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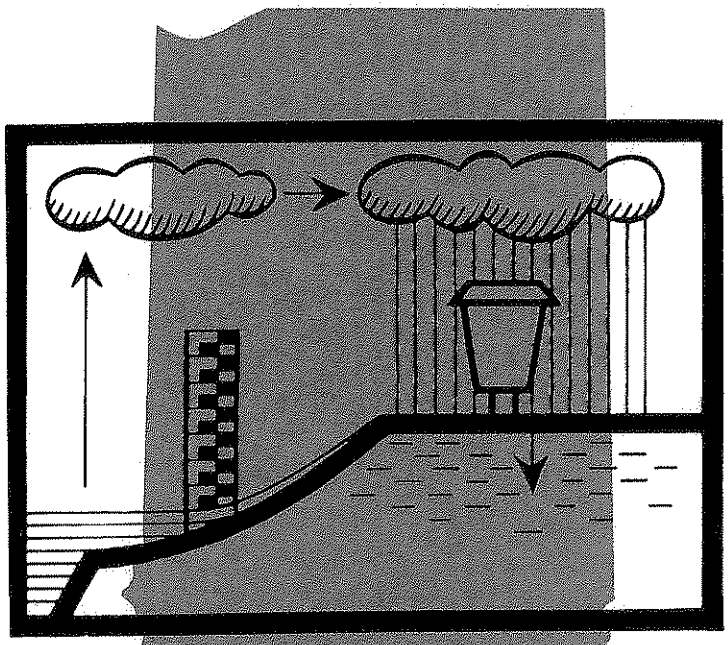
TECHNICAL REPORT 172
G905-05

IMPACT OF RECREATION ACTIVITY SPECIALIZATION ON MANAGEMENT AND PROGRAM SUPPORT FOR WATER RESOURCES



by

Joseph T. O'Leary

and

Jean C. Behrens-Tepper

September 1985

PURDUE UNIVERSITY
WATER RESOURCES RESEARCH CENTER
WEST LAFAYETTE, INDIANA

Technical Report Number 172

IMPACT OF RECREATION ACTIVITY SPECIALIZATION ON MANAGEMENT AND PROGRAM SUPPORT FOR WATER RESOURCES

by

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Water Resources Research Center
Purdue University, West Lafayette, IN 47907

September 1985

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ABSTRACT

Impact of Recreation Activity Specialization on
Management and Program Support
for Water Resources

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Recreation specialization is a term that refers to disaggregating participants within specific outdoor recreation activities into more homogeneous subgroups. This conceptual framework has been applied to Indiana freshwater anglers as high visibility users of the state's water resource. The angler sample examined consists of 535 Indiana residents who responded to the 1980 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. The present study classified anglers into 3 ordinal specialization categories based on annual frequency of participation in 4 different types of freshwater fishing.

Results indicate that level of specialization is related to concentration on a particular freshwater type. Urban anglers are proportionately represented in each specialization level. Approximately 40 percent of Indiana freshwater anglers fish most in man-made lakes and reservoirs greater than 10 acres; 13 percent fish most in rivers and streams. Little support is found for the hypothesis that conservation organization support varies predictably with level of specialization.

Age at initial exposure to fishing and years of fishing experience both are found to differentiate among those freshwater anglers exhibiting low, medium, and high levels of participation. The distribution of age at initial exposure to fishing indicates that over 95 percent of Indiana's freshwater anglers are involved by age 20. The importance of an early introduction to fishing for continued participation as an adult suggests that agencies consider providing future anglers with early learning opportunities.

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INTRODUCTION

The 1984 Indiana Outdoor Recreation Plan (IDNR 1984) notes in its discussion of "Recreational Opportunities" that many of the most outstanding places to visit in the state include lakes, rivers, streams, reservoirs, and impoundments that stretch from Lake Michigan to the Ohio River. The same plan points toward a growing interest in water-based recreation activities and increasing pressure to develop Indiana's inland waterways for recreational use.

As pressures mount to accommodate more recreation demand, state and regional water resource issues that incorporate recreational interests are increasing in complexity and importance. Geographically, Indiana is located in The Great Lakes - Upper Mississippi - Ohio River Basins defined as Region IV by the National Association of Water Institute Directors. At both the state and Region IV levels, there are a number of related items identified as priority concerns. Demand for sport fishing and other water-based recreation activities are expanding and this trend is expected to continue (IDNR 1984). In addition, a continuous demand exists to develop water-based recreation activities in close proximity to urban centers (USDI 1978; IDNR 1984). Pollution of lakes and streams affects the actual and perceived ability of recreational participants to use the resource and derive satisfaction. The quantity and quality of aquatic and freshwater related wildlife habitats are being lost or degraded, running counter to real and expected recreation growth (IDNR 1984).

As resource management agencies and state policy makers begin to take action on these issues, one important need will be to identify the types of users of these environments and the potential for conflict between different types of users and the responsible management agency. Empirical investigations of water resources in Indiana have concentrated almost exclusively on biological considerations (O'Leary and Dottavio 1979). Recent research (Heberlein

1977; Vaske and Donnelly 1980) suggests that failure to obtain input from social as well as biological sciences neglects the interdisciplinary character of resource allocation issues, and may hinder a program's effectiveness. A policy that is biologically sound but contrary to recreation participants' attitudes and behavior may not receive the support and cooperation needed to achieve its intended goal, and thus, may lead to social conflict.

Recreation specialization refers to within-activity variability in degree of orientation and activity involvement exhibited by participants. Bryan (1977) defined the term recreation specialization as a multi-dimensional continuum of behavior extending from the general to the particular. In an outdoor recreation activity, the dimensions of specialization are reflected by time spent, equipment, expenditures, skills used, and resource setting preferences. Bryan (1977, 1979) developed a typology of trout fishermen based on the underlying specialization continuum. He identified four levels of increasing angler specialization and predicted that anglers progress into more specialized stages over time. By definition, those anglers at the upper end of Bryan's (1977,1979) ordinal classification exhibit more specialized participation in trout fishing than those anglers at lower levels.

Recreation specialization supplants traditional theories (Bryan 1976) that assumed homogeneous behavior among participants within a specific activity. Identifying types of users and their degree of specialization may be useful in predicting attitudes and behavior of recreation participants. Such information would provide management agencies with a better understanding of the differences between clientele subgroups.

Identification of the Water Related Problem

There has been limited collection and in some cases no analysis of water-based recreation participation data in Indiana (O'Leary and Pate 1978; O'Leary and Dottavio 1979). Insufficient data collection and analysis are serious problems because, in the absence of data from local populations, incorrect inferences may be made about Indiana recreationists and resources with information collected in other parts of the country (O'Leary and Dottavio 1979; O'Leary et al. 1983). Extrapolated participation data does not take into account regional differences in behavior of water-based activity participants. Effective water resources management and planning for the state of Indiana should incorporate information about behavior and attitudes of its recreating population. An important direction for Indiana water resources research efforts should be to reject the traditional assumption of recreation activity homogeneity and to examine the variable recreation specialization as it relates to sportsman behavior and attitude formation.

Limited research (Romsa and Girling 1976; O'Leary and Pate 1979) into participation levels and activity specialization suggest that there are a small group of participants responsible for a large amount (60% to 80%) of the overall recreation participation that occurs. This intense involvement suggests a particularly interested group that affects demand for a resource, has the greatest impact both on- and off-site, and has the greatest potential to become involved in conflicts involving water resource use because of strong commitment to conservation.

The purposes of this research are (1) to compare water resource recreation participants who exhibit high and low levels of use on their attitudes and knowledge of recreation resource issues and solutions, (2) to examine factors that may influence the similarities or differences among high and low level

participants on these issues, and (3) to profile the composition of groups and positions that resource managers can become familiar with, to improve their recognition of conflict potential based on a knowledge of participants rather than activities. Indiana's freshwater anglers have been selected as high visibility users of the state's water resource.

Research Objectives

In response to the research priorities for recreation in Indiana and the Great Lakes Region, a study has been undertaken to develop a classification of different recreation participants for management and planning use with the following five objectives:

1. Empirically develop an activity specialization index that classifies different user groups within and between activities.

2. Evaluate the impact of resource access, and opportunity in activity specialization.

3. Test if age at which first exposure to an activity occurred and subsequent experience differs between activity participants with different levels of specialization.

4. Measure the extent to which activity specialization affects environmental organization involvement.

5. Determine if participant specialization levels affect attitudes toward program funding and management alternatives.

Hypotheses

Hypotheses have been designed to test some relationships evident in the above objectives. Stated in null form, study hypotheses are as follows:

H_1: There are no differences in sociodemographic variables or conservation organization support among Indiana angler subgroups that differ in degree of concentration on specific types of freshwater fishing.

H_2: There is no relationship between adult freshwater fishing participation level and age at time of first exposure to fishing or subsequent years of experience.

H_3: There is no relationship between frequency of angling participation and the number of different types of freshwater used for fishing.

H_4: There is no relationship between frequency of angling participation and resource setting preference (concentration on a specific type of freshwater fishing).

RELATED RESEARCH

Sufficient evidence exists (Graefe 1980; Kauffman 1984; Behrens-Tepper et al. 1985) to warrant further investigation of Bryan's recreation specialization concept (1977, 1979). The present study is designed to examine the degree of specialized use of Indiana inland waterways by freshwater anglers. Particular attention is paid to identifying variables that can be used to categorize different angler subgroups. This study builds upon previous work by Bryan (1977, 1979) and Graefe (1980) by examining the relationship between frequency of angling participation and other aspects of angler specialization. A new contribution of the present study is to examine the age at initial fishing experience as it relates to level of specialization achieved as an adult.

The following review of the literature includes two areas of social science research relevant to the testing of the previously stated hypotheses. Research topics reviewed are recreation specialization and the process of socialization toward outdoor recreation.

Recreation Specialization

A classification scheme based on degree of within-activity specialization is one strategy that has been proposed in order to separate outdoor recreationists into homogeneous subgroups (Van Doren and Lentnek 1969; Ditton et al. 1975; Romsa and Girling 1976; Bryan 1977, 1979; O'Leary and Pate 1978). Jacob and Schreyer (1980) further examined specialization in order to explain conflicts that occur in outdoor recreation.

One priority of water-based recreation planning and management is defining subgroups of participant populations. Significant differences can exist in the behavior patterns and attitudes of participants within the same recreation activity (Peterson 1974; Hautaloma and Brown 1978; Hicks et al. 1983).

Management directed toward satisfying the "average" recreationist may fail to provide distinct subgroups with satisfying experiences (Shafer 1969; Bryan 1976). Resource managers who are only familiar with traditional generic activities cannot deal effectively with the increasing segmentation and sophistication of the recreating public (Kauffman 1984; Lindner 1985). If incompatible subgroups interact, the potential for social conflict increases between different types of resource users and the responsible management agency (Jacob and Schreyer 1980).

Bryan (1977, 1979) observed that progressive and predictable levels of specialization are found within any recreation activity. He defined a continuum of recreation behavior, the dimensions of which were reflected in the equipment, skill, and preferences of participants. Based on an exploratory field study over a 3 year period in Montana and Idaho, Bryan (1977) developed a typology of trout fishermen along with a series of explanatory propositions. He proposed that various dimensions of the specialization continuum would vary predictably with increasing level of angler specialization. Bryan (1979) suggested that similar typologies could be used to explain the diversity of behavior and attitudes inherent among participant subgroups within a wide range of outdoor recreation activities. For example the sport-wide influence of "technique-setting specialists," Bryan's (1977, 1979) smallest yet most specialized angler subgroup, was explained by developing the concept of "leisure social worlds". Bryan found that the most specialized individuals form an influential peer group network with fellow specialists. Members of this group were hypothesized to show the strongest commitment toward conservation policy and practice. Wellman et al. (1982) further developed this concept by suggesting that small groups of highly committed and expert people emerge to set the standards for attitudes and behavior in an activity.

The concept of specialization developed by Bryan (1977, 1979) is applicable to water-based recreation planning and management. The notion of people starting some activity at a given level of involvement and progressing to greater levels of commitment and discrimination is intuitively appealing and particularly appropriate to recreation. An easily understood classification scheme is presented that arrays people from low to high, rather than according to complex, empirically derived scales (Wellman et al. 1982).

The classification of within-activity participant subgroups has continued to receive support in the recreation behavior literature. Vaske et al. (1982) argued for a movement away from the more traditional activity versus activity comparison to a consideration of groups operating along a continuum of involvement. Stebbins (1982) proposed a dynamic model of leisure activity involvement in which participants form a professional- amateur-public system based on degree of committed orientation toward the activity in question. Ditton et al. (1980) reported that patterns of participation within marine sport fishing could be predicted from boat-equipment variables used as measures of saltwater angler skill levels. Previous activity experience is another criteria proposed as both a single item indicator (Schreyer and Lime 1984) and as the basis of a multivariable index (Schreyer et al. 1984) to explain differing patterns of participation and perceptions of the environment among river recreationists. A similar index of past on-site experience was examined by Hammitt and McDonald (1983) to explain differential attitudes of river floaters toward managing river recreation resources. Hammitt and McDonald's (1983) analysis indicated that level of user experience was related to user perceptions of management issues.

Jacob and Schreyer (1980) provide a theoretical framework to describe activity specialization along a continuum linked to sources of recreation

conflicts. They identified four major factors that produce conflict: activity style, resource specificity, mode of experience, and lifestyle tolerance. A central theme to their theory is "intensity of participation", that is interpreted much like Bryan's (1977, 1979) concept of specialization. As the level of participation increases, the activity becomes more of a central life interest. The conflict prone individual develops a strong normative view of accepted behavior, has less flexible views on use and management of the environment, and is less tolerant of sharing resources with members of other lifestyle groups. Without this understanding of social structure and process in outdoor recreation settings, inappropriate management strategies and techniques for resolving conflict are likely to be adopted by resource agencies (Jacob and Schreyer 1980).

Recent research has attempted to operationalize portions of Bryan's (1977) original thesis of recreation specialization. Graefe (1980) demonstrated that annual frequency of angling participation was a useful measure of angler specialization among registered Texan boat owners. Graefe's (1980) analysis indicated that those anglers who fished more frequently were characterized by greater involvement with equipment, higher levels of skill, wider variety of fishing settings used, greater participation in angler social groups, and attached greater importance to more challenging aspects of angling than those who fished less often. Katz (1981) tested Bryan's (1977) resource setting dependency and resource orientation propositions, and found that concern for the environment and conservation increased with activity involvement level among Pennsylvania fly fishermen. Katz (1981) defined activity involvement by an individual's score on a multivariable scale or index based on participation patterns and preferences for conditions and techniques. Applicability of Bryan's (1977) specialization theory to an activity other than

fishing was demonstrated by the Wellman et al. (1982) study of mild whitewater river canoeists in Virginia. Canoeists were stratified according to a 10-element specialization index in order to test if attitudes toward depreciative behavior varied with specialization. The analysis of this study (Wellman et al. 1982), however, provided very limited support for its hypothesized relationship. On-site depreciative behavior may have been uniformly repugnant to all river recreationists sampled regardless of their specialization level. More recently, Kauffman's (1984) examination of a cross-section of eastern canoeists found that relationships do exist between specialization level and both resource related attitudes and expected benefits. Response variables chosen by Kauffman (1984) that included achievement, experiencing nature, and equipment testing were perhaps more consistent with Bryan's (1977) propositions than the Wellman et al. (1982) attitudes toward depreciative behavior.

A multivariate, 4-dimensional (participation, equipment, skill, lifestyle) index based on Bryan's (1977) definition of specialization was used by Kauffman (1984) to separate canoeists into homogeneous subgroups. Kauffman (1984) repeated his analyses using each dimension as a single variable indicator of specialization. Each dimension was found to discriminate among the resource related attitudes of canoeists, with lifestyle being the most discriminating. McGurrin (1984) introduced a single variable measure of specialization based on self-rating of respondents in a study of Maryland trout fishermen. McGurrin (1984) reported that highly specialized anglers exhibited greater commitment to the sport, had more specific quality requirements, and had greater interest in conservation of the resource than less specialized anglers.

Questions remain in the specialization literature regarding the relatively superiority of single variable indicators versus multi-dimensional indices.

Similar questions exist regarding researcher defined typologies versus respondent reported scales (Randall 1984). Randall's (1984) study is one of the first to compare the various methods used to classify subgroups of recreationists. She concludes that, while both single item indicators and multivariate indices have certain advantages and disadvantages, respondent defined scales are clearly superior to those that are researcher defined (Randall 1984).

Classifications based on within-activity specialization have been shown to provide useful information on attitudes and behavior of sportsmen in specific activities (Graefe 1980; Katz 1981; Kauffman 1984; McGurrin 1984). Information about the behavior of recreation participants is required to plan effective action on water-based recreation management issues identified as important in Indiana and Region IV. Continued empirical investigation of recreation specialization, therefore, can provide a better base of knowledge for water resources management and planning. The present study is designed to apply Bryan's (1977,1979) theories about recreation specialization to Indiana freshwater anglers. By identifying subgroups of anglers that differ in their frequency of use and concentration on specific aquatic resources, management agencies may be better able to elicit support from, and minimize conflict among these clients.

Socialization Toward Outdoor Recreation

The objectives of the present study are to identify the degree of specialized participation in Indiana freshwater fishing and to classify different angler subgroups. Further, this study proposes that the age at which an individual was initially exposed to fishing influences the level of angling specialization achieved by adult sport fishing participants. Age at initial

fishing experience is to be used as a measure of the extent of socialization toward the activity.

Socialization generally refers to the process whereby new individuals are initiated into a culture (Elkin 1978). Socialization may also be applied to learning particular aspects of that culture, such as rules for traditional childhood games and other structured uses of leisure time (Kelly 1974, 1977).

The relationship between childhood outdoor recreation experience and patterns of participation as an adult has been analyzed by numerous workers (Burch and Wenger 1967; Burch 1969; Hendee 1969; Sofranko and Nolan 1972; Christensen and Yoesting 1973; Yoesting and Burkhead 1973; Kenyon and McPherson 1973; Kelly 1974, 1977; Yoesting and Christensen 1978; Spreitzer and Snyder 1983). The earliest of these studies suggested the importance of the family and childhood environment to adult style of leisure participation, the "personal community," "pleasant childhood memory," and "opportunity" theories (Burch and Wenger 1967; Burch 1969; Hendee 1969). Other studies, which examined the "carry-over" of specific outdoor recreation activities from childhood to adulthood, concluded that childhood participation was highly correlated with adult participation (O.R.R.R.C. 1962, Bevins et al. 1968). Burdge and Field (1972) indicated the need for further exploration of "previous satisfying experience" as a motivational variable explaining subsequent outdoor recreation patterns.

Studies conducted during the seventies (Yoesting and Burkhead 1973; Christensen and Yoesting 1973; Yoesting and Christensen 1978) suggested that socialization toward outdoor recreation involved the development of a general receptiveness or disposition to active rather than passive endeavors during leisure time. Variation in the number of activities participated in during early life was shown to explain the variation in the extent of participation

during adult life. A child active in outdoor recreation is likely to be active as an adult (Yoesting and Christensen 1978). Kelly (1974, 1977) reported that approximately one-half of the recreation and sport activities in an adult's leisure repertoire were carried over from childhood. The balance of activities were those begun as an adult. Kelly used this evidence to support the concept of socialization toward leisure as a life-long developmental process.

Yoesting and Christensen (1978) found that childhood participation in a specific activity has low predictive value in determination of adult participation in the same activity. Hunting and fishing, however, do exhibit such carry-over. Sofranko and Nolan (1972) examined the relation of childhood background variables to adult levels of participation in hunting and fishing. They found that urban versus rural childhood residence, and the individual or social group who introduced the sport, were related to the extent of participation during youth. However, while it was found that frequent youthful participation in hunting and fishing was related to frequent adult participation, no relationship was found between childhood residence or source of introduction to the sport and higher levels of participation as an adult. This paradox was resolved by consideration of the influence of intervening factors such as income, free time, and access that emerge at different points of the life and work cycle. Intervening factors, in turn, diminish the influence of childhood background variables (Sofranko and Nolan 1972).

Fishing as an outdoor recreation activity has been shown to exhibit carry-over from childhood to adulthood (Sofranko and Nolan 1972; Yoesting and Burkhead 1973). The present study seeks to determine if age at first exposure to fishing differentiates between those freshwater anglers reporting low, medium, and high levels of angling participation.

METHODS

In agreement with Knopf's (1983) opinion that "data abound," no new data were collected in order to meet the present study's objectives. The source of this pre-existing data set was the 1980 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (FHWAR), conducted by the U.S. Bureau of Census (USBC), for the U.S. Fish and Wildlife Service (USFWS). The end product of this survey was an exhaustive compilation of estimates of angler, hunter, and nonconsumptive wildlife resource user populations, their sociodemographic characteristics, participation, and expenditures (USDC 1982).

In Indiana, as elsewhere, this data set has remained a largely untapped reservoir of information due to its great length and unwieldiness. Smaller segments of data are needed to provide resource managers with more useful information about the recreation behavior of their clients. The present study has attempted to apply Bryan's (1977) thesis of recreation specialization to Indiana freshwater anglers as high visibility users of the state's water resource. Therefore, after selecting Indiana residents from the data base, only those cases in which the respondent reported freshwater fishing in the state of Indiana have been analyzed.

Sampling Design

The 1980 FHWAR Survey was designed to provide independent estimates of hunting and fishing participation rates at the state level and nonconsumptive wildlife recreation rates at the regional level. A multistaged stratified sample of the U.S. population was selected. Sampling was conducted in two phases: an initial random screen of households to identify participants and a detailed followup interview of participants in selected households (USDC 1982).

The initial screening phase, conducted primarily by phone, sought to identify households in which at least one member, 6 years or older, engaged in wildlife-associated sport or recreation. Roughly 143,000 screening sample households were selected nationwide from expired Current Population Survey (CPS) samples (USDI 1982). Indiana's screening sample households were identified from CPS samples of the period November 1978 to February 1980. A response rate of approximately 95.8 percent was obtained with the successful completion of 2,560 screening interviews. The screening phase was completed in Indiana in March 1981 (USDI 1983).

The hunting and fishing portion of the followup phase consisted of detailed, personal interviews of all sportsmen, 16 years and older, residing in selected households with participants. The Hunting and Fishing Questionnaire, File FH-3, yielded over 30,000 records of individual sportsmen nationwide, with 5676 characters of information for each respondent. A sampling scheme developed by the USBC Statistical Methods Division selected detailed sample households based on the highest level of participation for any one sportsman in a household as reported in the screening interview. According to the survey summary booklet prepared for the state of Indiana (USDI 1983:64):

> "This procedure grouped households into two levels of participation, substantial households, i.e., at least one household member fished or hunted for 30 days or more or spent more than $500 for fishing or hunting, and nonsubstantial households. These households were further grouped by hunter and nonhunter classifications. Differential sampling rates were applied to the four strata such that one-fourth of the households in the nonsubstantial nonhunter stratum were revisited, one-half of the households in the nonsubstantial hunter stratum were revisited, and all of the households in the substantial hunter and nonhunter strata were revisited. Once a household was selected for detailed interviewing, all participants 16 years old and older, irrespective of their level of participation, were interviewed in detail. The [Indiana] detailed sample consisted of 500 households, selected from households identified from the screening sample as containing a sportsman. Roughly, 770 sportsmen were selected for detailed interviewing. Of these... a response Rate of 91.7 percent of eligible selected sportsmen

> [was obtained]. In all, about 680 interviews with [Indiana] sportsmen were completed. Including nonresponse to both the screening phase and the detailed phase as well as [any] misclassification of sportsmen, the overall response rate was roughly 84.5 percent."

Sportsmen participants in the detailed phase were limited to those at least 16 years of age because of the length and complexity of the FH-3 Questionnaire. Detailed sample interviewing was completed in Indiana in June 1981 (USDI 1983).

Those sportsmen interviewed, therefore, comprised a stratified rather than a random probability sample of the Indiana sportsman population. The USBC sampling scheme assigned a weighting variable to each individual case. The SPSS (Nie et al. 1975) data analysis system was used to inflate sample statistics to estimated population parameters.

Variable Selection

Variables analyzed in the present study were selected on the basis of the previously stated hypotheses. Pertinent variables included sociodemographic characteristics, age at initial exposure to fishing, and those variables measuring various aspects of angler specialization.

Variables selected from the Screening Questionionnaire, File FH-2, were the sociodemographics (coded as TENURE, T3C, I5A, I6, I7A, I8A, I9, I10A, I10B, I11, I12, HHSIZE, I13, I15A, UR) (USDI 1982). Variables selected from the Follow-up Hunting and Fishing Questionnaire, File FH-3, were those dealing with type of freshwater and degree of resource concentration (coded as 12930B through 12930B3); those dealing with conservation organization membership (coded as 149B, 150B, 151A, 151B); the number of days spent freshwater fishing in the respondent's state of residence in 1980 (coded as I24B); the age at which the respondent first fished (coded as 148A); and the number of years of fishing experience (coded as I48B) (USDI 1982).

Additional variables were computed as needed by means of SPSS data modification cards (Nie et al. 1975). The number of different freshwater types used, chosen out of four possibilities defined in the 1980 FHWAR Survey, was computed for each respondent in this manner.

Levels of Measurement

Sociodemographic and conservation activity variables were measured in dichotomous or ordinal categories. Resource setting preference, the degree of concentration on a specific type of freshwater fishing, was measured in 3 ordinal categories: none, some, or most fishing done in a particular freshwater type. The variable of resource setting preference was a respondent-reported qualitative measure and was not based on a researcher-specified quantitative interval (Randall 1984).

Building on the results of Graefe's (1980) study, annual frequency of angling participation was used as a quantitative measure of angler specialization. Annual angling frequency, the total number of days spent freshwater fishing in Indiana in 1980, was collapsed into 3 ordinal categories, representing low (1-7 days), medium (8-29 days), and high (30 days or more) levels of participation.[1] These categories were based on the histogram of the total annual angling frequency distribution generated by the SPSS subprogram, Frequencies (Nie et al. 1975). Boundaries between categories were defined by the weekly interval nearest empirically occurring breaks observed on the angling frequency distribution histogram.

---

[1] It was not the intent of the present study to duplicate Graefe's (1980) empirically derived annual fishing frequency scale of "low - medium - high - very high." The category designated as "high" in the present study included all freshwater anglers who spent 30 days or more fishing and, thus, was consistent with the previously quoted USBC sampling scheme's definition of a substantial household. While recognizing the impact of the 10% of Indiana freshwater anglers who fish 60 days or more, this study did not identify a fourth "very high" category.

The age at initial exposure to fishing was collapsed into five ordinal categories: ages 1 through 6, 7 through 12, 13 through 15, 16 through 18, 19 and older. Boundaries of the first 4 age categories were devised to approximate the ages of the school years: preschool, elementary, junior and senior high. The rationale for this age class grouping followed from a recent study (Behrens-Tepper and O'Leary 1985) of Indiana deer hunters and socialization toward their sport. Subsequent years of angling experience was collapsed into four ordinal categories: 1 through 10 years, 11 through 20 years, 21 through 30 years, and 31 years or more. Developing groupings or age classes for the age at initial exposure to fishing and subsequent years of experience variables received additional support from previous studies (Hiett and Worrall 1977; Graefe 1980) that recommended treating respondent recalled numerical data over time as ordinal categories rather than continuous variables.

Classifications based on a unit of time are scales that provide information not only about the magnitude of differences between their elements, but also on the exact distances between those elements (Blalock 1960). The classifications of age at initial exposure to fishing, years of experience, and 1980 angling days afield developed in the present study, therefore, may also be considered interval level measurements for purposes of selecting the appropriate statistical measure of association.

Data Analysis

Distributional characteristics of categorical variables used to test the present study's hypotheses were determined with the SPSS subprogram, Frequencies (Nie et al. 1975). Range and total distribution of responses to age at initial exposure to fishing and 1980 angling days afield were also computed by Frequencies analyses in order to recode these continuous variables

into mutually exclusive categories. Relative frequencies of categories presented as one-way frequency distribution tables were based on percentages of the inflated population estimate. Subsequent statistical analyses, however, were based on the number of Indiana freshwater angler cases selected from the uninflated weighted sample.

The statistical procedure used to test the four hypotheses was a contingency table analysis generated by the SPSS subprogram, Crosstabs (Nie et al. 1975). The general hypothesis testing format involved a cross-tabulation, or joint frequency distribution of cases, according to an independent and a response classificatory variable (Nie et al. 1975). A crosstabulation, or cross-classification analysis, has been established as an appropriate statistical procedure for variables that are classified into exhaustive and mutually exclusive categories (Everitt 1977). A test of statistical significance and measures of association for nominal, ordinal, and interval level variables may be computed to provide hypothesis decision criteria.

A test of statistical significance was provided by the Chi-square statistic. The Chi-square statistic has been shown to test for independence between the row and column variables in a cross-classification (Reynolds 1977). Limitations of the Chi-square technique, however, were twofold. Sample size and table size exerted a strong influence on Chi-square significance. As with any test statistic, its magnitude was proportional to the sample size (Reynolds 1977:9). Secondly, a Chi-square test indicates only that the two variables may or may not be statistically independent; it did not describe the strength or form of the relationship. A measure of association, that was appropriate to the level of variable measurement, was required in addition to the Chi-square statistic in order to indicate how strongly the two variables were related (Nie et al. 1975; Reynolds 1977).

Acceptance or rejection of each null hypothesis, therefore, was based on a cross-classification analysis of the uninflated weighted sample (n=535) rather than the inflated population estimate (n=916,031). Depending on whether the independent and response variables were considered of ordinal or interval level, measures of association selected were Kendall's Tau and the Pearson Correlation. Kendall's Tau was selected, following Reynolds' (1977) recommendation that it was a conservative ordinal correlation coefficient that gave better approximation to the "true" correlation than other available measures. Kendall's Tau B and C were provided by the SPSS subprogram, Crosstabs (Nie et al. 1975). Nie (1975) recommended that Tau B was appropriate for a square crosstabulation table, while Tau C was appropriate for a rectangular table (one in which the number of rows differs from the number of columns). The Pearson product-moment correlation was selected following Nie's (1975) recommendation that it was the most appropriate measure of association when both variables were at the interval or ratio level. The Pearson Correlation also was provided by the SPSS subprogram, Crosstabs (Nie et al. 1975).

Hypothesis 1, developed in order to identify variables appropriate for classifying Indiana freshwater anglers, used sociodemographic characteristics and conservation organization support as independent variables, and degree of concentration on a specific type of freshwater fishing as the response. Hypothesis 2, developed in order to test a measure of the influence of socialization toward fishing on adult participation level, used age at time of first exposure to fishing and subsequent years experience as the independent variables, and annual angling frequency as the response. Hypothesis 3, developed to test the relationship of increased angler specialization with variety of fishing settings, used annual angling frequency as the independent variable, and the number of different types of freshwater used for fishing as

the response. Hypothesis 4, developed to test the relationship of a researcher - specified measure of increased angler specialization with a respondent - recalled measure of resource setting preference, used annual angling frequency as the independent variable, and degree of concentration on a specific type of freshwater fishing as the response.

The decision criterion for rejection of each null hypothesis was the $p = 0.05$ level of significance. All computation were performed on the Purdue University CDC 6500 Computer using the SPSS data analysis system (Nie et al. 1975).

RESULTS

This chapter presents frequency distributions of pertinent variables as well as results of the four hypotheses tests. Of the 680 Indiana resident sportsmen who completed FH-3, the follow-up Hunting and Fishing Questionnaire, 622 identified themselves as anglers. Five hundred thirty-five of these individuals reported having done freshwater fishing in Indiana in 1980. The inflation of this weighted sample (n = 535) by the USBC precoded weighting factor yields a population estimate of 916,031 Indiana freshwater anglers. As the magnitude of the inflated population estimate would exert undue influence on computed test statistics, cross-classification analyses have been performed on the weighted, stratified sample (n = 535) of freshwater anglers interviewed.

Frequency of Angling Participation

The objectives of the present study call for developing a classification of Indiana freshwater anglers based on their degree of recreation specialization. Annual frequency of participation has been demonstrated (Graefe 1980) to be a useful measure of angler specialization. The distribution of annual participation in Indiana's freshwater fisheries by state residents has been obtained by a frequency analysis of the responses to Item I24B of the 1980 FHWAR Survey.

The resulting distribution of the estimated freshwater angler population classified according to three levels of annual participation (Table 1) shows 73% of respondents falling into the low and medium categories. The number of freshwater angling days afield ranges from a minimum of 1 to a maximum of 270. The mean number of freshwater angling days is 22.2, the median is 10.5, with a standard deviation of 32.1. More cases are found to the left of the mean value than to the right, with 68% reporting 22 days or less. Thirty days or more,

Table 1

Classification of 1980 Indiana Freshwater Anglers by Annual Frequency of Participation

Reported No. of 1980 Freshwater Angling (Days)	Absolute Freq. of Anglers (n)	Relative Freq. of Anglers (%)
1 - 7 (Low)	361,126	39.4
8 - 29 (Med.)	308,191	33.6
30 - 207 (High)	224,796	24.5
Nonrespondents	21,917	2.4
Total	916,031	100.0

$\bar{X}$ = 22.2 angling days
Median = 10.5

which would satisfy the USBC sampling scheme's definition of a substantial household is reported by approximately 25% of the respondents. The high standard deviation is accounted for by the nearly 10% of cases that reported 60 days or more afield. This skewed distribution is in agreement with the results of previous studies (Romsa and Girling 1976; O'Leary and Pate 1979; Graefe 1980) which found that a small percentage of participants in outdoor recreation activities are responsible for the majority of activity occasions. A classification of anglers based on annual frequency of participation, therefore, appears to be a reasonable single variable indicator of level of angler specialization.

Variety of Resource Settings

Bryan's (1977) original thesis proposes that any typology of recreationists based on their degree of activity specialization should consider environmental setting in addition to frequency of participation. The 1980 FHWAR Survey distinguishes four types of freshwater settings in Items I2930B through I2930B3. They are as follows: (1) Man-made lakes, reservoirs 10 acres or more; (2) Man-made ponds, reservoirs less than 10 acres: (3) Natural lakes, ponds; and (4) Rivers and streams. The frequency distribution of angling participation among these four types can provide some indication of the patterns of water resource use among Indiana freshwater anglers.

Apparent in the distribution of number of types of freshwater settings used (Table 2) is that nearly 75% of respondents reported using two types or less. The modal number of freshwater settings used is just one type. Only about 8% of cases participated in all four types of freshwater settings.

Table 2

Number of Different Types of Freshwater Settings Used by 1980 Indiana Anglers

No. of Freshwater Types Used	Rel. Freq. (%) (n = 916,031)	Cumulative Freq. (%)
1	45.2	50.0
2	22.3	74.7
3	15.2	91.5
4	7.7	100.0
Nonrespondents	9.6	---
Total	100.0	

$\bar{X}$ = 1.8 types
Median = 1.5
Mode = 1.0

Test of Hypothesis

The distribution of freshwater setting usage (Table 2) can now be applied to testing a study hypothesis by comparing the frequencies of number of freshwater types used across the levels of the annual frequency of participation classification (Table 1). Study Hypothesis 3 states:

H_3: There is no relationship between frequency of angling participation and the number of different types of freshwater used for fishing.

The general hypothesis testing format involving a cross-classification analysis of two classificatory variables has been conducted on interview responses obtained from the weighted angler sample (n = 535). Although category percentages may differ slightly from those of the inflated population estimate (n = 916,031), the indicated strength of relationships will be similar (McCabe, pers. commun.)

The data indicate that the null hypothesis of independence is rejected (Table 3). Annual frequency of angling participation is found to be related at the p = 0.05 level or less to the number of different types of freshwater used for fishing. Indiana anglers who participate less frequently are less likely to take advantage of a variety of freshwater settings. The emerging pattern of water resource use among the majority of Indiana freshwater anglers is low to medium levels of participation in a particular resource setting.

Resource Setting Preference

Although the 1980 FHWAR Survey data set was not designed specifically for specialization study, the question series I2930B through I2930B3 can be used to construct a classification of anglers based on respondent-recalled resource setting preference. Respondents specified whether they did none, at least some, or most of their in-state fishing in each of the four types of freshwater identified in the survey.

Table 3

Cross-classification of Frequency of Participation by Number of Freshwater Settings Used by 1980 Indiana Anglers in Sample

Key: (n)
Col. Pct.

Frequency of Participation	No. of Freshwater Types Used 1	2	3	4	Row Total
Low	(104) 51.0	(34) 26.4	(5) 5.2	(4) 8.5	(147) 30.8
Medium	(50) 24.5	(58) 45.0	(31) 32.0	(17) 36.2	(156) 32.7
High	(50) 24.5	(37) 28.7	(61) 62.9	(26) 55.3	(174) 36.5
Col. Total	(204) 42.8	(129) 27.0	(97) 20.3	(47) 9.9	(477) 100.0

Chi Square = 99.6447 Significance p < 0.0001

Kendall's Tau C = 0.3579 Significance p < 0.0001

Pearson's R = 0.3916 Significance p < 0.0001

Table 4 presents the distribution of the estimated Indiana freshwater angler population according to self-reported degree of concentration on each of the four types of freshwater settings. The data indicate a slight dominance of the larger man-made bodies of water in terms of angler usage. Approximately 40% of Indiana freshwater anglers fish most in man-made lakes and reservoirs of 10 acres or more; only 13% fish most in rivers and streams.

Table 4

Classification of 1980 Indiana Freshwater Anglers by Resource Setting Preference

Degree of Concentration	Absolute Freq. of Anglers (n)	Relative Freq. of Anglers (%)
Type 1. Man-made Lakes, Reservoirs ≥ 10 Acres		
None	449,466	49.1
Some	113,581	12.4
Most	352,985	38.5
Total	916,031	100.0
Type 2. Man-made Ponds, Reservoirs < 10 Acres		
None	591,522	64.6
Some	156,589	17.1
Most	167,920	18.3
Total	916,031	100.0
Type 3. Natural Lakes, Ponds		
None	562,709	61.4
Some	204,888	22.4
Most	148,433	16.2
Total	916,031	100.0
Type 4. Rivers and Streams		
None	537,918	58.7
Some	261,341	28.5
Most	116,772	12.7
Total	916,031	100.0

Test of Hypothesis

The intended purpose of the explanatory propositions developed by Bryan (1977, 1979) was to extend his typology of trout fishermen into a conceptual framework that would guide future research. The fourth of these propositions infers that as specialization level increases, dependency on particular resource types increases (Bryan 1977:186):

> "4. The values attendant to specialization are inextricably linked to the properties of the resource on which the sport is practiced. As level of angling specialization increases, resource dependency increases. What appeals to the specialist is a resource setting allowing for predictability and manipulation, a degree of control so as to be able to determine the difference between luck and skill."

The ordinal scale of "none-some-most" concentration on a particular freshwater setting affords the opportunity to compare a respondent-recalled scale of resource setting preference (Table 4) across a researcher-specified scale of angler specialization (Table 1). Study Hypothesis 4 states:

H_4: There is no relationship between frequency of angling participation and resource setting preference (concentration on a specific type of freshwater fishing).

The data indicate that the null hypothesis of independence is rejected (Table 5) for each of the four types of freshwater settings. The proportion of anglers in each concentration category for a particular resource setting is found to differ among the frequency of participation categories at the $p = 0.05$ level or less. Thirty to forty percent of those anglers who specify that most of their in-state fishing was done in a particular freshwater type fall into the high participation category. As several subsequent analyses are to be based on this respondent- specified "none-some-most" classification, both row and column percentages from the crosstabulations are presented (Table 5).

Table 5

Cross-classification of Frequency of Participation by Resource Setting Preference of 1980 Indiana Anglers in Sample

Key: (n)
Row Pct.
Col. Pct.

Frequency of Participation	Degree of Concentration None	Some	Most	Row Total
Type 1. Man-made Lakes, Reservoirs ≥ 10 Acres				
Low	(94) 58.7 38.1	(13) 8.1 18.6	(53) 33.1 26.1	(160) 30.8
Medium	(83) 46.4 33.6	(27) 15.1 38.6	(69) 38.5 34.0	(179) 34.4
High	(70) 38.7 28.3	(30) 16.6 42.9	(81) 44.8 39.9	(181) 34.8
Col. Total	(247) 47.5	(70) 13.5	(203) 39.0	(520) 100.0

Chi Square = 15.2751 Significance p < 0.01

Kendall's Tau B = 0.1272 Significance p < 0.001

Type 2. Man-made Ponds, Reservoirs < 10 Acres				
Low	(113) 70.6 35.8	(10) 6.3 9.2	(37) 23.1 38.9	(160) 30.8
Medium	(114) 63.7 36.1	(36) 20.1 33.0	(29) 16.2 30.5	(179) 34.4
High	(89) 49.2 28.2	(63) 34.8 57.8	(29) 16.0 30.5	(181) 34.8
Col. Total	(316) 60.8	(109) 21.0	(95) 18.3	(520) 100.0

Chi Square = 42.9327 Significance p < 0.0001

Kendall's Tau B = 0.1101 Significance p < 0.01

Table 5. (con't)

Frequency of Participation	Degree of Concentration None	Some	Most	Row Total
	Type 3. Natural Lakes, Ponds			
Low	(116) 72.5 38.7	(19) 11.9 14.6	(25) 15.7 27.8	(160) 30.8
Medium	(103) 57.5 34.3	(46) 25.7 35.4	(30) 16.8 33.3	(179) 34.4
High	(81) 44.8 27.0	(65) 35.9 50.0	(35) 19.3 38.9	(181) 34.8
Col. Total	(300) 57.7	(130) 25.0	(90) 17.3	(520) 100.0

Chi Square = 31.7393 Significance p < 0.0001

Kendall's Tau B = 0.1744 Significance p < 0.0001

	Type 4. Rivers and Streams			
Low	(114) 71.2 41.3	(120 12.5 11.5	(26) 16.2 37.1	(160) 30.8
Medium	(89) 49.7 32.2	(70) 39.1 40.2	(20) 11.2 28.6	(179) 34.4
High	(73) 40.3 26.4	(84) 46.4 48.3	(24) 13.3 34.3	(181) 34.8
Col. Total	(276) 53.1	(174) 33.5	(70) 13.5	(520) 100.0

Chi Square = 49.2829 Significance p < 0.0001

Kendall's Tau B = 0.1778 Significance p < 0.0001

Differences Among Subgroups

The objectives of the present study call for the identification of variables that may explain or vary predictably with varying degree of concentration on specific types of freshwater fishing. Sociodemographic variables and questions regarding support for conservation organizations have been selected for this purpose. The items chosen from File FH-2, the Screening Questionnaire, include: age, sex, race, education, employment, income, marital status, childhood environment, household size, ownership and locale of residence (Items TENURE, T3C, I5A, I5, I7A, I8A, I9, I10A, I10B, I11, I12, HHSIZE, I13, I15A, UR). The items chosen from File FH-3, the Hunting and Fishing Questionnaire, include: membership dues paid to local or national conservation or wildlife-related organizations, and reading of fishing, hunting, or wildlife magazines or periodicals (Items I49B, I50B, I51A, I51B).

Test of Hypothesis

The four distributions of resource setting preferences (Table 4) can now be used to test a study hypothesis by comparing the levels of the "none-some-most" concentration classification across groups representing levels of independent variables. Study Hypothesis 1 states:

H_1: There are no differences in sociodemographic variables or conservation organization support among Indiana angler subgroups that differ in degree of concentration on specific types of freshwater fishing.

This two part hypothesis has been developed in order to identify variables appropriate for classification of Indiana anglers within and between the four types of freshwater settings used for fishing. The general hypothesis testing format is repeated for the series of independent variables (sociodemographic

characteristics, conservation organization membership, familiarity with wildlife periodicals) and the four distributions of resource setting preferences.

Only seven of the 60 relationships between sociodemographic variables and resource setting preference examined have been found to be significant at the $p = 0.05$ level or less. The magnitude of the measure of association (Kendall's Tau C) in each case indicates that all of these relationships are weak. Significant relationships include: childhood environment and locale of residence with freshwater Type 1; education and locale of residence with freshwater Type 2; childhood environment with freshwater Type 3; and age and sex with freshwater Type 4. Those relationships considered to exhibit substantive trends as well as statistical significance have been presented (Tables 6 through 9). Closer inspection of Tables 6 and 7 reveals that while 61.5% of anglers who fish most in man-made reservoirs of 10 acres or more (Type 1) are from urban areas, 67.3% of anglers who fish most in man-made reservoirs less than 10 acres (Type 2) are from rural areas. Tables 8 and 9 indicate significant age and gender differences among angler subgroups that differ in their degree of concentration on river and stream fishing (Type 4). Indiana freshwater anglers exhibit a weak but significant trend to concentrate less on rivers and streams with increasing age (Table 8).

Only three of the 16 relationships between conservation organization support variables and resource setting preference examined have been found to be significant at the $p = 0.05$ level or less. The magnitude of the measure of association (Kendall's Tau B or C) in each case indicates that all of these relationships are weak. Those who concentrated some or most on freshwater Types 2, 3, and 4 are slightly more apt to read wildlife-related periodicals than those who do not so concentrate. Perhaps of greater interest is the low

Table 6

Cross-classification of Sociodemographic Variable
Residence by Resource Setting Preference of
1980 Indiana Anglers in Sample

Type 1. Man-made Lakes, Reservoirs ≥ 10 Acres

Key: (n)
Col. Pct.

Locale of Residence	Degree of Concentration None	Some	Most	Row Total
Urban	(129) 50.6	(30) 41.7	(128) 61.5	(287) 53.6
Rural	(126) 49.4	(42) 58.3	(80) 38.5	(248) 46.4
Col. Total	(255) 47.7	(72) 13.5	(208) 38.9	(535) 100.0

Chi Square = 10.3241 Significance $p < 0.01$

Kendall's Tau C = -0.0999 Significance $p < 0.05$

Table 7
Cross-classification of Sociodemographic Variable
Residence by Resource Setting Preference of
1980 Indiana Anglers in Sample

Type 2. Man-made Ponds, Resevoirs < 10 Acres

Key: (n)
Col. Pct.

Locale of Residence	Degree of Concentration None	Some	Most	Row Total
Urban	(129) 59.6	(30) 54.9	(128) 32.7	(287) 53.6
Rural	(131) 40.4	(51) 45.1	(66) 67.3	(248) 46.4
Col. Total	(324) 60.6	(113) 21.1	(98) 18.3	(535) 100.0

Chi Square = 22.0049 Significance p < 0.0001

Kendall's Tau C = 0.1779 Significance p < 0.0001

Table 8

Cross-classification of Sociodemographic Variable Age by Resource Setting Preference of 1980 Indiana Anglers in Sample

Type 4. Rivers and Streams

Key: (n)
Col. Pct.

Age of Respondent (years old)	Degree of Concentration None	Some	Most	Row Total
16 to 25	(88) 31.3	(69) 37.9	(21) 29.2	(178) 33.3
26 to 35	(74) 26.3	(58) 31.9	(24) 33.3	(156) 29.2
36 to 45	(36) 12.8	(28) 15.4	(14) 19.4	(78) 14.6
46 to 55	(37) 13.2	(13) 7.1	(5) 6.9	(55) 10.3
56 to 65	(21) 7.5	(11) 6.0	(3) 4.2	(35) 6.5
66 and older	(25) 8.9	(3) 1.6	(5) 6.9	(33) 6.2
Col. Total	(281) 52.5	(182) 34.0	(72) 13.5	(535) 100.0

Chi Square = 20.7274 Significance $p < 0.05$

Kendall's Tau C = -0.0777 Significance $p < 0.05$

Table 9

Cross-classification of Sociodemographic Variable Sex by Resource Setting Preference of 1980 Indiana Anglers in Sample

Type 4. Rivers and Streams

Key: (n)
Col. Pct.

Sex of Respondent	Degree of Concentration None	Some	Most	Row Total
Male	(186) 66.2	(158) 86.8	(49) 68.1	(393) 73.5
Female	(95) 33.8	(24) 13.2	(23) 31.9	(142) 26.5
Col. Total	(281) 52.5	(182) 34.0	(72) 13.5	(535) 100.0

Chi Square = 25.358 Significance $p < 0.0001$

Kendall's Tau C = -0.1183 Significance $p < 0.01$

percentages (13% pay any national dues; 6% pay any local dues) of Indiana freshwater anglers overall who contribute to wildlife-related organizations.

Socialization Toward Fishing

The prior sections of this chapter have built upon the work of others (Graefe 1980; McGurrin 1984) who found annual frequency of participation to be a useful single variable indicator of recreation specialization. The final analyses to be presented in this section have been designed to examine age at initial exposure to fishing (Item I48A) and subsequent years experience (Item I48B) as single variable predictors of adult participation level.

The total age at initial exposure to fishing frequency distribution for the estimated Indiana freshwater angler population (n = 916,031) ranges from 1- to 51-years old. The cumulative frequency of those who recalled having been introduced to fishing by age 20 was 95.2% for the population estimate. Problems resulting from inaccurate recall may be compensated for by collapsing the distribution into ordinal categories as recommended by Hiett and Worrall (1977). The resulting distribution of age at initial exposure to fishing for the estimated angler population is presented as recoded into 5 age categories (Table 10), the first four of which approximate the childhood school years (Behrens-Tepper and O'Leary 1985). This distribution illustrates that approximately 93% of Indiana's freshwater anglers are involved by age 18.

Test of Hypothesis

The distribution of age at initial exposure to fishing (Table 10) can now be used to test a study hypothesis by comparing the levels of the annual frequency of participation classification (Table 1) across the age classes of angling initiation. Groupings of years of fishing experience will be analyzed in a similar manner. Study Hypothesis 2 states:

Table 10

Classification of 1980 Indiana Freshwater Anglers by Age at Initial Exposure to Fishing

Age Class (years old)	Absolute Freq. of Anglers (n)	Relative Freq. of Anglers (%)	Cumulative Freq. (%)
1 thru 6	309,297	33.8	33.8
7 thru 12	457,609	50.0	83.7
13 thru 15	57,446	6.3	90.0
16 thru 18	25,352	2.8	92.8
19 thru 51	66,326	7.2	100.0
Total	916,031	100.0	---

H_2: There is no relationship between adult freshwater fishing participation level and age at time of first exposure to fishing or subsequent years of experience.

The data indicate that the null hypothesis of independence is rejected (Tables 11 and 12) for both analyses. Age at initial exposure to fishing varies predictably at the $p = 0.05$ level or less with frequency of participation reported by an adult angler. The Kendall's Tau C and the Pearson Correlation coefficients have negative values indicating that "low" values of age at introduction to fishing tend to occur with "high" values of adult participation. A similar systematic relationship is exhibited between years of experience and adult participation, but one that is positively correlated.

The magnitude of the measures of association for both of these cross-classification analyses indicate statistically significant, albeit weak, relationships (Tables 11 and 12). The implications of these findings are to be discussed in the next chapter.

Table 11

Cross-classification of Age at Initial Exposure to Fishing by Frequency of Participation of 1980 Indiana Anglers in Sample

Key: (n)
Row Pct.

Age of Initiation (years old)	Frequency of Participation Low	Medium	High	Row Total
1 thru 6	(44) 22.8	(64) 33.2	(85) 44.0	(193) 37.1
7 thru 12	(81) 33.1	(89) 36.3	(75) 30.6	(245) 47.1
13 thru 15	(13) 40.6	(12) 37.5	(7) 21.9	(32) 6.2
16 thru 18	(7) 43.8	(2) 12.5	(7) 43.8	(16) 3.1
19 and older	(15) 44.1	(12) 35.3	(7) 20.6	(34) 6.5
Col. Total	(160) 30.8	(179) 34.4	(181) 34.8	(520) 100.0

Chi Square = 20.7827 Significance p < 0.01

Kendall's Tau C = -0.1520 Significance p < 0.0001

Pearson's R = -0.1556 Significance p < 0.001

Table 12

Cross-classification of Years of Fishing Experience by Frequency of Participation of 1980 Indiana Anglers in Sample

Key: (n)
Row Pct.

Years of Experience (no. of years)	Frequency of Participation Low	Medium	High	Row Total
1 thru 10	(57) 47.5	(36) 30.0	(27) 22.5	(120) 23.1
11 thru 20	(51) 28.2	(66) 36.5	(64) 35.4	(181) 34.8
21 thru 30	(31) 29.0	(31) 29.0	(45) 42.1	(107) 20.6
31 and greater	(21) 18.8	(46) 41.1	(45) 40.2	(112) 21.5
Col. Total	(160) 30.8	(179) 34.4	(181) 34.8	(520) 100.0

Chi Square = 27.7271 Significance p < 0.001

Kendall's Tau C = 0.1713 Significance p < 0.0001

Pearson's R = 0.1864 Significance p < 0.0001

CONCLUSIONS

The objectives of the present study have been designed in response to research priorities identified for water-based recreation in the state of Indiana and Region IV. Effective allocation of the diminishing water resource can be enhanced by a better understanding of behavioral differences that exist among subgroups of recreation participants.

Recreation specialization is a term that refer to disaggregating the spectrum of participants found within a specific outdoor recreation activity into more homogeneous subgroups (Wellman et al. 1982). The conceptual framework of a specialization typology (Bryan 1977) has been extended to Indiana freshwater anglers as high visibility user's of the state's water resource. Results indicate that within the population of Indiana freshwater anglers exist subgroups of recreationists that differ in frequency of participation and preference for particular types of fishing settings. The present study has been able to identify a few variables that will facilitate discrimination of these subgroups.

Review of Significant Findings

Rather than empirically derive a multivariate specialization index, this study has followed Graefe's (1980) use of annual frequency of participation as a single variable indicator of angler specialization. The present study classifies anglers into three ordinal specialization categories based on total annual frequency of participation in four different types of freshwater fishing.

The 1980 FHWAR Survey also provides a respondent-reported degree of concentration scale for each of the four freshwater settings it has identified. Randall (1984:92) recently has argued that self-evaluated levels of specialization provide the most accurate and easily used management tools for

identifying within-activity specialists. Bryan's original thesis (1977) identifies increasing resource setting dependency, or preference, as another dimension of the specialization continuum. The 1980 FHWAR data set, therefore, affords a unique opportunity to examine the relationship between a researcher-specified measure of angler specialization with a respondent-recalled measure of resource setting preference. The significant relationships found suggest that degree of concentration on a particular water resource setting would be a suitable basis for a typology tailored to the Indiana freshwater angling experience.

The preference of Indiana freshwater anglers for particular fishing settings has been examined. Approximately 40% of the estimated angler population fish most in man-made lakes and reservoirs of 10 acres or more; 13% fish most in rivers and streams. However, if those anglers who conduct either some or most of their fishing in rivers and streams are combined into a single category, over 41% of Indiana freshwater anglers are found to make some use of this resource setting.

The study hypothesis of no differences among angler subgroups based on sociodemographic characteristics has received only partial support. Urban and rural anglers are found to differ in their degree of concentration on man-made lakes and reservoirs of 10 acres or more, and man-made ponds and reservoirs less than 10 acres. The state-wide distribution of these resource settings and their differential availability to urban and rural anglers must be considered. Urban anglers do not appear to be hampered by lack of opportunity or access as they are proportionately represented in each frequency of participation level.

The explanatory propositions that accompany Bryan's (1977) typology of trout fishermen posit that anglers tend to become more specialized over time and evolve from a consumptive to a non-consumptive mode. However, the present

study has found some indication of trends among Indiana anglers that appear to run counter to Bryan's hypotheses. Significant age differences are found among angler subgroups that differ in degree of concentration on river and stream fishing. In addition, little support is found for the study hypothesis that conservation organization membership varies predictably with level of specialization.

Socialization toward fishing has been examined as a process that influences the level of specialization achieved as an adult. Age at initial exposure to fishing and years of fishing experience both are found to differentiate among those freshwater anglers exhibiting low, medium, and high levels of angling participation. The distribution of age at initial exposure to fishing indicates that over 95% of Indiana freshwater anglers are involved by age 20.

Limitations of the Data

A limitation of the available 1980 FHWAR Survey data set is the lack of information concerning angler or hunter attitudes toward program funding and management alternatives. No information is included that concerns the respondent's personal source of introduction or typical recreation activity social group. These omissions clearly limit the ability of researchers to fully characterize experience and behavior of the water or wildlife resource user.

However, it is important to note that this is a powerful, virtually unexplored data set that very few other states currently have analyzed. Study can provide at least some information to address the water resource priorities that have been identified and identify data that is missing without incurring the substantial costs of new data collection. In addition, conducting a pilot

type study for Indiana has provided a framework for examining the same information from other states in and outside the region to further test a theoretical model or the hypothesis that Indiana is in many respects unique.

Implications

The concept that recreationists can be arranged on a continuum of orientation to a sport appears applicable to the activity of freshwater fishing in the state of Indiana. Bryan's (1977,1979) contention that this user inventory would apply to a number of activities continues to gain empirical support. However, results of the present study indicate some departures from Bryan's typology that may reveal unique characteristics of the Indiana condition. While the generalizability of Bryan's (1977) thesis is confirmed, a strong case is presented for the existence of real inter-state and regional differences in angler behavior. In addition, interpretation of similar national data sets on a state or regional basis is suggested.

The large percentage of anglers reporting at least some river and stream fishing was unanticipated as the State of Indiana has recently acknowledged problems encountered by recreationists seeking access to these areas (IDNR 1984). We speculate that as these problems are alleviated the percent of anglers using this resource setting would increase. In addition, the intent of urban communities to develop the river corridor as an economic and recreational partnership should also precipitate greater pressure on Indiana's riparian ecosystems.

The fact that even a few differences among angler subgroups could be defined on the basis of sociodemographic variables (age, sex, childhood environment, locale of residence) is of special interest. Previous research attempts to account for differential rates of participation with traditional

social aggregate variables have been unsuccessful (Romsa and Girling 1976; O'Leary and Pate 1979). Additional research is recommended especially as to how these variables affect differential degrees of concentration on Indiana's water resource of rivers and streams.

Previous work by O'Leary and Pate (1979) suggested that inclusion of social action system variables, such as a measure of socialization, to leisure analyses would lead to increased prediction of differential rates of use. Perhaps the present study's most significant finding is that age at initial exposure to fishing varied predictably with frequency of participation. Knowledge of the importance of an early introduction to fishing for continued participation as an adult suggests that water resource management agencies may have to consider providing future anglers with learning opportunities early in life.

The stated purpose of this research was to profile water resource recreationists, their behavior and attitudes, in order to improve the ability of resource managers to recognize conflict potential based on a knowledge of participants rather than activities. The findings of this pilot Indiana study provide a rationale for viewing recreational users of Indiana's freshwater fisheries as heterogeneous subgroups rather than one homogeneous group.

LITERATURE CITED

Behrens-Tepper, J.C. and J.T. O'Leary. 1985. The Indiana deer hunter: influence of age at first hunting experience on adult hunting behavior. Unpublished Rpt. to Indiana Dept. of Natr. Resour., Div. of Fish and Wildl., Indianapolis, IN. 37 pp.

_____, O'Leary, J.T. and D.C. Andersen. 1985. Focused recreation use in riparian ecosystems. Proceedings: First North American Conf. on Riparian Ecosystems and Their Manage. Univ. of Arizona, Tucson, AZ. (In press)

Bevins, M.I., R.S. Bond, T.J. Corcoran, K.D. McIntosh, and R.J. McNeil. 1968. Characteristics of hunters and fishermen in six northeastern states. Vermont Agric. Exp. Sta. Bul. 656. Burlington, VT. 76 pp.

Blalock, H.M. 1960. Social statistics. McGraw-Hill, New York. 465 pp.

Bryan, H. 1976. The sociology of fishing: a review and critique. Pages 83-92 in H. Clepper, ed. Marine Recreational Fisheries. Sport Fishing Inst., Washington, D.C.

_____. 1977. Leisure value systems and recreational specialization: the case of trout fishermen. J. Leisure Res. 9(3):174-187.

_____. 1979. Conflict in the great outdoors. Sociological Studies No. 4, Bureau of Pub. Admin., Univ. of Alabama, University, AL. 98 pp.

Burch, W.R., Jr. 1969. The social circles of leisure: competing explanations. J. Leisure Res. 1:125-147.

_____, and W.D. Wenger, Jr. 1967. The social characteristics of participants in three styles of family camping. USDA Forest Serv. Res. Paper PNW-48. Pacific Northwest Forest and Range Exp. Sta., Portland, OR. 30 pp.

Burdge, R.J. and D.R. Field. 1972. Methodological perspectives for the study of outdoor recreation. J. Leisure Res. 1:63-72.

Christensen, J.E. and D.R. Yoesting. 1973. Social and attitudinal variants in high and low use of outdoor recreational facilities. J. Leisure Res. 5:6-15.

Ditton, R.B., A.R. Graefe, and A.J. Fedler. 1980. Predicting marine recreational fishing patterns from boat characteristics and equipment. Trans. of the American Fisheries Soc. 109:644-648.

_____, T.L. Goodale, and P.K. Johnsen. 1975. A cluster analysis of activity, frequency, and environment variables to identify water-based recreation types. J. Leisure Res. 7(4)282-295.

Elkin, F. 1978. The child and society: the process of socialization. Random House, New York. 229 pp.

Everitt, B.S. 1977. The analysis of contingency tables. Wiley and Sons, Inc., New York. 128 pp.

Graefe, A.R. 1980. The relationship between level of participation and selected aspects of specialization in recreational fishing. Unpublished Ph.D. Dissertation, Texas A&M Univ., College Station, TX. 155 pp.

Hammitt, W.E. and C.D. McDonald. 1983. Past on-site experience and its relationship to managing river recreation resources. Forest Sci. 29(2):262-266.

Hautaluoma, J. and P.N. Brown. 1978. Attributes of the deer hunting experience: a cluster analytic study. J. Leisure Res. 10(4):271-287.

Hendee, J.C. 1969. Rural-urban differences reflected in outdoor recreation participation. J. Leisure Res. 1:333-341.

Heberlein, T.A. 1977. Density, crowding, and satisfaction: sociological studies for determining carrying capacities. Pages 67-76 in Proc.: River Recreation Manage. and Res. Symposium. USDA Forest Ser. General Tech. Rpt. NC-28. North Central Forest Exp. Sta., St. Paul, MN.

Hicks, C.E., L.E. Belusy, D.J. Witter, and P.S. Haverland. 1983. Application of angler attitudes and motives to management strategies at Missouri's trout parks. Fisheries 8(5):2-7.

Hiett, R.L. and J. Worrall. 1977. marine recreational fishermen's ability to estimate catch and to recall catch and effort over time. Tech. Rpt. HSR-RR-77/13-Cd, Natl. Marine Fisheries Serv., Washington, D.C. 57 pp.

Indiana Dept. of Nat. Resourc., Div. of Recreation. 1984. Outdoor Recreation Plan. IDNR, Indianapolis, IN. 95 pp.

Jacob, R. and R. Schreyer. 1980. Conflict in outdoor recreation: a theoretical perspective. J. Leisure Res. 12(4):368-380.

Katz, M. 1981. An assessment of intra-group differences in conservation attitudes and environmentalism as a function of activity involvement among fly fisherman. Unpublished Ph.D. Dissertation, Pennsylvania State Univ., University Park, PA. 277 pp.

Kauffman, R.B. 1984. The relationship between activity specialization and resource related attitudes and expected rewards for canoeists. Unpublished Ph.D. Dissertation, Univ. of Maryland, College Park, MD. 133 pp.

Kelly, J.R. 1974. Socialization toward leisure: a developmental approach. J. Leisure Res. 6:181-193.

_____. 1977. Leisure socialization: replication and extension. J. Leisure Res. 9:121-132.

Kenyon, G.S. and B. McPherson. 1973. Becoming involved in physical activity and sport: a process of socialization. Pages 303-332 in G.L. Rarick, ed. Physical activity: human growth and development. Academic Press, New York. 420 pp.

Knopf, Richard C. 1983. Recreational needs and behavior in natural settings. Pages 205-240 in I. Altman and J. F. Wohlwill eds. Behavior and the natural environment. Plenum, New York.

Lindner, R. 1985. Opening a can-o-worms. In-Fisherman. 60:63-76.

McGurrin, J.M. 1984. Angler specialization in Maryland trout fisherman. Unpublished M.S. Thesis, Univ. of Maryland, College Park, MD. 60 pp.

Nie, N.H., C. Hadlai Hull, J.G. Jenkins, K. Steinbrenner, and D.H. Bent. 1975. Statistical package for the social sciences. McGraw-Hill, Inc., New York. 675 pp.

O'Leary, J.T. and G. Pate. 1978. An examination of frequency of participation in water-based activities by recreation consumers in Indiana. Water Resour. Res. Cent., Purdue Univ., W. Lafayette, IN. Tech. Rpt. No. 114, 18 pp.

_____, and _____. 1979. Water-based activity involvement for recreation consumers at state, federal, local, or private facilities. Water Resour. Bull. 15(1):182-188.

_____, and F.D. Dottavio. 1979. Socioeconomic relationships for water-based recreation involvement in Indiana. Water Resour. Res. Cent., Purdue Univ., W. Lafayette, IN. Tech. Rpt. No. 125, 71 pp.

_____, D.C. Zumeta, and R.M. Pate. 1983. Differential targeting in policy development for nonindustrial private forest lands. Pages 301-310 in J.D. Royer and C.D. Risbrudt, eds., Nonindustrial Private Forests: A Review of Economic and Policy Studies. Duke University, Durham, NC.

Outdoor Recreation Resour. Rev. Comm. 1962. Participation in outdoor recreation: factors affecting demand among American adults. Study Report No. 20. U.S. Gov. Printing Off., Washington, D.C. 94 pp.

Peterson, G.L. 1974. Evaluating the quality of the wilderness environment: congruence between perception and aspiration. Environ. and Behav. 6(2):169-192.

Randall, S.A. 1984. A multitrait-multimethod matrix comparative approach to recreational specialization. Unpublished M.S. Thesis, Univ. of Maryland, College Park, MD. 138 pp.

Reynolds, H.T. 1977. The analysis of cross-classifications. The Free Press, NY. 236 pp.

Romsa, G. and S. Girling. 1976. The identification of outdoor recreation market segments on the basis of frequency of participation. J. Leisure Res. 8(4):247-255.

Schreyer, R. and D.W. Lime. 1984. A novice isn't necessarily a novice -- the influence of experience use history on subjective perceptions of recreation participation. Leisure Sci. 6(2):131-149.

_____, D.W. Lime and D.R. Williams. 1984. Characterizing the influence of past experience on recreation behavior. J. Leisure Res. 16(1):34-50.

Shafer, E.L., Jr. 1969. The average camper who doesn't exist. Forest Serv. Res. Paper NE-142. Northeast Forest Exp. Sta., Upper Darby, PA. 27 pp.

Sofranko, A.J., and M.F. Nolan. 1972. Early life experiences and adult sports participation. J. Leisure Res. 4:6-18.

Spreitzer, E., and E.E. Snyder. 1983. Correlates of participation in adult recreational sports. J. Leisure Res. 15:27-51.

Stebbins, R.A. 1982. Serious leisure: conceptual statement. Pacific Sociological Review 25(2):251-272.

U.S. Dept. of Commerce, Bureau of the Census. 1982. Survey of Fishing, Hunting and Wildlife-Associated Recreation, 1980 Tape Technical Documentation. Prepared by the Data User Services Division, Bureau of the Census, Washington, D.C. 506 pp.

U.S. Dept. of the Interior. 1978. National Urban Recreation Study. U.S. Govt. Printing Office, Washington, D.C. 184 pp.

U.S. Dept. of the Interior, Fish and Wildlife Service. 1982. 1980 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. U.S. Govt. Printing Office, Washington, D.C. 156 pp.

_____. 1983. Indiana: 1980 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. U.S. Govt. Printing Office, Washington, D.C. 75 pp.

Van Doren, C.S. and Lemtnek, B. 1969. Activity specialization among Ohio's recreation boaters. J. Leisure Res. 1(4):296-315.

Vaske, J.J. and M.P. Donnelly. 1980. Hunter attitudes toward wild turkey management in Maryland. Tech. Rpt., Maryland Agric. Exp. Sta., Univ. of Maryland, College Park, MD.

_____, M.P. Donnelly, T.A. Heberlein, and B. Shelby. 1982. Differences in reported satisfaction ratings by consumptive and nonconsumptive recreationists. J. Leisure Res. 14(3):195-206.

Wellman, J., J.W. Roggenbuck, and A.C. Smith. 1982. Recreation specialization and norms of depreciative behavior among canoeists. J. Leisure Res. 14(4):323-340.

Yoesting, D.R. and D.L. Burkhead. 1973. Significance of childhood recreation experience on adult leisure behavior: an exploratory analysis. J. Leisure Res. 5:25-36.

_____, and J.E. Christensen. 1978. Reexamining the significance of childhood recreation patterns on adult leisure behavior. Leisure Sci. 1(3):219-229.

Stebbins, R.A. 1982. Serious leisure: a conceptual statement. Pacific Sociological Review 25(2):251-272.

U.S. Dept. of the Interior. 1978. National Urban Recreation Study. U.S. Government Printing Office, Washington, D.C. 184 pp.

Vaske, J., M.P. Donnelly, T.A. Heberlein, and B. Shelby. 1982. Differences in reported satisfaction ratings by consumptive and nonconsumptive recreationists. J. Leisure Res. 14(3):195-206.

Wellman, J., J.W. Roggenbuck, and A.C. Smith. 1982. Recreation specialization and norms of depreciative behavior among canoeists. J. Leisure Res. 14(4):323-340.