a common system for inventorying, classifying, and managing wildlands for recreation (Buist and Hoots, 1982). The system recognizes the need to provide a wide range, or spectrum, of recreation opportunities and is called, therefore, the Recreation Opportunity Spectrum (ROS) system.

The ROS system — more clearly than past classification systems — recognizes the recreation “setting” (in addition to the “activity”) as a principal part of a recreation opportunity. A third part of an opportunity recognized by ROS is “experience,” the psychological outcomes resulting from participating in a given activity in a given setting. Although a wide range of recreation opportunities involving the three principal components are recognized, this wide range is divided into six classes for practical planning purposes. ROS classes range from a primitive class to an urban class with semi-primitive nonmotorized, semi-primitive motorized, roaded natural, and rural classes in between (USDA, 1980).

Although there has been considerable empirical work elucidating the relationships among activity, setting, and experiential components of recreation opportunities (Brown and Ross, 1981; Driver and Brown, 1981; Roggenbuck, 1980;

Tinsley, *et al.*, 1977; Knopf, *et al.*, 1973; Manfredo, 1979), there has been limited testing (Udd, 1981) of the key notion that areas designated as representing different ROS classes actually provide different experience opportunities. The primary purpose of our study was to test this notion.

The premise of ROS is that settings and activities are primary determinants of the kinds of experiences that recreationists can have. And, although a manager cannot control the kind of experience a recreationist will have, a manager can make it more likely that a person will have a given experience by providing particular combinations of settings and activities. For a given setting and activity, people's experiences will vary because of differences in personalities, home and work environments, social groups, and prior experiences (Knopf, 1982), factors a recreation manager has little influence on. Practically speaking, management of activities and settings can only provide opportunities for certain recreation experiences, it cannot guarantee them.

In the ROS system, areas are inventoried and classified according to three categories of setting attributes: physical, social, and managerial. Standard criteria enable managers to classify areas consistently across different environments.

To control for sources of variability other than ROS classification, our strategy was to study the same activity in areas that differed in ROS classification. The same activity in the different areas was studied to eliminate the variation in experience due to activity.

Areas near each other were selected so that recreationists generally would be coming from the same socio-demographic population and the recreationists' choices between the areas would not be influenced by distance traveled to the area. A more rigorous control would have been to study the same set of individuals in two different ROS classes, but carrying out such a study was too difficult. Rather, a probabilistic approach was used in which we assumed that across many individuals there would be, in general, a different experience opportunity expressed for different ROS classes.

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²Respectively, Research Assistant, University of Minnesota, St. Paul, Minnesota 55108 (present address, 22625 31st. Ave. S.E., No. 100, Bothell, Washington 98011); Research Forester, USDA Forest Service, North Central Forest Experiment Station, 1992 Folwell Avenue, St. Paul, Minnesota 55108; and Professor, Forest Resources, University of Minnesota, St. Paul, Minnesota 55108.

The recreation experience opportunities associated with rafting rivers were examined. Following from the notion that river segments in different ROS classes provide opportunities to realize different experiences, the primary null hypothesis was, "The recreation experience opportunities associated with rafting rivers do not vary between two ROS classifications."

METHODS

Study Areas

Variability due to factors other than ROS class was further limited by studying rivers that had different ROS classes along segments of the same river. Four study segments on the Colorado and Arkansas Rivers in the state of Colorado were selected (Figure 1). The river segments have been officially classified according to ROS procedures by the Bureau of Land Management District Offices. Segments classified as "roaded natural" were Brown's Canyon on the Arkansas River and Catamount to Twin Bridges on the Colorado River. Segments classified as "rural" were Salida to Parkdale on the Arkansas River and Pumphouse to State Bridge on the Colorado River.

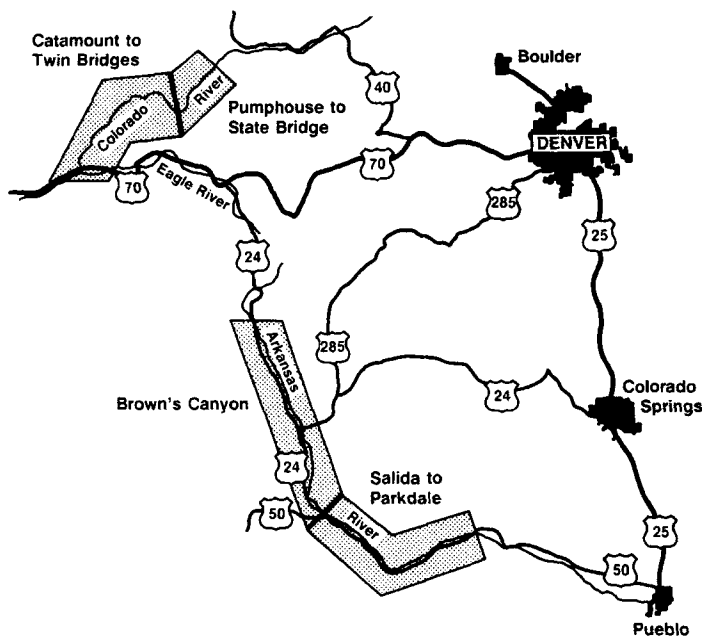


Figure 1. Map of Study Area.

Although nearly contiguous on each river, the segments differ in their level of use and development (Table 1). The Arkansas segments were classified differently primarily on the basis of physical setting; Colorado segments were classified differently primarily because of differing levels of use or social setting.

The Sample

Data for the rural segment on the Colorado were collected in 1979 and on the other segments in 1981 as part of a nationwide study of river users (Knopf and Lime, 1984). Interviewers collected names and addresses of all users over 15 years old on each segment on randomly selected days throughout a use season. At the end of the season, 350 names were drawn for each river, and questionnaires were mailed to the selected persons. Two followup mailings helped increase the average response to 69 percent.

The study population consisted of respondents who were repeat rafters with floating experience on the river segment on which we contacted them. Analysis was limited to repeat visitors because they would provide a more valid indication of the type of experience available (Driver and Bassett, 1977). Only rafters (i.e., no kayakers or innertubers) were included in the study population because past studies have shown that different activity groups can seek different experiences within the same setting (Brown and Ross, 1981; Driver and Brown, 1981).

Recreationists with different socio-demographic characteristics may have dissimilar leisure perceptions (Peterson, 1975), attitudes (Hammer and Leadley, 1975), and behaviors (Knopp, 1972; Burch, 1966; Sessoms, 1963). Respondents from each segment were assumed to have similar socio-demographic characteristics and that any differences in the reasons they reported for visiting the river were due, therefore, to the river setting. As a partial test of our assumption, the occupation, education, residence (zip code), and age of floaters on the four segments of the Arkansas and Colorado Rivers were compared. There were no significant differences among the four segments at the 0.05 level.

Experience Opportunity Measure

Unlike obtaining volume of a natural resource such as timber, it is impossible to directly measure opportunities for recreational experience. Instead, opportunities that might exist must be inferred from other information. Repeat visitors were asked their reasons for visiting the river and because of the visitors' past experience on the river, it was inferred that these reasons represent the opportunities that exist on the river. A person's reasons for visiting a river were measured with the following: "I took this river trip because I wanted. . .". This statement was followed by phrases that gave possible reasons for taking a river trip. The phrases are a subset of items from Driver's (1977) pool of desired psychological outcomes. The phrases have been used in other studies of recreational experiences and resource attributes (Allen, 1979; Haas, 1979), and they span the majority of the desirable psychological outcomes that research has shown recreationists value in a wide variety of activities (Driver and Rosenthal, 1982). A five-point response format ranging from strongly disagree (1) to strongly agree (5) was used.

To reduce the number of outcomes to a minimal set, underlying outcome factors were extracted with principal components analysis and varimax rotation (Nie, *et al.*, 1975).

TABLE 1. Characteristics of the Study Areas.

	Roaded Natural		Rural	
	Arkansas	Colorado	Arkansas	Colorado
Use (visitor days)	29,500	5,000-10,000	18,600	35,000
Development	Railroad	Railroad; Gravel Road	Railroad; Paved Highway	Railroad
Length (miles)	6	8	44	12
Prevalent Type of Use	Day Trips	Day Trips	Day Trips	Day Trips

A minimum loading of ± 0.4 was selected to interpret the factor matrix. The analysis yielded five factors made up of a total of 26 items. Two items loaded greater than 0.4 on two factors. These items were assigned to the factors with the greater loading. A person's score for each factor was constructed by calculating the mean response values for the items that make up that factor. The items in each factor were:

Self-Fulfillment (alpha = 0.84)

- To test and use my equipment.
- To be my own boss.
- To develop my skills and abilities.
- To keep physically fit.
- To test my abilities.
- To take chances in dangerous situations.
- To show others I can do it.
- To share what I have learned with others.

Nature/Learning (alpha = 0.75)

- To be close to nature.
- To learn more about nature.
- To be with people having similar values.
- To learn more about things here.

Change (alpha = 0.79)

- To get away from the usual demands of life.
- To have a change from the daily routine.
- To give my mind a rest.
- To release tensions and anxieties.
- To experience new and different things.
- To be away from the noise back home.

Solitude/Introspection (alpha = 0.75)

- To think about my personal values.
- To strengthen my feelings of self-worth.
- To get away from other people.
- To be alone.
- To be away from crowds of people.

Affiliation (alpha = 0.64)

- To be part of a group.
- To talk to new and varied people.
- To be with friends.

Analysis

A two-way multivariate analysis of variance (MANOVA) design was used to compare the experience opportunities associated with the study river segments. The dependent variables were the five psychological outcome factors – self-fulfillment, nature/learning, change, solitude/introspection, and affiliation. The independent variables were river and ROS class. River was included as a control variable to ensure that any differences in outcomes across river segments were not due to a difference in rivers.

RESULTS

The MANOVA design allowed testing for differences in the mean reported psychological outcome scores due to river alone, ROS class, or an interaction between the two. None of the tests were significant at the 0.05 level (Tables 2 and 3). The null hypothesis could not be rejected and we concluded, therefore, that rafting recreation experiences, on the average, do not differ between rivers classified as rural and rivers classified as roaded natural.

DISCUSSION

Two adjacent ROS classes were compared and no differences between recreation experience opportunities was found. Why? There are several possible reasons.

First, it may be that our basic assumption is not true and that setting is not linked with experience opportunities. It is difficult to give up this assumption, though, because of its intuitive appeal and previous empirical work (Haas, 1979; Manfredo, 1979; Ballman, 1980; Graefe, *et al.*, 1981). More appealing is the view that experiences are not predominantly determined by setting but that many other facets contribute. This view was adopted by Knopf, *et al.* (1983), after examining the motive profiles of floaters on 11 rivers nationwide and finding little difference among the profiles. The conclusions drawn from the study of 11 rivers could only be considered tentative because of sample characteristics: first-time floaters were included and they would not be expected to have well-formed views on the type of experience expected; floaters who used a variety of watercraft were included, and their motives would be expected to vary with the kind of

TABLE 2. Outcome Factors, Factor Means, and Standard Deviations for Each Study River Segment of the Colorado and Arkansas Rivers.

River Segment	Outcome Factor									
	Self-Fulfillment		Nature/Learn		Change		Solitude		Affiliation	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
COLORADO										
Pumphouse to State Bridge (R)	3.16	0.754	3.71	0.506	3.87	0.580	2.97	0.499	3.76	0.582
COLORADO										
Catamount to Twin Bridges (RN)	3.33	0.723	3.74	0.639	3.94	0.664	3.04	0.797	3.79	0.676
ARKANSAS										
Brown's Canyon (RN)	3.35	0.647	3.43	0.649	3.73	0.576	2.95	0.712	3.61	0.658
ARKANSAS										
Salida to Parkdale (R)	3.45	0.635	3.73	0.646	3.98	0.584	2.89	0.655	3.81	0.661
Bartlett's Box-F:	0.630	P=0.596	1.06	P=0.367	0.448	P=0.719	3.00	P=0.030*	0.350	P=0.789
Bartlett Test of Specificity = 191.013 (10 D.F.) P=0.000										
* - Indicates statistical significance.										
R = Rural										
RN = Roaded Natural										

TABLE 3. MANOVA Summary Table for Test of Significance Among Outcome Factor Means Across Colorado and Arkansas River Segments.

	U Statistic	Approximate F	Hypothesis D.F.	Error D.F.	Significance of F at 0.05 or Below
A	0.964	1.34	5	180	NS
B	0.952	1.83	5	180	NS
AB	0.977	0.83	5	180	NS

A = ROS Class (roaded natural vs. rural)
 B = River (Colorado vs. Arkansas)
 AB = Interaction between ROS class and river.

Dependent Variables
 - Self-Fulfillment
 - Nature/Learn
 - Change
 - Solitude
 - Affiliation

floating activity and thus contaminate the motive-setting relationship; floaters were from diverse locales nationwide, and these people did not all have the same opportunities available to them and their choice of rivers may have been influenced by limited opportunities. Also, the socio-demographic characteristics of the latter group would likely differ and further obscure the motive-setting relationship.

Our study controlled for these sources of variability and still no difference between adjacent ROS classes was found. Like Knopf, *et al.* (1983), we question the strength of the relationship between environmental setting as reflected in ROS classes and recreation experience opportunities. The implications of this indefinite relationship for inventorying, allocating, and managing recreational lands is discussed in the last section of the paper.

A second reason for not finding a difference might be that the areas were not correctly classified. Care was taken, however, in designing this study to select study areas that had previously been classified according to ROS guidelines by BLM recreation planners. Also, the classification of each area was based on more than a single individual's judgment. Input from the BLM state office recreation planning staff and interaction with other district recreation planners added consistency. The classification of the study segments points to an important question in the ROS system; how should an area be classified if the present settings are inconsistent? If all settings fall within the range appropriate for a given class, there is no problem. However, if the environmental setting falls in one class and the social setting in another class, then the classifier must decide which is the appropriate class. Clark and Stankey (1979) and USDA (1980) offer extended discussions of the inconsistency issue with the general guideline that the class which best reflects current management direction be chosen in the case of an inconsistency. Among our study segments emphasis was put on physical development in classifying the Arkansas segments and on visitor use in classifying the Colorado segments. This difference in emphasis is not a case of misclassification; rather, it is an example of the accommodation made to management direction within the classification scheme of the ROS system.

A third reason might be that the experience opportunities were poorly measured. For a number of reasons, we are confident that our measures reflect, at a general level, the opportunities floaters desire on these segments. First, the items were chosen from Driver's well-developed pool of items designed to quantify psychological outcomes desired from recreational participation; and, although all of the items that define the 39 scales developed by Driver were not used, the items do represent the breadth of psychological outcomes desired from recreational participation. Second, the factors are stable, and presumably meaningful, for river recreation. The factors were based on six earlier factor analyses using sample sizes of 900 cases, each selected from a total of 12,000 cases from 43 different rivers nationwide (see Wollmuth, 1982, for details of factor analyses). And, because of the relatively large number of cases (50) that went into calculating the mean for each factor score, the means are considered a reliable measure for each segment with a standard error of about 0.1. That is, although the population mean for a factor score is not known with certainty, means of samples of 50 cases each would not deviate from it in either direction more than 0.1 unit about two-thirds of the time.

A fourth reason might be that the study river segments are in different classes, but because they each are near the class boundary they are insignificantly different. For example, the rivers chosen for this study might be represented by the "X's" in Figure 2 and differences may not be detectable, as they might be for the "Y's." When the study was begun rivers that were classified more widely apart were considered, but it was felt that studying rivers in adjacent classes would provide the most powerful test of the hypothesis. River segments may be too much alike to detect differences, given our current methodology. This possibility is discussed more fully in the implications section.

A fifth reason may be that a river recreation opportunity spectrum is very limited or does not exist. At least two studies (Graefe, *et al.*, 1981; Knopf, *et al.*, 1983) have raised the possibility that floating rivers is a generic form of recreation that leads to similar psychological outcomes across settings. If activity, *vis-a-vis* setting, is the predominant determinant of experience opportunities, then our sample, which was limited to rafters, would be expected to show little variation in experience opportunity. With our data there is no way of establishing the relative importance of activity, setting, or for that matter, social group, personality, or prior experience in influencing recreation experiences. Further research must identify the relative importance of these various factors.

The sixth reason is that by classifying a multidimensional, complex phenomenon into unidimensional, ordinal classes, information is lost. In the case of ROS some of this lost information may be important determinants of experience opportunities, and thus the spectrum will not reflect the diversity of opportunities experienced by recreationists. As a result, the relationship measured between ROS classes and experience opportunities would not be expected to be strong.

ROS is a simplified description of the real world. The question is whether this simplification overly limits the usefulness of ROS. Although this question cannot be answered directly, our findings, although preliminary and limited, give some insight into the application of the ROS on rivers.

IMPLICATIONS

No relationship was found between environmental settings as reflected in two adjacent ROS classes on rivers and the recreation experience opportunities measured for experienced

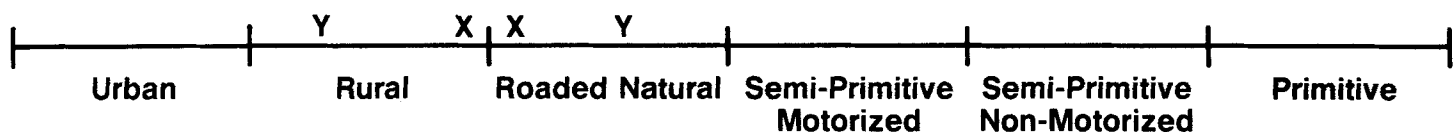


Figure 2. Schematic Representation of Two Possible Pairs of Rivers Classified Under the ROS System.

rafters. Does this mean ROS is not useful? We think not. The ROS concepts can be applied at a variety of planning levels. Brown, *et al.* (1978), point to several: (1) national planning, (2) area or regional planning, (3) subarea planning, (4) unit planning, and (5) site planning within management units.

Currently, the ROS system serves best for broader planning to inventory, allocate, and guide management of outdoor recreation opportunities. The system reminds policy makers and planners that a spectrum of opportunities is desirable; it reminds managers of the consequences of management actions and helps them focus on objectives (Clark and Stankey, 1979). The ROS system serves as a general guide and therefore it must also deal with experience opportunities in a general way.

For specific planning and management, additional information is needed to differentiate among the areas and to produce opportunities for specific psychological outcomes (Brown, *et al.*, 1978). The specificity inherent in inventorying and managing a particular river segment and recognizing variations in experience opportunities that differ less than the ones in this study seems beyond the current applicability of the ROS system.

Much similarity exists among river recreation opportunities. A river recreation experience takes place in a limited, narrow corridor, and most corridors are dominated by the natural environment. Also, the recreationist often floats the river confined to a raft that forces a closeness with others. When floaters shoot rapids, whitewater dominates and there is considerable variation in whitewater between rivers. So, to better differentiate among opportunities on rivers, the predominantly land-related ROS criteria might be supplemented with the frequency and degree of whitewater.

In conclusion, if managers and researchers want to identify and measure different experience opportunities within an activity like river rafting, and if they want to establish a link between settings and experiences, then the situation must be described more specifically, and the means for measuring experiences must be capable of differentiating experiences just as specifically.

The issue is parallel to the issue of specificity in attitude-behavior research (Fishbein and Jaccard, 1973). In order to establish relationships between entities, the variables must be measured at the same level of specificity. There is evidence that the items most commonly used to measure experience opportunities function at a general level and can differentiate among river recreation, passive recreation like watching movies and visiting museums, and active recreation like bowling and tennis (Knopf, *et al.*, 1983). Our study and the Knopf, *et al.* (1983), study suggests that the items we used do not differentiate well among the variety of experiences within river recreation.

However, from our personal experience and the reports of others we know that river recreation experiences do vary. To be relevant at the more detailed levels of planning, the activity must be specified beyond "floating the river." To

really understand the experience the activity, in behavior and style, needs to be defined more specifically. Measures should reflect the differences in riding in a raft *vis-a-vis* rowing a raft; traveling on a bright sunny day compared to traveling in a day-long drizzle; floating with a close-knit group of old friends compared to a spontaneous, loosely organized group of college acquaintances; traveling having seen wildlife compared to traveling without seeing wildlife. The list of specifications can go on. The point is that to go beyond the general, broad level of ROS and find relationships between experience and the setting that are relevant at the detailed levels of planning (at the river level, for instance), measures of experience will have to be reliable enough to detect differences of the type just listed. This is a real challenge to the research community.

SUMMARY

Differences in experience opportunities between rivers classified in adjacent classes on the Recreation Opportunity Spectrum could not be shown. However, enough reasons for not finding a difference exist to justify a better test of the notion that areas representing different ROS classes should facilitate different experience opportunities. Given current methodologies, there needs to be a test between widely separated ROS classes. The test should control for activity, past experience, access to the rivers, and socio-demographic background, as ours did. Regardless of our findings, ROS is valuable for broader planning. For planners wishing a comparable system useful for more detailed planning (for which ROS was not designed), specifications and measurements need to be refined.

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LITERATURE CITED

- Allen, D. J., 1979. Wilderness User Preferences for Psychological Outcomes and Setting Attributes. Ph.D. Dissertation, Colorado State University, Fort Collins, Colorado, 123 pp.
- Ballman, G., 1980. Operationalizing the Cross-Country Skiing Opportunity Spectrum. *In: North American Symp. on Dispersed Winter Recreation*, February 27-29. University of Minnesota, St. Paul, Minnesota.
- Brown, P. J., B. L. Driver, and C. McConnell, 1978. The Opportunity Spectrum Concept and Behavioral Information in Outdoor Recreation Resource Supply Inventories: Background and Application. *In: Integrated Inventories of Renewable Natural Resources: Proceedings of the Workshop*. USDA For. Serv. Gen. Tech. Rep. RM-55.
- Brown, P. J. and D. M. Ross, 1981. Recreation Opportunity Spectrum User Preference Study for the Glenwood Springs Resource Area. Report to the Colorado State Office. Bureau of Land Management.

- Buist, L. J. and T. A. Hoots, 1982. Recreation Opportunity Spectrum Approach to Resource Planning. *J. Forestry* 80:84-86.
- Burch, W. P., 1966. Wilderness – The Life Cycle and Forest Recreational Choice. *J. Forestry* 64(9):606-610.
- Clark, R. N. and G. H. Stankey, 1979. The Outdoor Recreation Opportunity Spectrum: A Framework for Recreation Planning Management and Research. Pac. Northwest For. and Range Exp. Stn. Gen. Tech. Rep. PNW-98, 69 pp.
- Driver, B. L., 1977. Item Pool for Scales Designated to Quantify the Psychological Outcomes Desired and Expected from Recreation Participation. On file at USDA For. Serv., Rocky Mountain For. and Range Exp. Stn., Fort Collins, Colorado, 31 pp.
- Driver, B. L. and J. R. Bassett, 1977. Problems of Defining and Measuring the Preferences of River Recreationists. *In: Proceedings of River Recreation Management and Research Symposium*. North Central For. Exp. Stn., USDA For. Serv. Gen. Tech. Rep. NC-28.
- Driver, B. L. and P. J. Brown, 1981. Measuring Dispersed Use and Visitor Preferences on the Bureau of Land Management's National Resource Lands. Final Report. Colorado State Univ., Fort Collins, Colorado.
- Fishbein, M. and J. J. Jaccard, 1973. Theoretical and Methodological Considerations in the Prediction of Family Planning Intentions and Behavior. *Representative Research in Social Psychology* 4:37-51.
- Graefe, A. R., R. B. Ditton, J. W. Roggenbuck, and R. Schreyer, 1981. Notes on the Stability of Factor Structure of Leisure Meanings. *Leisure Sciences* 4(1):51-65.
- Hammer, E. R. and S. M. Leadley, 1975. A Comparative Study of Socioeconomic Characteristics Associated with Leisure Attitudes. Center for Study of Environmental Policy – Working Paper No. 11, Pennsylvania State Univ.
- Haas, G. E., 1979. User Preferences for Recreation Experience Opportunities and Physical Resource Attributes in Three Colorado Wilderness Areas. Ph.D. Dissertation, Colorado State University, Fort Collins, Colorado, 141 pp.
- Knopf, R. C., 1982. Recreational Needs and Behavior in Natural Settings. *In: The Human Behavior and Environment Series, I*. Altman and J. F. Wohlwill (Editors). Behavior and the Natural Environment, Vol. VI, Plenum Publ. Corp., New York, New York.
- Knopf, R. C., B. L. Driver, and J. R. Bassett, 1973. Motivations for Fishing. *In: Trans. 38th North Am. Wildl. and Nat. Res. Conf. Wildl. Manage. Inst.*, Washington, D.C., pp. 191-204.
- Knopf, R. C. and D. W. Lime, 1984. A Recreation Manager's Guide to Understanding River Use and Users. Gen. Tech. Rep. WO-38, U.S. Department of Agriculture, Forest Service, Washington, D.C., 37 pp.
- Knopf, R. C., G. L. Peterson, and E. C. Leatherberry, 1983. Motives for Recreational River Floating: Relative Consistency Across Settings. *Leisure Sciences* 5:231-255.
- Knopp, T., 1972. Environmental Determinants of Recreation Behavior. *Journal of Leisure Research* 4(2):129-138.
- Manfredo, M. J., 1979. Wilderness Experience Opportunities and Management Preferences for Three Wyoming Wilderness Areas. Ph.D. Dissertation, Colorado State University, Fort Collins, Colorado, 113 pp.
- Nie, N. H., C. H. Hull, J. G. Jenkins, K. Steinbrenner, and D. H. Bent, 1975. Statistical Package for the Social Sciences, 2nd Edition. McGraw-Hill Book Company, New York, New York.
- Peterson, G. L., 1975. Perceptual Bases for Outdoor Recreation Choice by Teenagers-Relationships Between Cultural and Environmental Attributes. The Technological Institute, Northwestern University.
- Roggenbuck, J. W., 1980. Wilderness Users Preferences: Eastern and Western Areas. *In: Proceedings of Wilderness Management Symposium*, November 13-15. USDA Forest Service and Univ. of Tennessee, Knoxville, Tennessee.
- Sessoms, H. D., 1963. An Analysis of Selected Variables Affecting Outdoor Recreation Patterns. *Social Forces* 43:112-115.
- Tinsley, H. E., T. C. Barrett, and R. A. Kaas, 1977. Leisure Activities and Need Satisfaction. *Journal of Leisure Research* 9(2):110-120.
- Udd, E., 1981. Visitor Perceptions of Recreation Settings Defined by the Recreation Opportunity Spectrum Criteria. Master's Thesis, University of Nevada, Reno, Nevada, 56 pp.
- U.S. Department of Agriculture, Forest Service, 1980. ROS Users Guide (Handbook). USDA Forest Service, Washington, D.C., 38 pp.
- Wollmuth, D. C., 1982. Evaluation of the Recreation Opportunity Spectrum (ROS) System for Classifying Rivers. Master's Thesis, University of Minnesota, Minneapolis, Minnesota, 82 pp. + appendices.