# Chattooga National Wild & Scenic River Private Whitewater Boater Substitution Study

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## Activity or Resource Substitutes: Paddlers Using the Chattooga River

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### How to Use and Disseminate this Report

This report uses the Pettigrew format, developed by a graduate student at Clemson University who conducted research on report format preferences of professionals who purchased research from universities and consultants. Based on input from professionals, she developed a new format. Professionals found it prohibitive to hand out copies of bulky reports to interested parties. They also were aware that only a small portion of a study they requested was of interest to most readers. With traditional reports, this required rewriting or reassembling sections by the purchasing agency. Pettigrew developed a modular report format that allows the creation of mini-reportlets by the agencies that purchase the information and ultimately distributes it. The report is presented in a three-ring binder. Each section has a banner heading so that any section can stand alone as a reportlet. This structure allows the agency to assemble customized mini-reports containing only the sections of the report of interest to anyone requesting data. No color charts are used so that graphics can be readily copied on black and white copiers. Pettigrew formatted reports may be read in their entirety or the "Table of Contents" and the "Statistics at a Glance" section may be used to identify useful information.

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## Statistics at a Glance

- *Median age*: 40
- *Mean years of education*: 16
- *Percent of respondents indicating they are retired*: 2.6
- *Percent of respondents indicating their occupational category is "Professional/ Technical"*: 51.1
- *Percent with household income above $60K*: 56.8
- *Percent with household income under $20K*: 12.8
- *Median number of years participating in the activity*: 11
- *Percent agreeing that their activity is one of the most satisfying things they do*: 95.8
- *Percent indicating agreeing that their life is centered around their activity*: 53.4
- *Percent agreeing with the statement that the Chattooga River is the best place for their activity*: 64.3
- *Mean number of years that boaters have been participating at the Chattooga River*: 10.5
- *Percent who indicated that the most important reason for participating at the Chattooga River is because they enjoy the Chattooga itself*: 64.6
- *Percent who indicated that the most important reason for participating at the Chattooga River was because it was a good place for their activity*: 27.8
- *Percent who agreed that the Chattooga is a very special place to them*: 96.2
- *Percent who agreed with the statement that they are attached to the Chattooga*: 87.3
- *Mean overall attachment rating on a 1 to 7* scale: 6.1
- *Percent who would go to a different river to participate if they could not do it on the Chattooga*: 82.6
- *Percent who indicated they had no substitute for the Chattooga*: 41.3
- *River attribute most important to choosing a substitute*: Water flow
- *River attribute least important in choosing a substitute*: River is dam released

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## Executive Summary

A study of whitewater boaters, who registered and used the Chattooga River during 2000 was conducted by the Department of Parks, Recreation and Tourism Management at Clemson University. The focus of the study was to understand the perceptions of whitewater boaters using the Chattooga River. The river is a federally designated Wild and Scenic River. Existing uses include boating, trout fishing, hiking and camping.

Of the many approaches to studying outdoor recreation and the people who participate, involvement with the activity and place attachment are often productive approaches. Involvement captures many aspects of participation while place attachment addresses the relationship of the recreationist to the natural area they are using. This study was conceptualized along these two lines.

Permits are required of all those using the Chattooga River. A stratified random sample of 500 permits was drawn from a population of 3,311 permits completed during 2000. The existing sample was then stratified by month to reflect year-round usage. After duplicate names were removed, a total of 447 names and addresses were available for the mail-back survey. Using a reminder postcard and replacement survey routine based on the research of Donald Dillman (2000), a response rate of 53 percent was achieved.

The sample was middle class and well-educated. Mean household income was around $60K and half of the respondents had completed 16 years of school. About half were employed in professional or technical occupations.

Most of the respondents were experienced boaters, reporting 13 mean years of activity with 10 mean years spent on the Chattooga River. This group reported taking an average of 13 trips down the Chattooga in the previous year. The Chattooga River was not the only river they boated. The respondents reported having boated on as many as 50 other rivers with a mean of 6.9 rivers.

With a focus on substitutability of other rivers, respondents were asked what were the most important attributes of other rivers they might paddle. Water flow, scenery, difficulty of the rapids and the number of other boaters were the top ranked concerns. All the attributes except one had importance ratings above the neutral point suggesting that paddlers consider many attributes when deciding on a trip. The importance of river attributes is probably situational, varying with season, weather and social group. The level of involvement in boating was measured with a scale. Whitewater boating requires specialized equipment, knowledge and skills. Often these wildland recreationists are highly involved in what they do. A 12-item scale documented a high degree of involvement. Respondents reported being attracted to the sport, viewing participation as self-expressive and to a lesser extent a central life interest.

This study documented a high degree of involvement in the activity but also explored place attachment. Place attachments are influenced by experience and result in emotional bonds to a place. Respondents were asked a series of questions that measured their development of attachment to the Chattooga River. The measures indicated that respondents were familiar with the river, had a sense of affiliation or belongingness, self-identified with the river, and to a lesser extent were functionally dependent on the Chattooga.

Another way to understand the importance of a resource to a whitewater paddler is to measure how willing they are to substitute other activities or rivers for an experience on the Chattooga River. When an outdoor enthusiast has lost access to an activity at a specific place in time, they can return at another time, participate in another activity or do a different activity in the same place. Respondents tended to choose a resource substitute over participating in another activity. While paddlers readily identified other rivers in the area that they could use, few received similarity ratings indicating that these rivers were equivalent or better. The Green River and the Little River Canyon received similarity ratings equivalent to the Chattooga River. Three other rivers (Big South Fork, Upper Youghigany, Obed) had similar mean similarity ratings to the Chattooga River, but only two or three respondents listed these rivers, making the similarity estimate unreliable.

Results of this study indicate that current users are please with the Chattooga River. Paddlers report a place attachment to the river, and while substitutes are available, they view these substitutes as dissimilar and generally less desirable than the Chattooga River. Results of this study suggest that management practices should continue to preserve the character of the Chattooga.

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## Introduction

Management of natural resource areas is typically done to protect the resource and to provide satisfying experiences for wildland recreationists. Recreationists who are both ecologically knowledgeable and have enjoyable experiences in a place are most likely to care for and protect that resource. This study examined the relationship private whitewater boaters using the Chattooga River, have with this Wild and Scenic River.

Management objectives for Wild and Scenic Rivers like the Chattooga River are at least partially defined by laws governing the Wild and Scenic Rivers system. The Chattooga River is characterized by splendid scenery, excellent trout fishing, clean water, and high quality whitewater paddling for canoe, kayak and raft. There are many reasons why outdoor recreationists would want to visit the area, federal regulations dictate that it be managed to provide a certain type of experience. This study sought to understand how whitewater paddlers perceive the Chattooga River as a place and as a location to recreate. Measures of involvement, place attachment, desired attributes of a whitewater river and the paddlers' perceptions of the similarity of substitute rivers were all used as measures to define and describe how satisfying the Chattooga River is to current users. This multi-variable approach combined with comparisons with other available rivers provides a rich description of the the importance of the resource to whitewater enthusiasts.

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## Methods

Potential respondents to the survey used in this study were drawn from a stratified sample of boaters who completed the permit process during 2000. A random sample of 500 was taken from a total of 3,311 permits. The sample was stratified by month to reflect the proportion of river use throughout the year. After duplicate names of boaters who took multiple trips were removed, the sample size decreased to 447. Table 1 displays the total number of permits for each month, the proportion of the total each month represents in a percent and the number of permits drawn for each month.

**Table 1: Sampling frame for private whitewater boaters.**

| Month | Number of Permits | Percent of Total | Sample per Month |
|---|---|---|---|
| January | 206 | 6 | 30 |
| February | 239 | 7 | 35 |
| March | 371 | 11 | 55 |
| April | 525 | 16 | 80 |
| May | 670 | 20 | 100 |
| June | 444 | 13 | 65 |
| July | 308 | 9 | 45 |
| August | 222 | 7 | 35 |
| September | 158 | 5 | 25 |
| October | 31 | 1.5 | 7 |
| November | 88 | 3 | 15 |
| December | 49 | 1.5 | 8 |
| **Total** | **3311** | **100** | **500** |

Data were collected using a social survey questionnaire. The instrument consisted of seven pages and required approximately fifteen minutes to complete. Questions were divided into four sections: Section I, "Whitewater Boating Involvement;" Section II, "The Chattooga;" Section III, "Substitute Streams;" Section IV, "Background Information." There were 83 questions.

In Section I: "Whitewater Boating Involvement," respondents were asked to indicate the type of boater they are, their self described ability level, the year they began boating, and how many other people they typically boat with on the Chattooga. Involvement in whitewater boating was measure using McIntyre's (1989) Enduring Involvement Scale. The scale consisted of 12 items and each was rated on a 5-point scale where 1= Strongly Disagree, 2=Strongly Agree, 3=Neutral, 4=Agree and 5=Strongly Agree.

In Section II: "The Chattooga," questions measured the boaters' emotional and symbolic bonds to the Chattooga. The Place Attachment scale consisted of 27 items measured on the same five-point scale as Involvement. Experience Use History – the respondents past boating experience was assessed in a six-item format asking the number of years and frequency of boating the Chattooga and other rivers. Next respondents were asked to indicate the most important reason for boating the Chattooga River from a list of three choices: 1) because they enjoy the place itself; 2) because it is a good place to whitewater boat; or 3) because they want to spent time with their companions. They were then asked to rate how strong their feeling of attachment to the Chattooga were on a one to seven scale where 1= Weak and 7=Strong. Finally in this section, respondents were asked what they would do if they could not boat the Chattooga. The four options they were given to choose from included: a) Go whitewater boating, but at another river; b) Do some other activity on the Chattooga; c) Do a different activity, in a different place; or d) I would not do another activity or go boating on another river. If options b or c were chosen, the respondent was asked to write in an alternative activity and alternative place they would take part in and/or go to.

Section III: "Substitute Rivers" identified the setting substitutes for the whitewater boaters. They were asked to supply the number of other places that could offer a similar experience as boating the Chattooga. Respondents were then asked to name their best substitute. For that substitute they were asked to rate its similarity to the Chattooga in terms of the whitewater boating experience on a one to eight scale where 1=Not as good, 4=Equivalent, and 8=Better. Next they were asked "What is the most important reason for choosing their best substitute?" The choices were: Because they enjoy the river itself; because it is a good place to go whitewater boating or; because they want to spend time whitewater boating with their companions. Finally, respondents were asked to rate a list of twelve items and an "other" category as to the importance of each when choosing an alternative river.

The final section collected background information on the anglers. Gender, age, and socio-economic status were asked as well as miles from home and minutes to travel to the Chattooga River.

Data were collected through a modified Dillman (2000) procedure. On October 22, 2001, a survey packet was sent to each permit holder. The packet included the survey instrument, a postage-paid return mail envelope and a cover letter. On November 6, 2001, a reminder postcard was mailed to those who had not returned the survey. Those who still had not returned the survey were sent a second survey packet with a new cover letter emphasizing the importance of their response on December 3, 2001. Finally, on December 14, 2001 a final reminder postcard was sent to non-respondents. As the surveys were returned, the date was recorded and the respondent's name was removed from the mailing list. The adjusted response rate was 53 percent.

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## Socio-Demographic Characteristics of the Sample

This section describes the socio-demographic characteristics of the respondents. Statistics on group membership provide a general description of the sample. The value of these statistics is more in monitoring change. Shifts in the demographic makeup of a group over time, typically determined when a study like this is repeated ten years later, help in judging whether data sets can be compared that are collected years apart.

By sex, the composition of respondents is 86.9 percent male. The mean age is 40 with 85 percent of the sample between 25 and 65. Almost seven percent were under age 25 and only one person (.4%) reported being over 65. The group was well educated, having completed an average of 16 years of education. Eight percent had completed only high school, while 31 percent had completed graduate school.

Occupations, including being a student, were documented as part of the study. Individuals employed in professional or technical positions made up 51 percent of the sample. Students accounted for 9.3 percent of the group. Household income varied with 12.8% of the sample having incomes below $20,000. Some of the lower income groups are students. Thirty percent had income between $20K and $59K.Thirty-three percent had income between $60K and $99K. Almost a quarter (23%) reported household income levels between $100K to >$140K. In general, the group is well educated with a middle class income. Statistics are summarized in Table 2.

**Table 2: Socio-economic characteristics for private whitewater boaters.**

| Variable | n | % |
|---|---|---|
| Gender | | |
| Male | 205 | 86.9 |
| Female | 31 | 13.1 |
| Age | | |
| < 25 | 16 | 6.8 |
| 25 – 34 | 69 | 29.2 |
| 35 – 44 | 68 | 28.8 |
| 45 – 54 | 61 | 25.8 |
| 55 – 64 | 21 | 8.9 |
| 65 + | 1 | .4 |
| | mean = 40 | sd = 10 |
| Education | | |
| High School | 19 | 8.1 |
| College | 143 | 60.6 |
| Graduate School | 74 | 31.4 |
| | mean = 16 | sd = 2.3 |
| Occupation Category | | |
| Professional & Technical | 120 | 51.1 |
| Laborer | 7 | 3.0 |
| Clerical | 2 | .8 |
| Homemaker | 1 | .4 |
| Operative | 3 | 1.3 |
| Sales | 11 | 4.7 |
| Service Worker | 4 | 1.7 |
| Student | 22 | 9.3 |
| Manager & Administrator | 23 | 9.7 |
| Farmer | 1 | .4 |
| Craftsperson | 11 | 4.7 |
| Retired | 6 | 2.6 |
| Other | 23 | 10.2 |
| Income Category | | |
| < 20,000 | 29 | 12.8 |
| 20,000 – 39,999 | 34 | 15.0 |
| 40,000 – 59,999 | 35 | 15.4 |
| 60,000 – 79,999 | 40 | 17.6 |
| 80,000 – 99,999 | 35 | 15.4 |
| 100,000 – 119,999 | 22 | 9.7 |
| 120,000 – 139,999 | 7 | 3.1 |
| > 140,000 | 25 | 11.0 |

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## Whitewater Boating Experience

Respondents were asked about their previous experience whitewater boating. While sociodemographic data provide a general group description of the sample as being predominantly male, well educated, and with a middle class income, experience questions provides measures directly relevant to the study question. The questions are behavioral measure of past experience.

Table 3 presents a summary of the data from questions asked about past experience. For each question the range, median ($50^{th}$ percentile) and mean (average score) are presented. Respondents have been boating for 13 mean years, 10.5 of those years on the Chattooga. The average number of years boating other rivers was a mean of 10.8. Respondents were asked to estimate the number of times they had boated the Chattooga River since they started visiting it and the number of times they traveled the river last year. Respondents reported a mean of 145 trips since their first trip, and a mean of 13.8 trips last year.

Respondents were also asked to report how many other rivers they have boated and the frequency that they had traveled down other rivers last year. Respondents reported paddling between 0 and 50 rivers with a mean of 6.9 rivers. They took between 0 and 250 trips on other rivers besides the Chattooga, with a mean value of 23.2 rivers. The study group is actively involved in whitewater boating and use several rivers besides the Chattooga.

**Table 3. Previous experience whitewater boating on the Chattooga and other rivers.**

| | n | Min | Max | Range | Median | Mean | SD |
|---|---|---|---|---|---|---|---|
| Years whitewater boating | 238 | 1 | 38 | 37 | 11 | 13.0 | 8.5 |
| Years whitewater boating the CNWSR | 237 | 1 | 50 | 49 | 7 | 10.5 | 8.4 |
| Years boating other rivers | 231 | 0 | 55 | 55 | 9 | 10.8 | 8.2 |
| Times whitewater boating the CNWSR | 229 | 1 | 3000 | 2900 | 50 | 145.5 | 319.1 |
| Times whitewater boating the CNWSR last year | 237 | 0 | 200 | 200 | 5 | 13.8 | 24.8 |
| Number of other rivers boated | 237 | 0 | 50 | 50 | 5 | 6.9 | 7.9 |
| Times boating other rivers last year | 233 | 0 | 250 | 250 | 10 | 23.2 | 33.9 |

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## Involvement Levels in Whitewater Paddling

Outdoor recreation research has focused some of its resources on understanding specialization and involvement ever since Bryan (1977) suggested that participation in an activity takes place in a specialization continuum reflected in technique, equipment, and setting preferences. The initial research was conducted with anglers. Central to the psychological basis of specialization is enduring involvement (McIntyre, 1989; McIntyre & Pigram, 1992). Involvement addresses the personal relevance of an activity. In studies of campers and rock climbers, McIntyre & Pigram (1992) conceptualized involvement as consisting of attraction, self-expression, and centrality to lifestyle. The attraction dimension is a combination of importance and pleasure derived from the activity. Self expression refers to the self-impressions individuals convey to others on the basis of their activity participation. Finally, centrality refers to the degree to which a person organizes the rest of their life around the activity. These three dimensions yield a profile of participation in an activity indicating and overall relevance or meaning for that activity in the individual's life (Kyle, Graefe, & Manning, submitted). Logically, the more people are in an activity, the less likely they are to substitute another activity for their preferred one. Highly involved individuals are more likely to make location or temporal substitutes. That is, they will go to a different place or go to their preferred place at a different time rather than participate in another activity.

Respondents were asked 12 questions that measured involvement in whitewater boating. (Table 4) The set of questions taps three dimensions (subscales) of involvement; attraction, self expression and centrality. The measurement scale was a bi-polar five point scale from 1 to 5 where 1= strongly disagree, 3=neutral, and 5=strongly agree. For the subscale of attraction, the grand mean of 4.64 was high, indicating almost universal attraction to the activity. The self-expression subscale grand mean was 3.79. Above the neutral point, these values suggest that boating is a socially-expressive activity. Centrality is a measure of the degree to which boating is a dominant sphere in a person's life. The grand mean is again above the neutral point (3.41). These subscales indicate that boaters are involved in their activity, that it is an important expressive behavior that is associated with social rewards and that many boaters consider it a central part of their life. The narrow distribution of answers to questions and resulting low standard deviations provide further evidence that respondents are a homogeneous group. Segmentation analysis found no subgroups.

**Table 4: Frequency as percent, means, and standard deviations for the enduring involvement scale.**

| Variable | n | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree | Mean | SD |
|---|---|---|---|---|---|---|---|---|
| Whitewater boating is one of the most relaxing things I do. | 238 | .4 | .4 | 4.2 | 21.8 | 73.1 | 4.67 | .62 |
| Whitewater boating is one of the most enjoyable things I do. | 236 | .8 | 0 | 3.0 | 26.7 | 69.5 | 4.64 | .63 |
| Whitewater boating is one of the most satisfying things I do. | 238 | .4 | .4 | 3.4 | 27.7 | 68.1 | 4.61 | .62 |
| Whitewater boating is important to me. | 237 | .4 | 0 | 2.5 | 34.2 | 62.9 | 4.59 | .59 |
| I enjoy discussing whitewater boating with my friends | 238 | .4 | 0 | 6.7 | 42.0 | 50.8 | 4.43 | .66 |
| I have little or no interest in whitewater boating.[1] | 238 | 91.2 | 7.1 | 0 | .8 | .8 | 1.13 | |
| **Attraction** | | | | | | | **4.64** | **.46** |
| When I am whitewater boating I can really be myself. | 235 | .9 | .9 | 20.0 | 40.0 | 38.3 | 4.14 | .82 |
| Whitewater boating says a lot about who I am. | 238 | 1.7 | 1.7 | 26.9 | 52.5 | 17.2 | 3.82 | .79 |
| When I am whitewater boating others see me the way I want them to see me. | 237 | 1.7 | 1.3 | 40.5 | 33.8 | 22.8 | 3.75 | .88 |
| You can tell a great deal about a person when you see them whitewater boating. | 237 | 2.5 | 11.0 | 42.6 | 27.4 | 16.5 | 3.44 | .98 |
| **Self –Expression** | | | | | | | **3.79** | **.68** |
| I find a great deal of my life is centered around whitewater boating. | 238 | 2.1 | 14.7 | 29.8 | 36.6 | 16.8 | 3.51 | 1.01 |
| Most of my friends are in some way connected with whitewater boating. | 238 | 2.5 | 24.4 | 26.9 | 31.5 | 14.7 | 3.32 | 1.07 |
| **Centrality** | | | | | | | **3.41** | **.94** |

[1] Item reverse coded for the purpose of calculating the grand mean.

References

Bryan, H. (1977). Leisure values systems and recreation specialization: The case of trout anglers. *Journal* of *Leisure Research, 24*, 348-360.

Kyle, G., Graefe, A. R., Manning, R. E. (In Press). An examination of the involvement -- place attachment relation among hikers along the Appalachain Trail. *Journal of Leisure Research.*

McIntyre, N. (1989). The personal meaning of participation: Enduring involvement. *Journal of Leisure Research, 21*(2), 167-179.

McIntyre, N. & Pigram, J. J. (1992). Recreation specialization reexamined: The case of vehicle-based campers. *Leisure Sciences, 14*, 3-15.

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## Place Attachment

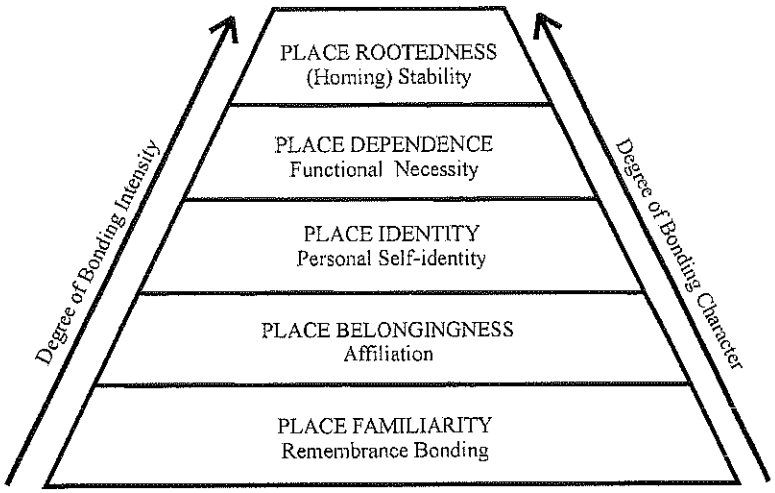
Through repeated experiences at the Chattooga River in an aesthetically pleasing environment, participating in challenging activities with a supportive social group, it is possible that whitewater paddlers develop an affinity to the area. Numerous authors, academic and otherwise, have written about a "sense of place" for environments and locations. Sense of place is a holistic construct that describes the symbols, meanings, interpretations, values, beliefs and feeling imbued on a geographic location by individuals, groups and cultures.

Similar to the sense of place is the idea of place attachment. Attachments are influenced by biological, environmental, socio-cultural, and psychological processes. Research into place attachment has revealed patterns of attachments, places, actors, social relationships, and development over time (Low & Altman, 1992). Frequently discussed variations on the bonds formed to a place are sense of place (Tuan, 1977), community attachment (Kasarda & Janowitz, 1974), place identity (Proshansky, 1978; Proshanksy, Fabian, & Kaminoff, 1983), place dependence (Stokols & Schumaker, (1981), and place attachment (Gerson, Stueve, & Fischer, 1977). Despite different names, the connecting theme among these concepts is that humans form affective (emotional) bonds to the significant places in their lives, whether the focus of the investigation is their home, their community, or the places they recreate.

The two most widely accepted conceptualizations in the wildland recreation and natural resource literature have been place identity and place dependence, both falling under the umbrella term place attachment. Place identity has been defined as a "broadly conceived cognitions about the physical world in which the individual lives" (Proshansky, Fabian & Kaminoff, 1983 p.59). Place dependence comes from a perspective where places are characterized by functions they fulfill. Place dependence is based on an individual's or group's assessment of the quality of a place and the relative quality of alternative places. The occupants' awareness and familiarity of alternatives, their mobility, and the specificity of the place they require affect the assessments (Stokols & Schumaker, 1983).

Hammitt's (1998) taxonomy of place bonds is a framework to empirically test a place attachment process based on stages. The taxonomy (Figure 1) indicates that place bonds both increase in intensity and change in character depending on the level of place bonding.

Figure 1: Taxonomy of Emotional Place Bonds




The basic level of attachment is familiarity. It involves knowledge and awareness of a place. Individuals have images, memories, and expectations of a place as well as beliefs about size, distance, and color of a place (Kaplan & Kaplan, 1989). Previous studies have shown that familiarity is associated with place identity and dependence (Williams & Vaske) as well as previous experience in a place.

Place belonging is the second stage of place bonding in the place identity path. It refers to the affective or emotional attachments an individual makes to a geographic place and its associated social setting (Milligan, 1998). In this stage a person has feelings and preferences for a place (Proshansky, 1978). To develop this sense of affiliation with a place, positive experiences in a place need to out-weigh negative experiences over time (Proshansky, Fabian, & Kaminoff, 1983).

Place identity and place dependence are the third and forth levels of the taxonomy. Place identity is the degree to which the physical environment has been assimilated into a person's sense of self. Place dependence is the bond formed based on recreationists' reliance on a resource to facilitate participation in desired activities.

Finally, the strongest bond and top of the taxonomy is rootedness. Rootedness as defined by Tuan (1981) is characterized by a lack of curiosity toward the external world that is oblivious to the passage of time. It is a psychological state of being, based on an acquired sense of extended time and genealogical depth. In a recreation or natural resources context, places such as vacation cottages or unique fishing hole passed down through generations may engender rootedness.

Place attachment has been used in research for such things as to predict conflict between recreationists, preferences for management, and environmental perception, and its relation to specialization. Studies of recreation conflict based on Jacob and Schreyer's (1980) goal interference model, have used place attachment as a measure of resource specificity. An

investigation into the conflicts between hikers and pack users in the John Muir Wilderness area found that place attachment was predictive in a discriminant model classifying whether respondents liked or disliked encounters with other groups (Watson, Niccolucci, & Williams, 1994). Warzecha and Lime (2001) employed place attachment to study recreation motivations, management preference, and encounter norms (level of acceptable use) in the Canyonlands National Park, specifically the Green and Yampa Rivers. Differences in motivation, acceptance of management practices and encounter norms all were found to depend on the attachment level and were also found to be different between the two rivers. Green River recreationists were more attached than Yampa River recreationists and their motivations were suggestive of a wilderness experience.

Respondents to the Chattooga River study were asked a number of questions measuring their place attachment. The questions mirrored the Hammitt (1998) stages of place attachment model. The questions and results are presented in Table 5. The response categories are from 1 to 5 where 1=strongly disagree, 3=neutral and 5=strongly agree. The items are sorted by which of the five types of place attachment they represent. As expected, as one moves through the stages of place attachment from familiarity to rootedness, the grand means are lower. The grand mean for familiarity is 4.34 indicating that respondents agree to strongly agree with this group of items. Similar grand mean values were exhibited for place belonging (4.16) and place identity (4.17). Place dependence has a lower grand mean (3.44), but still above neutral. Not surprisingly, rootedness has a grand mean below the neutral point (2.50).

These data indicate that the respondents are attached to the Chattooga River. They are familiar with it, feel a belonging, and identify themselves with the use of the river. They have a positive but somewhat weaker dependence on the river.

**Table 5: Frequency as percent, means, and standard deviations for place bond items.**

| Measure and Variable | n | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree | Mean | SD |
|---|---|---|---|---|---|---|---|---|
| I have many memories of whitewater boating on the Chattooga. | 237 | 0.0 | 1.3 | 1.3 | 24.9 | 72.6 | 4.69 | .56 |
| I know the best rapids to run on the Chattooga. | 2.38 | .4 | 2.5 | 10.9 | 24.9 | 54.2 | 4.53 | .81 |
| I have whitewater boated the Chattooga many times and I am quite familiar with it. | 2.37 | .4 | 5.9 | 7.6 | 25.7 | 60.3 | 4.40 | .89 |
| I could draw a rough map of the Chattooga. | 237 | .8 | 5.5 | 7.2 | 39.2 | 47.3 | 4.27 | .88 |
| I know the Chattooga like the back of my hand. | 238 | 2.5 | 16.8 | 15.5 | 28.2 | 37.0 | 3.80 | 1.18 |
| **Familiarity** | | | | | | | **4.34** | |
| I am fond of the Chattooga. | 238 | 0.0 | 0.0 | 1.7 | 28.6 | 69.7 | 4.68 | .50 |
| I feel connected to the Chattooga. | 238 | 1.3 | 2.1 | 9.2 | 36.1 | 51.3 | 4.34 | .83 |
| When I am at the Chattooga, I feel part of it. | 238 | 0.0 | 1.7 | 13.0 | 42.9 | 43.4 | 4.26 | .75 |
| The Chattooga makes me feel like no other place can. | 238 | .8 | 9.7 | 25.2 | 34.0 | 30.3 | 3.83 | 1.00 |
| I feel like I belong at the Chattooga. | 238 | 3.8 | 6.7 | 29.4 | 39.1 | 21.0 | 3.67 | 1.00 |
| **Place Belonging** | | | | | | | **4.16** | |
| The Chattooga is very special to me. | 237 | .4 | .4 | 2.9 | 29.8 | 66.4 | 4.61 | .61 |
| The Chattooga means a great deal to me. | 238 | .8 | .4 | 6.3 | 30.3 | 62.2 | 4.53 | .71 |
| I am very attached to the Chattooga. | 237 | .8 | 2.1 | 9.7 | 35.0 | 52.3 | 4.36 | .81 |
| I identify strongly with the Chattooga. | 238 | 1.3 | 1.3 | 17.6 | 39.1 | 40.8 | 4.17 | .85 |
| I feel like the Chattooga is part of me. | 238 | 2.5 | 6.7 | 25.6 | 37.8 | 27.3 | 3.81 | 1.00 |
| Visiting the Chattooga says a great deal about who I am. | 238 | 3.8 | 6.3 | 40.8 | 33.2 | 16.0 | 3.51 | .96 |
| **Place Identity** | | | | | | | **4.17** | |
| No other place can compare to the Chattooga for the whitewater boating. | 237 | 1.3 | 10.5 | 22.8 | 31.6 | 33.8 | 3.86 | 1.04 |
| The Chattooga is the best place for whitewater boating. | 238 | 1.3 | 8.4 | 26.1 | 40.8 | 23.5 | 3.77 | .95 |
| Whitewater boating on the Chattooga is more important to me than whitewater boating any other river. | 237 | 2.5 | 12.2 | 30.8 | 30.4 | 24.1 | 3.61 | 1.06 |

**Table 5: Frequency as percent, means, and standard deviations for place bond items.**

| Measure and Variable | n | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree | Mean | SD |
|---|---|---|---|---|---|---|---|---|
| I get more satisfaction out of whitewater boating the Chattooga than from whitewater boating any other river. | 238 | 3.4 | 18.1 | 36.6 | 25.2 | 16.8 | 3.34 | 1.06 |
| I wouldn't substitute any other area for the whitewater boating I do at the Chattooga. | 237 | 3.8 | 20.7 | 34.2 | 25.3 | 16.0 | 3.29 | 1.08 |
| The whitewater boating I do at the Chattooga I would enjoy just as much at a similar river or stream.[2] | 238 | 11.3 | 35.3 | 29.4 | 20.2 | 3.8 | 2.70 | 1.02 |
| **Place Dependence** | | | | | | | **3.44** | |
| The Chattooga is like a home to me. | 237 | 2.5 | 11.8 | 25.7 | 32.1 | 27.8 | 3.71 | 1.08 |
| I rarely if ever whitewater boat any place other than the Chattooga. | 238 | 16.0 | 44.5 | 14.3 | 16.8 | 8.4 | 2.57 | 1.19 |
| The Chattooga is the only place I desire to go whitewater boating. | 238 | 20.2 | 51.7 | 16.8 | 8.0 | 3.4 | 2.23 | .97 |
| I consider only the Chattooga when I go whitewater boating. | 238 | 21.8 | 52.1 | 13.9 | 8.4 | 3.8 | 2.20 | 1.00 |
| If I could not boat the Chattooga I would stop whitewater boating. | 238 | 46.6 | 36.1 | 10.1 | 6.3 | .8 | 1.79 | .92 |
| **Rootedness** | | | | | | | **2.50** | |

[2] Item reverse coded for analysis.

References

Gereson, K., Stueve, C. A., & Fischer, C. S. (1977). Attachment to place. In C. S. Fischer, R. M. Jackson, C. A. Stueve, K. Gerson, L. Jones, M. Baldassare (Eds), *Networks and places,* New York: The Free Press.

Hammitt, W. E. & Cole, D. N. (1998). *Wildland recreation: Ecology and management.* New York: John Wiley & Sons.

Jacob, G. R., & Schreyer, R. (1980). Conflict in outdoor recreation: A theoretical perspective. *Journal* of *Leisure Research, 12*, 368-380.

Kaplan, R. & Kaplan, S. (1989). *The Experience of Nature:* A *Psychological Perspective.* New York: Cambridge University Press.

Kasarda, J. D. & Janowitz, M. (1974). Community attachment in mass society. *American Sociological Review, 39*, 328-339.

Low, S. M. & Altman, I. (1992). Place attachment: A conceptual inquiry. In I. Altman & S. M. Low (Eds), *Place Attachment.* New York: Plenum.

Milligan, M. J. (1998). Interactional past and potential: The social construction of place attachment. *Symbolic Interaction, 21*(1), 1-33.

Proshanky, H. M. (1978). The city and self-identity. *Environment and Behavior, 10,* 147-169.

Proshansky, H. M., Fabian, A. K., & Kaminoff, R. (1983). Place Identity: The physical world and socialization of the self. *Journal of Environmental Psychology, 3*, 57-83.

Stokols, D. & Shumaker, S. A. (1981). People and places: A transactional view of settings. In J. Harvey (Ed.), *Cognition,Social Behavior, and the Environment* (pp. 441-488). Hillsdale, N.J.: Lawrence Erlbaum Associates, Publishers.

Tuan, Y. F. (1977). *Space and Place.* London: Arnold.

Warzecha, C. A. & Lime, D. W. (2001). Place attachment in Canyonlands National Park: Visitor's assessment of setting and attributes on the Colorado and Green rivers. *Journal of Park and Recreation Administration, 19*(1), 59-78.

Watson A. E., Niccolucci, M. J., & Williams, D. R. (1994) The nature of conflict between hikers and recreational stock users in the John Muir Wilderness. *Journal of Leisure Research, 26*(4), 372-385.

Williams, D. R. & Vaske, J. J. (In Press). The measurement of place attachment: Validity and generalizability of a psychometric approach. *Forest Science.*

Activity or Resource Substitutes: Paddlers Using the Chattooga River

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## Substitution Choices

Recreationists motivated to participate in an activity or visit a favorite place are sometimes not able to do so. Such situations occur when recreationists change where they live, requirements of their job change, they suffer a health problem, family demands their attention or policies at a recreation site change due to a variety of reasons. Someone wanting to participate in recreation but not able to participate in his/her desired activity at the desired time at the desired place, must make some sort of substitute. She may simply change the time she goes, participate in the activity at some other place, or change the activity. Managers and social scientists refer to these strategies as temporal shift, activity substitution and place substitution. Recreationists may also continue to use the same place at the same time, even though the situation is not satisfactory, rationalizing their behavior through a psychological process termed "product shift." In this situation, they rethink why they participate, making an originally unacceptable situation, more acceptable.

But where do the recreationists who are displaced go to recreate if temporal or product shifts are not acceptable? According to the behavioral approach to recreation, they go to an alternative resource where the same motivations, needs, and benefits can be achieved, or more generally to some place or some other activity that can provide a similar experience (Brunson & Shelby, 1993; Hendee & Burdge, 1974; Iso Ahola, 1986). In economics, substitutability is the concept that two commodities or services that fulfill a need can be classified as substitutes. Previous research has shown that substitution behaviors are affected by social groups, alternative activities, and the recreator's specialization level for the originally intended behavior (Choi, Ditton, & Loomis, 1994).

### Activity Substitutes

Most of the research into substitution has focused on activity substitutes. Many of the empirical investigations into recreation substitutability by recreation behaviorists were initially designed to identify broad patterns of leisure participation. This was done by grouping activities that share general characteristics. From this line of research, Hendee and Burdge (1974) suggested that these typologies show that some activities might be interchangeable. They defined

recreation activity substitutability as "the interchangeability of recreation activities in satisfying participants motives, needs, and preferences" (p. 15).

Unsatisfied with results from the activity type approach, some authors investigated the importance that elements of the recreation experience play in choosing substitute activities. A study of goose and deer hunters in Wisconsin looked at elements of the recreation experience including preparation for the activity, social interaction that accompanies an activity, the process of participation, achievement of a goal, and the post-experience recollections. The results indicated that the meanings of recreation experiences are important to the perception of substitutes. The authors suggest that good substitutes are not activities that individuals derive the same satisfactions, but offer experiences similar to the originally intended activity (Baumgartner & Heberlein, 1981)

A study of fly-anglers on the Metolious River, Oregon demonstrated that the importance of activity attributes was inversely related to the number of substitutes and the perceived quality of the substitutes. Most telling from the study was that 95% of the anglers would fly-fish someplace else rather than find substitute activities (Manfredo & Anderson, 1991). From a theoretical and management perspective, these findings alter the course of substitution research. Identifying where recreationists will go becomes more important than what other recreation activity they might choose

Resource Substitutes

Vaske and Donnelly (1984) suggest that there are five types of variables that could differentiate those who substitute resources from those who would not. Recreationists who could substitute would have knowledge of substitutes, display behavioral commitment indicated by years and frequency of participation in the activity, psychological commitment to the activity, goal achievement during the activity, and would be willing to pay to continue to take part in the originally intended activity at a different site. Their analysis indicated there were differences in turkey hunters who had resource substitutes in each of these variables. The variable "knowledge of substitutes" accounted for the greatest difference between those who would make resource substitutions and those who would not.

Just because a place is identified by a recreationist as a substitute, does not necessarily mean it is a desirable substitute. A study of salmon anglers in New Zealand (Shelby, 1984) investigated resource substitutes. Findings indicated that some rivers were substitutes for each other but the substitutes were described as not as good. A second part of the study asked respondents to indicate why other rivers were not substitutes. The reasons most often cited include: that the drive was too long, going to the substitute was too expensive, and there were fewer salmon at the alternatives.

The history of substitution research in the recreation literature has revealed that studying recreationists' resource substitutes is probably more useful than identifying substitute activities (Shelby & Vaske, 1991). Questions remain as to why resources are perceived as asymmetrical and what forces drive activity versus resource substitutions. The concepts of place attachment and activity involvement could be helpful in gaining a better understanding of these issues.

Respondents to the Chattooga National Wild and Scenic River Study were asked what they would do if they could not boat the Chattooga. They were given four choices:

Whitewater boat but at a different river
Do some other activity on the Chattooga
Do a different activity in a different setting
Not do either another activity or go boating on a river

The choices provided all logical possibilities based on the question, including the fourth choice which indicates the recreationist would do nothing. The question does not logically allow for a response of temporal substitution or product shift. If respondents indicated that they would participate in another activity or go to a different activity and setting, they were asked to indicate what would be those activities and setting.

Respondents were also asked how many other rivers would provide a similar experience as boating the Chattooga. After answering this question, which required the respondents to think about the possibilities, they were then asked to name the river in the southeast that is the best substitute. A further question asked the respondents to rate their best substitute river on a scale from 1 to 7 where 1=not as good, 4=equivalent and 7=better.

Most rivers received mean ratings below equivalent suggesting that they were not considered as good a substitute as the experience available on the Chattooga River. Eighteen rivers were listed by at least two respondents and 19 other rivers were listed once. Rivers that had mean scores suggesting equivalency were the Green River, Little River Canyon and the Tallulah. These rivers were listed by between 8 and 19 respondents and had mean similarity ratings between 4.00 and 4.25. See Table 6 for a complete list.

**Table 6. Frequency of rivers indicated as substitutes for the Chattooga with similarity rating.**

| River | n | % | Similarity Rating | |
|---|---|---|---|---|
| | | | M | SD |
| Ocoee | 32 | 18.2 | 3.38 | 1.29 |
| Nolichucky | 29 | 16.5 | 3.00 | .85 |
| Green | 19 | 10.8 | 4.11 | 1.63 |
| Little River Canyon | 15 | 8.5 | 4.0 | .85 |
| Tellico | 11 | 6.3 | 3.35 | 1.02 |
| Talluah | 8 | 4.5 | 4.25 | 1.16 |
| Chuaga | 7 | 4.0 | 3.00 | 1.15 |
| French Broad | 7 | 4.0 | 1.83 | .75 |
| Gauley | 5 | 2.8 | 3.20 | .84 |
| New River | 4 | 2.3 | 3.25 | .96 |
| Nantahala | 4 | 2.3 | 1.50 | 1.00 |
| Obed | 3 | 1.7 | 4.00 | .00 |
| Watauga | 3 | 1.7 | 3.67 | 2.08 |
| Upper Youghigany | 2 | 1.1 | 5.00 | 1.14 |
| Big South Fork | 2 | 1.1 | 4.00 | .00 |
| Wilson Creek | 2 | 1.1 | 3.50 | 2.12 |
| Chattahoochee | 2 | 1.1 | 3.00 | 1.41 |
| Big Laurel | 2 | 1.1 | 2.00 | 1.41 |
| Other | 19 | 10.8 | 3.32 | 1.85 |

n = 1.58, 1 = Not as good, 4 = Equivalent, 7 = Better

References

Baumgartner, R. & Heberlein, T. A. (1981). Process, goal, and social interaction differences in recreation: What makes an activity substitutable. *Leisure Sciences, 4*, 443-458.

Becker, R. H. (1981). Displacement of recreational users between the lower St. Croix and upper Mississippi rivers. *Journal* of *Environmental Management, 13*, 259-267.

Brunson, M. W., & Shelby, B. (1993). Recreation substitutability: A research agenda. *Leisure Sciences, 15*, 67-74.

Choi, S., Loomis, D. K., & Ditton, R. B. (1994). The effect of social group, activity, and specialization on recreation substitution decisions. *Leisure Sciences, 16*, 143-159.

Ditton, R. B., Goodale, T. L., & Johnsen, P. K. (1975). A cluster analysis of activity, frequency, and environment variables to identify water-based recreation types. *Journal* of *Leisure Research, 7*, 282-295.

Hall, T. & Shelby, B. (2000). Temporal and spatial displacement: Evidence from a high-use reservoir and alternate site. *Journal* of *Leisure Research, 32*, 435-456.

Hendee, J. C. & Burdge R. J. (1974). The substitutability concept: Implications for recreational research and management. *Journal of Leisure Research, 6*, 157-162.

Iso-Ahola, S. E. (1986). A theory of substitutability of leisure behavior. *Leisure Sciences, 8*, 367-389.

Peterson, G., Stynes, D., Rosenthal, D., & Dwyer, J. (1985). Substitution in recreation choice behavior. In G. Stankey & S. McCool (compilers), *Proceedings --The Symposium of Recreation Choice Behavior,* (USDA Forest Service General Technical Report INT -184, pp.19-30). Ogden, I U.T.: Intermountain Research Station.

Shelby, B. (1984). Resource and activity substitutes for recreational salmon fishing in New Zealand. In Stankey, G. H, & McCool, S. F., *Proceedings -- Symposium on recreation choice behavior,* (USDA Forest Service General Technical Report INT -184, pp.79-85). Ogden, UT: Intermountain Research Station.

Shelby, B. & Vaske, J. (1991). Resource and activity substitutes for recreational salmon fishing in New Zealand. *Leisure Sciences, 13*, 21-32.

Shelby, B., Bregenzer, N., & Johnson, R. (1988). Displacement and product shift: Empirical evidence from Oregon rivers. *Journal* of *Leisure Research, 20,* 274-288

Vaske, J. J., Donnelly, M. P., & Tweed, D. L. (1983). Recreationist-defined versus researcher defined similarity judgments in substitutability research. *Journal of Leisure Research, 15*, 251-262.

Activity or Resource Substitutes: Paddlers Using the Chattooga River

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## Preferred River Attributes of Alternate Sites

Respondents were asked to rate the importance of a range of attributes in choosing a substitute river. The list was based on attributes that are known to play a role in decision making of experienced rafters. Each attribute was rated on a five point bi-polar scale from 1 to 5 where 1=very unimportant, 3=neutral and 5=very important. Table 7 reports the frequencies, means and standard deviations for each attribute. The larger the standard deviation for each item, the greater the distribution of answers, or differences in opinion.

The items in Table 7 are ranked by mean importance. These attributes were presented in the questionnaire in a different order. The functional item "Water flow" was top ranked (mean of 4.52) followed at a mean of 4.43 by "Scenery." The third item "Difficulty of rapids" (4.23) and "Number of boaters"(3.98) rounded out the list of top ranked items with relatively small standard deviations. The results suggest that boaters are looking for a combination of challenging rapids in a scenic environment. The item "Number of boaters" can be interpreted two different ways. The first would be a desire for uncrowded areas, the other would be for an environment that offers a supportive social environment.

All attributes except "Dam release" received a mean rating above neutral (3.0). Dam release is important only for rivers dependent on release of water for adequate river flow. This attribute would only be important to paddlers considering using rivers that have scheduled dam releases. A segmentation analysis of the data from the scale failed to identify any meaningful segments among respondents. The group is relatively homogeneous in terms of its evaluations of the importance of river attributes.

**Table 7. Frequency as percent, mean and standard deviation of importance scores for river attributes.**

| Item | n | Very un-important | Somewhat Unimportant | Neutral | Somewhat Important | Very Important | Mean | SD |
|---|---|---|---|---|---|---|---|---|
| Water Flow | 195 | 2.6 | 1.0 | 2.1 | 30.8 | 63.6 | **4.52** | **.81** |
| Scenery | 195 | 1.0 | 3.6 | 4.6 | 32.8 | 57.9 | **4.43** | **.82** |
| Difficulty of the Rapids | 194 | 2.1 | 2.6 | 4.6 | 51.5 | 39.2 | **4.23** | **.82** |
| Number of other Boaters | 194 | 2.1 | 5.2 | 11.9 | 54.1 | 26.8 | **3.98** | **.88** |
| Drive Distance | 195 | 4.6 | 10.8 | 11.3 | 49.7 | 23.6 | **3.77** | **1.07** |
| Knowledge of Alternatives | 194 | 1.0 | 6.7 | 26.3 | 47.9 | 18.0 | **3.75** | **.86** |
| Wild & Scenic Designation | 194 | 5.7 | 9.8 | 21.1 | 39.7 | 23.7 | **3.66** | **1.11** |
| Release Date | 192 | 9.4 | 5.2 | 31.3 | 26.6 | 27.6 | **3.58** | **1.21** |
| Previous Experience | 194 | 4.1 | 12.4 | 25.8 | 44.8 | 12.9 | **3.50** | **1.00** |
| Ease of Access | 194 | 7.7 | 22.2 | 22.7 | 37.6 | 9.8 | **3.20** | **1.13** |
| Cost of Trip | 195 | 15.9 | 14.4 | 27.7 | 27.7 | 14.4 | **3.10** | **1.28** |
| Dam Release | 193 | 15.5 | 14.0 | 41.5 | 22.3 | 6.7 | **2.91** | **1.12** |
| Other | | | | | | | | |