

STREAM ATTRIBUTES FOR SELECTING SUBSTITUTABLE FISHING RESOURCES²⁷

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Abstract

The purpose of this study was to investigate the influence of the number of substitute streams and use history of substitute streams, on trout angler importance ratings of attributes when choosing a substitute stream to fish. Members (292) of two Trout Unlimited Chapters, associated with the Chattooga National Wild and Scenic River in South Carolina and Georgia, were surveyed by mail for their experience use history with local substitute streams, numbers of substitute streams they had for the Chattooga, and importance ratings for 12 stream and fishing attributes. Return rate for the questionnaire was 71%. Results indicated that anglers were quite experienced at using the alternative streams, averaging 17 years of use and an average of 21 fishing trips during the last 12 months. Contrary to the hypothesized influence of number of substituted streams and experience use history on importance of attribute ratings, there was no significant influence found.

1.0 Introduction

Recreation use experience influences the knowledge base by which humans perceive a management situation (Hammitt & McDonald 1983). In terms of outdoor recreation management, a recreationist who is a beginner may have little knowledge of the recreation activity undertaken and/or the setting in which it occurs. On the other hand, it is likely that an experienced recreationist has a substantially greater knowledge base (Schreyer et al 1984; Manning 1999). Such differences in knowledge and cognitive development may lead to differences in resource perceptions and management preferences, including user preferences toward resource attributes (Watson et al. 1999).

²⁷This paper is an abbreviated version of a paper submitted for publication in a journal.

Cognitive development theory supports the proposition that amount of experience and associated developmental knowledge can influence the perception of setting attributes. More specifically, the theory suggests that greater experience leads to a greater range of attribute perceptions and greater differentiation among site attribute values (Watson et al. 1991:21). The authors state that we need to know more about the knowledge based frame-of-reference from which recreationist evaluate resource settings, how the frame-of-reference evolves with experience use history, and how the frame-of-reference shapes the importance and specificity of site attributes.

While considerable use history with a particular resource setting makes one quite knowledgeable and familiar with that specific site, it may mean that one has little EUH with alternative resources and has little familiarity with the physical and fishing attributes of alternative, substitute places. For example, if trout anglers have a lot of experience and attachment with one stream, and few fishing substitute streams, they are likely to be less knowledgeable about attributes of substitute streams. Likewise, an angler who has several substitute streams is likely to have a good knowledge base about attributes of substitute streams, and may perceive certain attributes more important than others.

The purpose of this paper was to investigate the influence of the number of substitute streams and use history (EUH) of substitute streams, on trout angler importance ratings of attributes when choosing a substitute stream to fish.

R.Q.1: Does the number of substitute streams of an angler influence their importance ratings of stream attributes?

R.Q.2: Does the experience use history of an angler influence their importance ratings of stream attributes?

2.0 Methods

2.1 Study Area and Participants

The research was conducted with Trout Unlimited (TU) members of the Chattooga River and Rabun Chapters, located in western South Carolina and northern Georgia, respectively. The study area was the Chattooga National Wild and Scenic River (CNWSR), a natural flowing

mountain river, with the upper reaches reserved for trout fishing while the lower sections are famous for whitewater paddling. The lower sections of the river are stocked with rainbow and brown trout, but not the upper section.

2.2 Data Collection

Active membership for the two chapters of TU was about 300 members. A seven page questionnaire was mailed to 292 members with current addresses. The questionnaire was mailed with a postage paid, return addressed, business reply envelope. A four stage mailing procedure, recommended by Dillman (2001), resulted in an adjusted response rate of 71% (n = 202). For the data analysis purposes of this specific paper, the questionnaire obtained the following information: 1) Background and fishing characteristics; (2) Numbers of substitute streams; (3) Experience use history at trout fishing; (4) Importance of substitute stream attributes.

2.3 Data Analysis

Measures of central tendency (i.e., means) and dispersion (i.e., standard deviations) were formed for the 12 substitute stream attributes, which anglers rated on a 5-point importance scale (1=not important, 3=neutral, 5=very important). The importance ratings for the substitute attributes were factor analyzed, using Principal Components Analysis with varimax rotation. Eigen values of \$1.0 were required for factors to be retained, and factor loadings of items had to be \$0.40 for items to be included in a factor component. Grand means (Factor means) and reliability values (Cronbach alphas) were formed for each factor component identified. To test the influence that the number of substitute streams and EUH has on the importance ratings of substitute attributes, ANOVA was used, with a significance level of 0.05.

3.0 Results

3.1 Angler Characteristics

The majority of respondents were male (97.5%), with an average age of 54 years. Ages ranged from 17 to 86 with nearly 70% over the age of 45. Close to 90% had some college or graduate school education (Mean = 16 years education). Thirty-six percent indicated job occupations of professional/technical, 33% were retired, followed by manager/administrator (11%). The most frequently reported income category was \$60,000 to \$79,999 (19.2%), while 16.8% had incomes of \$40,000 - \$59,999 and 16.2% had incomes of more than \$140,000.

Trout Unlimited members predominately fished with other individuals. However, the fishing group was small, usually consisting of one to two companions. They fished about equally for brook (73%), brown (91%), and rainbow (93%) trout. When choosing a stream, 77% fished non-stocked streams containing naturalized (browns and rainbows) or native (brook) trout. Ninety percent of the anglers fished primarily with fly rods and flies (89.9%). In addition, the trout anglers were quite experienced, with an average of 32 years of trout fishing. On average, the respondents had fished the CNWSR for 15 years, averaging about 10 trips in the last year. They had also fished other local trout streams for an average of 17 years, and averaged about 21 fishing trips on other local streams last year (see Hammitt et al. in press, for more information on past experience of anglers.)

3.2 Number of Stream Substitutes

An overwhelming majority (91.5%) of the anglers said that if they could not fish the CNWSR for trout, they would trout fish another stream rather than do some other activity. When specifically asked, "How many streams or rivers do you think can offer an experience that is just as good as the Chattooga?" 65% reported three or fewer substitutes. About 20% of anglers had four to six substitutes, while nearly 15% reported seven or more substitutes. When asked to "name their best substitute for the Chattooga," over 40 different streams were listed. Thus, the Trout Unlimited anglers are an experienced group at fishing and have fished several places, suggesting that they should be aware of stream and fishing attributes of substitute streams.

3.3 Importance of Stream/Fishing Attributes

When anglers were asked to rate for importance 12 attributes when choosing a substitute stream for the Chattooga, the most important item was general water quality (Mean = 4.51). Scenery, number of other anglers, and number of fish were also rated as important to very important (Table 1). The presence of native trout and number of expected strikes were somewhat important. Anglers were neutral toward the items of driving distance, ease of river access, whether the stream was stocked, and cost of trip. While 41.3% found the cost of trip to an alternate stream "important," about an equal number found it unimportant (35.9%).

The 12 attributes were factor analyzed for underlying themes, producing four factors that explained 63% of the

Table 1.—Frequencies (%), means and standard deviations for the importance of substitute stream and fishing attributes.

Item	Unimportant	Neutral	Important	Mean ¹	SD
General water quality	1.2	6.4	92.4	4.51	.67
Scenery	2.8	9.2	88.0	4.29	.79
Number of other anglers	4.6	9.8	85.6	4.27	.88
Number of fish	5.8	16.7	77.6	4.00	.93
Native trout	7.0	23.8	69.2	3.93	.98
Number of expected strikes	8.1	22.1	69.8	3.82	.91
Previous experience	13.8	22.0	64.2	3.64	1.03
Knowledge of alternatives	9.3	28.5	62.2	3.62	.88
Drive distance	27.3	10.3	58.6	3.33	1.30
Ease of access	30.1	20.8	49.8	3.14	1.21
Stocked with trout	24.4	35.5	40.1	3.13	1.17
Cost of trip	35.9	22.1	41.3	2.95	1.29

¹Means based on a 5-point rating scale of importance, where 1 = not important, 2 = somewhat unimportant, 3 = neutral, 4 = somewhat important, 5 = very important.

Table 2.—Principal components analysis of stream and fishing attribute importance items.

Component and Items	Component Loadings			
	Environment	Knowledge	Fishery	Willingness to pay
Environment (M = 4.25, % = 0.61)				
Number of other anglers	.77			
Scenery	.69			
Native trout	.61			
General water quality	.56			
Knowledge (M = 3.47, % = 0.67)				
Previous experience		.86		
Knowledge of alternatives		.79		
Ease of access		.52		
Fishery (M = 3.65, % = 0.71)				
Number of fish			.85	
Number of expected strikes			.84	
Stocked with trout			.54	
Willingness to pay (M = 3.14, % = 0.72)				
Cost of trip				.90
Drive distance				.85
Eigen values	2.00	1.99	1.90	1.69
% of variance	16.70	16.56	15.82	14.04
Total % variance explained = 63.12				

variance (Table 2). The most important factor (Grand mean = 4.25) contained four attributes related to the physical and social environment found at the substitute streams. This component was labeled “Environment.” Second in importance was the “Fishery” component

Grand mean = 3.65), containing three items that dealt with the quality of fishing. The third component included three attributes that indicated the importance of knowledge about the substitute resource. The last component, with two items concerning willingness to

Table 3.—Effect of number of substitute streams on importance of attributes of substitute streams (ANOVA)

Attribute Factor	Number of substitute streams						F	P-level
	0	1	2	3	4-6	7+		
Environment	4.31 ¹	4.20	4.08	4.24	4.27	4.43	1.12	0.35
Knowledge	3.25	3.54	3.52	3.60	3.59	3.39	0.62	0.69
Fishery	3.60	3.65	3.66	3.73	3.69	3.54	0.16	0.98
Willingness to pay	3.40	3.33	3.29	3.06	2.95	2.93	0.73	0.56

¹Means based on a 5-point importance scale, where 1 = not important, 2 = somewhat unimportant, 3 = neutral, 4 = somewhat important, 5 = very important.

pay, was rated neutral by anglers (Grand mean = 3.14). All four factored components were reliable measures, having Cronbach alphas ranging from 0.61 to 0.72. In summary, TU anglers found environmental attributes concerned with the quality of the substitute stream and density of anglers to be most important, and attributes dealing with the quality of fishing as somewhat important. They felt that knowledge about alternative streams was somewhat important, but that cost and driving attributes were not a factor when choosing a substitute stream for the CNWSR. This may be explained, partially, by the abundance and fishing quality of alternative streams in the local area of the Chattooga River (Hammitt et al. in press).

3.4 Influence of Number of Substitute Streams on Attribute Importance

Since the TU anglers were quite experienced at fishing the CNWSR and alternative streams in the surrounding area, and felt that “previous experience” and “knowledge of alternative streams” were fairly important substitute attributes (Table 1), we wanted to know if number of substitute streams had a differential effect on importance of substitute attributes (R.Q.1). In other words, does having more resource substitutes make an individual more knowledgeable and therefore more critical or different in how they rate the different attributes of substitute resources?

Results of the ANOVA indicated that there were no significant differences in the mean ratings of the attributes, no matter how many substitute streams an angler has (Table 3). Whether anglers had no substitutes or seven-plus, they rated the 12 attributes the same ($p \geq 0.05$). This finding goes against the hypothesized relationship predicted; that anglers with more substitute

streams would have a greater base of knowledge and reference frame from which to evaluate and rate the various attributes. Possible explanations for the counter finding are: 1) the attributes selected for evaluation are too generic or universally desired that their rating of importance is not dependent on cognitive knowledge gained by exposure to more substitutes; and 2) the number of substitute streams is only one measure of exposure/experience with substitute streams. Years of experience and frequency of fishing substitute streams might be a better differentiating variable. It could be possible that an angler with only two substitution streams would be a longer term and more frequency user of those streams than an angler with five substitutes who is a short term and infrequent user of those five streams.

3.5 Influence of Experience Fishing Substitute Streams on Attribute Importance

To examine the second explanation in the previous paragraph, four classifications of anglers, based on number of years and frequency of trout fishing substitute streams were formed and tested against the four attribute components. The four experience classifications were computed by using the median value for the number of years fishing alternate local streams and for the number of times fishing alternate local streams last year to form a low and high half for each variable. The low and high 50-percentile of respondents were classified as short and long term substitute anglers, respectively. The low and high frequency halves were classified as infrequent and frequent anglers. ANOVA was then used to test for significant differences between each experience classification and the importance ratings of the four attribute components. Again, there was little evidence that experience with substitute streams influenced how anglers rated the stream and fishing attributes (Table 4).

Table 4. Effect of fishing experience with alternate local streams on importance of attribute of substitute streams (ANOVA).

Attribute Factor	Angler Experience Classification ¹				F	P-level
	Short term, frequent	Long term, frequent	Short term, infrequent	Long term, infrequent		
Environment	4.24 ²	4.37	4.20	4.22	0.83	0.48
Knowledge	3.26	3.62	3.49	3.40	1.38	0.25
Fishery	3.69	3.71	3.67	3.44	0.87	0.46
Willingness to pay	2.999	2.80 ^a	3.30	3.40 ^b	2.86	0.05

¹ Short term, frequent angler: low years of use, but high frequency of use.

Long term, frequent anglers: High years of use, high frequency of use.

Short term, infrequent angler: Low years of use, low frequency of use.

Long term, infrequent angler: High years of use, but low frequency of use.

² Means based on a 5-point importance scale, where 1=not important, 2=somewhat unimportant, 3=neutral,

4=somewhat important, 5=very important

^aMeans with different letter superscripts are significantly different, Duncan's Mean Different Test.

Only willingness to pay showed a significant difference ($F = 2.66$, $df = 3,162$, $p = 0.05$). Long term, frequent anglers rated willingness to pay lower (Mean = 2.80) in importance than long term, infrequent anglers (Mean = 3.40). However, this variable just reached the minimum alpha level of 0.05; both means are in the neutral (i.e., 3.0) range of the importance rating scale. The other three attributes did not come close to being influenced significantly by substitute experience (see significance level in Table 4). Thus, we have to conclude that amount of past experience fishing substitute streams does not have an effect on how Trout Unlimited anglers perceived and rated the importance of various stream and fishing attributes (R.Q.2).

4.0 Summary and Discussion

Cognitive development theory and some recreation management research predicts that amount of past use experience and associated developmental knowledge with a resource place can influence user perception of setting attributes. However, we had to reject this hypothesis, as number of substitute streams experienced and experience use history (years and frequency) of fishing substitute streams, had little significant ($p \leq 0.05$) influence on the perception of attributes. How does one explain this discrepancy in predicted results? One possible explanation concerns the lack of specificity in our list of stream and fishing attributes. They may have been too generic and important to any trout stream; not dependent on specific acquired knowledge characteristic of a specific setting or place. The list of attributes was

adapted from previous research (Shelby & Vaske 1991) and may have been too generic for our purposes. It is suggested that future research explore the use of a more specific list of place and fishing attributes that are more dependent on acquired knowledge gained from use history with a particular place.

A second possible explanation is that the majority of the respondents in our study were quite experienced users. For example, the medians used to form the four experience classifications of anglers tested in Table 4 were 15 for years of use and eight for times last year at fishing alternate rivers. Thus, even though the "short term, infrequent anglers" had the lowest amount of experience (i.e., < 15 years, < eight trips), this is still considerable exposure to alternative streams. Future research with a less experienced group of anglers may produce different attribute perceptions. However, the authors favor the lack of knowledge dependence and specificity in stream/fishing attributes' explanation, based on a similar analysis between experience use history (i.e., independent variable) and degree of place bonding (dependent variable) with the study river (Hammitt et al. in press). In that analysis, experience use history of the same respondents studied here had a significant ($p < 0.05$) influence on all six aspects of place bonding tested. Thus, specificity of the dependent variable may be the problem.

In conclusion, even though the predicted outcomes were not supported by our data, there was considerable information gained from the study to assist fishery

managers. The Trout Unlimited anglers were a very experienced group of stream users and a knowledgeable group, not only concerning the study stream but other streams in the local area. They are a valuable resource group of users for management input and support. They could be an important focus group concerning resource management issues in the area. They know the resource, its attributes, and feel many of the stream attributes are important. For example, scenery, number of other anglers, and number of fish, were rated important to very important stream and fishing attributes. For the Chattooga National Wild and Scenic River the scenery of the resource is protected by law, but the social carrying capacity of anglers and fish density are not. Currently, there is controversy on the upper section of the Chattooga which has been reserved for years for trout fishing, but now is being petitioned for use by private, whitewater paddlers. EUH information made fishery managers of the Chattooga aware of the specific number of years and frequency of use of Trout Unlimited anglers associated with the river. The fact that anglers have substitute streams in the local area is also important for fishery managers to know, but it may have little influence on the high value and possessive feelings that anglers have acquired through years of using the study river.

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