ENCOUNTER NORMS AND PERCEIVED CROWDING
ON THE WHITE SALMON RIVER IN SOUTHERN WASHINGTON

A Thesis in
Recreation, Parks, and Tourism Management

by
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ABSTRACT

Encounter Norms and Perceived Crowding on the Lower White Salmon River in Southern Washington

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The purpose of this study was to investigate visitors’ perceptions of encounters, norms, conflict, crowding and satisfaction during recreation experiences on the White Salmon River in Southern Washington. Visitors included both whitewater rafters and kayakers, recreating privately or with the assistance of a commercial outfitter. This study also sought to identify the existence of social norms among visitors by examining levels of norm prevalence and norm crystallization (agreement).

The study took place on the White Salmon River, within the Columbia River National Scenic Area in southern Washington. Surveys were administered in two waves, during the Summer and Fall seasons of 2008 and 2009. A total of 1260 completed surveys were collected. All data were analyzed with quantitative methods, using SPSS version 17.0.

The findings of this study suggest that visitor perceptions of crowding have increased on the river since the most recent study was conducted in 1993. Despite this increase, the level of crowding on the White Salmon remains on the level or below the level of perceived crowding reported at comparable recreation areas in the United States. In terms of normative standards, findings from this study were consistent with a prior study examining the relationships between encounters, norms and crowding (Vaske & Donnelly, 2002). Perceived crowding scores were significantly higher for those visitors reporting a norm violation (reporting an encounter higher than the corresponding normative standard). The findings of this study also indicate significant relationships between encounters, conflict, crowding and satisfaction. Relationships supported the idea that conflict is a significant predictor of crowding (as proposed by Manning et al, 2000), which was an addition to the traditional crowding – satisfaction model. The final model produced by this study expands on the traditional crowding – satisfaction model by adding the influence of conflict on perceived crowding. This final model was statistically strong, predicting 52 percent of the variance in perceived crowding and 58 percent of the variance in satisfaction scores.
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CHAPTER ONE
INTRODUCTION

The lower White Salmon River was designated a National Wild and Scenic River in 1986, as part of the Columbia River Gorge National Scenic Act. The river runs from Mt. Adams, near Troutdale, Washington, to the Columbia River just north of Hood River, Oregon. The 7.7 mile section of the White Salmon between BZ Corner, Washington, and Northwestern Lake offers recreation opportunities for whitewater boating and has become an increasingly popular whitewater boating destination since the early 1980s.

The White Salmon River offers a range of whitewater boating experiences. The lower-most stretch, from Husum, Washington to Northwestern Lake, features class I and II rapids that are ideal for a less-challenging float. The middle section from BZ Corner to Husum is more challenging, featuring class II and III rapids throughout the float and culminating at Husum Falls, an 8-foot waterfall just upstream of the Husum Bridge. Most commercial rafting trips on the White Salmon run both sections, from the main USFS launch site at BZ Corner to Northwestern Lake where Condit Dam slows the river. However, many private rafters and kayakers choose to float one of the two halves, depending on the level of challenge desired. A small portion of particularly skilled kayakers choose to put onto the White Salmon upstream from BZ Corner, where a very challenging and technical whitewater experience is available. The water level of
this river is fairly consistent, allowing for whitewater boating throughout most of the year (Shelby & Wing, 1993).

Recreation use on the White Salmon River has grown substantially in the last 20 years. This trend has been illustrated in two empirical studies. A 1988 study by Allen and Ratcliffe measured annual recreation use on the White Salmon River. The investigators estimated that whitewater boating had increased from 1,785 users in 1984 to 2,471 users in 1986, and 6,067 users in 1988. A second study (Shelby & Wing, 1993) estimated that 11,190 boaters utilized the White Salmon River in 1991, which exceeded the level of use projected by the former study (9,000) for that year.

In addition to use levels, Shelby and Wing (1993) examined the impacts of increased recreation use on the White Salmon, most notably the levels of crowding perceived by whitewater boaters on the river. These investigators examined users’ perceptions of the frequency and duration of encounters, as well as waiting times at the boat launch and rapids. Most boaters on the White Salmon believed the river had acceptable levels of perceived crowding, but due to the growing trend in use, the investigators recommended “continued monitoring of use patterns and users” (Shelby & Wing, 1993.) Despite the recommendations of this study, and the estimation that recreation use on the White Salmon grew at least 20 percent per year throughout the 1980s and early
Crowding, in one form or another, has been one of the most investigated concepts in outdoor recreation for almost 50 years. Crowding is an evaluative concept that is based on users’ standards or preferences concerning appropriate use levels within a recreation setting. These normative standards, referred to as crowding norms, can be based on behavioral (such as user conflict), social (i.e. user density), and/or environmental (such as motivations for solitude associated with backcountry settings) factors (Donnelly, Vaske & Shelby, 1992; Manning, Valliere, Wang & Jacobi, 1999; Shelby & Vaske, 1991; Vaske, Graefe, Shelby & Heberlein, 1986). Perceived crowding occurs when the presence or behavior of other users violates those norms and results in a negative evaluation of some aspects of the user’s recreation experience (Shelby, Vaske & Heberlein, 1989).

In a whitewater recreation setting, those violations could be due to preferences concerning number of encounters, proximity of other users, time spent in sight of other users, or waiting times at boat launches, takeouts, or rapids (Shelby & Wing, 1993; Vaske, Donnelly & Shelby, 1993).

Crowding is often misinterpreted as density, which is an objective concept describing the use level, or number of people present within a given recreation area (Shelby, Vaske & Heberlein, 1989). Whereas density places no value judgment on the number of people, crowding is a negative evaluation of the
number of encounters or waiting times that a recreation user remembers experiencing (Manning, 1999; Shelby & Heberlein, 1986; Tarrant, Cordell & Kibler, 1997). A recreation area is crowded when the number of users within that area is perceived as too many. While crowding is often correlated with density, the concept is more complex than an objective count of users within a given area.

The theoretical base of crowding research in the outdoor recreation field can be traced back to carrying capacity and, more closely, social carrying capacity studies. The idea that many motivations for outdoor recreation experiences are negatively affected by increased levels of use within a given recreation area has been examined as early as the 1930s (Adams, 1930; Leopold, 1934). In 1964, Wagar provided the basis for crowding research through to the present day when the author stated, “When too many people use the same (recreation) area, some traditional wildland values are lost.”

More recent studies have found that certain variables may impact the level of crowding that recreation users experience. Characteristics concerning the recreation user, other users encountered, and the recreation area can change the way that a recreation user views the recreation experience, including levels of perceived crowding. A recreation user’s previous experiences, expectations, preferences and motivations for recreating may influence his or her perceptions of the conditions at that area (Ditton, Fedler & Graefe, 1983). The recreation
setting itself may influence perceptions of crowding within that area as well. For instance, because solitude is often a motivating factor for visiting such areas, visitors within backcountry, wilderness, or otherwise remote recreation areas often display a greater sensitivity to encounters (Stankey, 1973; Graefe & Drogan, 1989). In addition, the attitudes and behavior of other visitors may influence survey respondents’ perceptions, particularly if there is conflict between those recreation users (Lucas, 1964; Adelman, Heberlein, & Bonnickson, 1982). Conflict occurs whenever one recreation user feels that another visitor or group of visitors are interfering with his or her goals (Jacob & Schreyer, 1980). Visitors may report higher levels of crowding if they are bothered by the behavior of other visitors, such as the size of other groups, the activities in which other groups participate, or simply the respondents’ perception of alikeness with other users encountered.

The aim of this study is to re-evaluate the effects of recreation use on a protected recreation resource. While previous survey research studies have found levels of crowding on the White Salmon River to be acceptable (with most users reporting crowding scores that indicate no or only slight crowding), those studies also project increasing visitor use levels and recommend continued monitoring in order to ensure quality recreation experiences in this recreation area.
Problem Statement

The primary purpose of this study is to examine levels of perceived crowding on the White Salmon River, a federally-designated Wild and Scenic River in southern Washington. This study will expand on previous studies by re-assessing the levels of perceived crowding in a recreation setting that has been found to have increasing levels of use and a potential for crowding issues that could impact recreation users’ quality of experience. First, this study will examine recreation users’ reported levels of perceived crowding. The study will examine potential relationships between levels of perceived crowding and other variables that have been found to influence users’ perceptions of density within recreation areas. These variables include the users’ perceptions of encounters, waiting times and normative standards, as well as variables that influence those norms, such as the users’ motivations or preferences and the behavior of other users they encounter at the recreation area. Those findings will be compared with the 1993 Shelby and Wing study of the White Salmon River. Second, this study will examine the prevalence of normative standards concerning use levels and the level of norm crystallization (also referred to as consensus or agreement) among users on the White Salmon River. These findings will also be compared with the 1993 Shelby and Wing study. Third, this study will examine the relationship between reported encounters, crowding norms, and perceived crowding. Previous research has demonstrated that when a user’s reported
encounters exceed normative standards, reports of perceived crowding increase. Lastly, this study will examine relationships between users’ reports of encounters, norms, and crowding with their level of overall satisfaction with their recreation experience on the White Salmon River.
Research Questions and Hypotheses

R1: What is the level of perceived crowding among recreation users on the White Salmon River?

H1: Reported encounters are a positive predictor of perceived crowding among recreation users on the White Salmon River.

H2: Reported encounters are a negative predictor of satisfaction among recreation users on the White Salmon River.

H3: Perceived crowding is a negative predictor of satisfaction among recreation users on the White Salmon River.

R2: Is there a relationship between perceived crowding and trip preferences, including group size preferred and experience preferred, among users on the White Salmon River?

R3: What is the level of norm prevalence among users on the White Salmon River?

R4: What is the level of norm crystallization among users on the White Salmon River?

H4: Recreation users will report higher levels of crowding if they also report experiencing a norm violation during their visit to the White Salmon River.

R5: What is the relationship between encounters, conflict, crowding, and satisfaction on the White Salmon River?
**Delimitations and Limitations**

This study is limited to whitewater paddlers that recreated on the White Salmon River in southern Washington during the summers of 2008 and 2009. This study used a cross-sectional method, in which a single round of exit interviews was administered. This study relied on self-report measures from respondents. The validity of these findings is subject to selection biases and systematic response distortion. In addition, the study did not include recreation use level counts to compare with the survey participants’ responses. In addition, because waiting times at Husum Falls were omitted from the second wave of surveys, all analyses involving the encounter variable concerning the users’ waiting time at Husum Falls are limited to data from the first wave of surveys conducted during the Summer and Fall of 2008.

**Definitions**

Recreation Users. For the purposes of this study, recreation users are defined as visitors engaged in recreation pursuits, including whitewater rafting, kayaking and canoeing, on the White Salmon River.

Commercial Users. For the purposes of this study, commercial users are defined as recreation users who have paid an outfitter to facilitate their trip.

Private Users. For the purposes of this study, private users are defined as recreation users who are visiting the White Salmon River without a professional
outfitter or guide.

Crowding. A subjective concept that is based on users’ standards or preferences concerning appropriate use levels within a recreation setting, resulting in a negative evaluation of user density within that setting. These standards can be based on behavioral, social, and / or environmental factors (Donnelly, Vaske & Shelby, 1992; Manning, Valliere, Wang & Jacobi, 1999; Shelby & Vaske, 1991; Vaske, Graefe, Shelby & Heberlein, 1986). Crowding was measured using a single item, 9-point Likert scale. This type of question, which asked participants to indicate how crowded they felt while on the river, has been used to evaluate crowding in at least 180 recreation crowding studies (Vaske & Shelby, 2008).

Encounter Norms. Recreation users’ individual or shared standards or preferences concerning use levels or social conditions within a recreation setting or activity (Lewis, Lime & Anderson, 1996). The survey instrument used four items to measure recreation users’ norms concerning the number of users encountered, the percent of time spent in the presence of others and waiting times during the trip. Survey respondents were asked to provide the length of time that would be reasonable to wait at the put-in and at Husum Falls.

Norm Prevalence. The percent of recreation users providing a response to survey items concerning norms (Donnelly, Vaske, Whittaker & Shelby, 2000). Norm Prevalence is one way researchers verify the existence of a social norm.
Norm Prevalence also allows the researcher to determine how relevant a particular issue (such as user density or waiting times) is to survey respondents. Norm prevalence was measured by running frequency distributions on the four items that measured norms.

Norm Crystallization. The level of agreement or consensus among recreation users regarding normative standards (Budruk & Manning, 2006). In this study, norm crystallization was measured in two ways. First, frequency distributions were used to determine what percentages of users agree about the acceptability of specific levels of encounters or waiting times. Second, standard deviations were used as measures of dispersion to determine how narrowly clustered users’ normative standards were.

Conflict. Conflict occurs when a recreation user’s goals are negatively affected (usually referred to as “goal interference”) by the behavior of other users (Jacob & Schreyer, 1980). In this study, conflict was measured using a dichotomous survey item that asking participants if they had any conflicts with other parties. If the user responded that they had experienced conflict, they were asked to describe the nature of the conflict.
CHAPTER TWO
LITERATURE REVIEW

Introduction

Crowding studies have been a consistent and complex topic in recreation research for decades. Crowding is a concept in recreation research and literature that refers to a recreation user’s perception of the use level in a specific recreation area or activity. Crowding is a subjective judgment of the use level within an area and should not be confused with use level (an objective count or measure of the use level within a specific recreation area or activity; Manning, 1999). Further, crowding is a negative evaluation. Visitors feel crowded when use level exceeds the desired or appropriate levels for an area and thus degrades with the visitor’s experience (Shelby, Vaske & Heberlein, 1989).

The initial examinations of use level in wild areas date back to the early 1930s (Adams, 1930; Leopold, 1934). Since then, public land managers have used crowding studies when establishing use limits in recreation land management plans. The earliest example of this occurred in a 1962 study which examined users’ satisfaction with 24 outdoor recreation areas throughout the United States (Department of Resource Development, 1962). The investigators found that 20 percent of respondents indicated that there were too many people at the recreation area. Crowding research has continued to be developed in the subsequent decades, being utilized in attempts to explain user perceptions and
satisfaction, user interaction, and social norms. Management frameworks, such as Visitor Impact Management, Limits of Acceptable Change, or the Visitor Experience and Resource Protection Plan use measurements of crowding to establish physical and social carrying capacities for recreation areas managed by agencies such as the National Park Service or USDA Forest Service (Stankey, Cole, Lucas, Peterson, Frissell & Washburne, 1985; Graefe, Kuss & Vaske, 1990; National Park Service, 1997).

Conceptual Background

This research topic has evolved to incorporate measurements of use levels (actual density), reported use levels (reported encounters), and user perceptions concerning appropriate use levels (encounter norms) into users' evaluative standards of use levels (perceived crowding). In addition, researchers have identified the recreation setting (resource type), the nature of user interactions (encounter type), and the activity of the user (activity type) as influential variables in recreation users’ perceptions of crowding.

The descriptive aspect of crowding and carrying capacity research is actual density. Actual density refers to the actual number of people (or sometimes vehicles) in a given recreation area. This is a valuable measurement in study of use levels, because it is the objective measure that is manipulated by managers, in order to manage for users’ subjective perceptions of crowding.
The most closely-related subjective measurement to actual density is the reported encounters by recreation users. Reported encounters refer to the number of other visitors that users indicate they have encountered while visiting a recreation area. Although users’ perceptions of encounters will undoubtedly be influenced by the actual density, the number they report will also be shaped by several other factors, including their own motivations, the behavior of other visitors, the setting, and their standards for use levels within the given location and circumstances. A review of crowding published in 2002 found that studies measuring the relationship between actual density and reported encounters reported an average correlation of .49, with some studies reporting as little as .15, and others reporting as high as a .75 correlation (Vaske & Donnelly). An earlier review article examined the relationships between actual density, reported encounters and perceived crowding (Graefe, Vaske & Kuss, 1984). The authors reported that the effects of reported encounters on perceived crowding were stronger and more consistent than the effects of actual density on perceived crowding (average correlations were .34 and .21, respectively; Graefe, Vaske & Kuss, 1984).

Encounter norms exist when a user or group of users develop standards concerning the appropriate use levels and behavior within a given recreation setting and activity. Several recreation studies have examined the presence of encounter norms within specific settings and activities (Donnelly, Vaske,
Whittaker & Shelby, 2000; Manning, Valliere, Wang & Jacobi, 1999; Manning, Valliere, Minteer, Wang & Jacobi, 2000; Vaske & Donnelly, 2002; Vaske, Graefe, Shelby & Heberlein, 1986). Norms can exist within individual users (personal norms) or through a common standard among user groups.

Social norms are significantly more difficult to measure, and some researchers have questioned whether or not they actually exist (Roggenbuck, Williams, Bange & Dean, 1991). However, within specific recreation contexts, some levels of consistency have been found, which would indicate that social norms do exist in specific settings and activities (Donnelly, Vaske, Whittaker & Shelby, 2000). Further, numerous studies have evaluated the existence of social norms by measuring norm prevalence and crystallization. A 2000 article by Donnelly, Vaske, Whittaker and Shelby reviewed 30 studies of norm prevalence across 56 norm evaluation contexts, concluding that nearly three-quarters (71%) of all respondents surveyed (n=9806) were able to indicate a numerical encounter norm. The existence of social norms can be verified further by measuring norm crystallization. Norm crystallization measures the variation in responses to survey items concerning norms. Studies have used frequency distributions, measures of central tendency, measures of dispersion, and analysis of variance to determine the level of norm crystallization within study samples (Budruk & Manning, 2006; Shelby & Heberlein, 1986; Shelby & Vaske, 1991; Whittaker & Shelby, 1988; Manning, Valliere, Wang & Jacobi, 1999).
While the literature suggests that there is not yet a clear definition of what constitutes an acceptable level of norm crystallization, some studies have recommended the use of multiple methods to resolve the issue (Budruk & Manning, 2006; Roggenbuck, Williams, Bange & Dean, 1991). Despite the uncertainty surrounding measurement of this concept, norm crystallization remains a strong indicator for the existence of aggregated social norms among a sample of recreation users.

The presence of social norms is particularly attractive for land managers designing strategies to manage crowding or establish social carrying capacity levels (Manning, Valliere, Minteer, Wang & Jacobi, 2000). Several researchers have tested the hypothesis that users are more likely to report feeling crowded when a user’s reported encounters exceed his or her encounter norm, and have found results which support such a hypothesis (Shelby & Vaske, 1991).

Perceived crowding is yet another subjective evaluation of use level. The distinction between reported encounters and perceived crowding lies in the negative connotation of crowding. While reported encounters are not necessarily a positive or negative evaluation, perceived crowding is described within recreation literature as a value judgment with a negative evaluative nature (Shelby, Vaske & Heberlein, 1989). The concept is related to user density, but also is an indicator of the users’ opinion concerning how many people should be in that area.
Certain variables have been found to contribute to the user's negative evaluation of density and encounters. These variables include: size and composition of the recreation area, the activities pursued by the user and other visitors, and the likelihood of conflict (Manning, Valliere, Minteer, Wang & Jacobi, 2000). The motivations, preferences, and goals of each recreation user influence that user's norms and perceptions regarding density, encounters, conflict, and crowding. One particular study highlighted this by demonstrating that even among recreation users engaged in similar activities on the Buffalo National River, users motivated to “get away” felt more crowded than those motivated to “be part of a group” or “share what I have learned with others” (Ditton, Fedler & Graefe, 1983). In contrast, some studies have found that higher use levels may increase user satisfaction, depending on user characteristics (Ditton, Fedler & Graefe, 1983). This concept was referred to as “functional density” in a consumer behavior study by Eroglu and Harrel (1986). Certain activities are more likely to reflect this trend, such as parties, celebrations, or festivals. In a recreation context, Ditton et al. (1983) applied this concept by rephrasing a crowding measure to allow for either positive or negative interpretations of crowding. In this study, crowding is measured and described in the more conventional sense, as a negative evaluation of use levels or contacts, due to the setting, activity types, and user preferences concerning desired experience.
The recreation setting itself can also influence visitor perceptions. Numerous studies have demonstrated this by comparing users in backcountry settings (who are more often seeking solitude or nature connection) with those in frontcountry recreation areas (Donnelly, Vaske, Whittaker & Shelby, 2000) or between users at central and peripheral regions of recreation areas (Lime, 1977; Lucas, 1980; Stankey, 1973, 1980). The setting of this study features characteristics of both backcountry and frontcountry settings. The river itself is situated along a rural highway with easy access and parking at the major put-in and takeout locations. However, the view from much of the river features high, narrow banks and stretches of private property that isolate boaters from the highway.

The characteristics of other visitors may also influence perceptions of encounters and crowding. Several studies have found that conflict may increase a users’ sensitivity to encountering other visitors, such as paddle canoeists encountering motorized canoes or motorboats (Lewis, Lime & Anderson, 1996; Lime 1977; Lucas, 1964; Stankey, 1980). Conflict occurs when the behavior of other visitors adversely affects a recreation user, interfering with their goals for the experience in some way (Jacob & Schreyer, 1980). This interference often occurs through direct contact with other users, but also may occur without contact, in situations where the visitors’ interpretation of others’ behavior affects that visitor’s goals for an experience (Graefe & Thapa, 2004). The White Salmon
River setting features many characteristics that have been linked to instances of conflict in previous studies, including multiple activity types, interaction of several user groups and varying experience preferences (Bury, Holland & McEwen, 1983; Devall & Harry, 1981; Noe, Wellman & Buhyoff, 1982). Conflict is also a concept within recreation research with potential for growth in terms of understanding how conflict can be measured, both individually and in relation to other variables. In particular, an examination of conflict may allow for a greater understanding of visitor perceptions of encounters, crowding and satisfaction.

It appears that both recreation researchers and land managers have recognized the value in such a descriptive and encompassing concept. A standard, single-item measure of perceived crowding has been included in at least 181 studies, including over 85,000 recreation users, according to a 2008 review of the crowding literature (Vaske & Shelby, 2008). Below, this paper will examine both the theory behind and the application of perceived crowding in recreation settings.

Normative Theory

The theoretical basis for much of the crowding and carrying capacity literature lies in normative theory. Investigators have utilized norms to build a conceptual framework concerning recreation crowding, not only examining whether or not a recreation area is crowded, but also at what use level most
users would consider that crowding to take place. Normative theory assumes that visitors have standards concerning appropriate behavior (including appropriate use levels) within a given recreation activity or setting (Donnelly, Vaske & Shelby, 1991; Shelby & Vaske, 1992; Vaske, Graefe, Shelby & Heberlein, 1986). Employing a normative approach allows the researcher to establish standards of quality, which further allows for the development of carrying capacities within land management plans. This approach has been utilized in several notable recreation land management frameworks, including Visitor Impact Management (Graefe, Kuss & Vaske, 1990), Limits of Acceptable Change (Stankey, Cole, Lucas, Peterson & Frissell, 1985) and the Visitor Experience and Resource Protection framework employed by the National Park Service (NPS, 1997).

The application of normative theory to outdoor recreation is based on normative research in the social psychology field, primarily that of Jackson (1965) and his return potential curve methodology, which evaluates the presence of social norms within groups. Several studies have employed this technique to evaluate normative standards of crowding within recreation activities and settings (Manning, Valliere, Minteer, Wang & Jacobi, 2000; Patterson & Hammitt, 1990; Shelby, 1981; Shelby & Heberlein, 1986; Shelby & Wing, 1993; Tarrant & English, 1996; Vaske & Donnelly, 2002; Vaske, Graefe, Shelby & Heberlein, 1986; Williams, Roggenbuck & Bange, 1991). In addition, several studies have
found that visitors who report violations of their normative standards also report personal behavior reacting to those violations (such as reacting to feelings of perceived crowding by avoiding further encounters; Lewis, Lime & Anderson, 1996; Manning, Lime & Hof, 1996; Vaske, Graefe, Shelby & Heberlein, 1986; Williams, Roggenbuck & Bange, 1991). As illustrated above, normative theory has served as a common and promising approach in the examination of crowding within outdoor recreation settings.

An examination of recreation users' perceptions concerning encounters, normative standards, and crowding will provide recreation land managers with a better understanding of how users perceive the current levels of use on the White Salmon River. The use of Normative Theory in this study not only allows for measurement of the changes in use levels and crowding, but also provides insight into trends concerning how users' standards have changed since this recreation setting was last studied.
CHAPTER THREE
METHODS

Introduction

Data for this study were collected as part of a larger study funded by the USDA Forest Service (Columbia River Gorge National Scenic Area) in an effort to understand the perceptions of crowding, satisfaction, and conflict among visitors on the White Salmon River. Previous recreation studies of the White Salmon River have predicted a trend of increasing use and recommended further study in order to monitor levels of perceived crowding on the river (Allen & Ratcliffe, 1988; Shelby & Wing, 1993). The primary focus of this study was to determine visitors’ perceptions of the recreation experience on the White Salmon River.

This study focused on understanding whitewater recreationists who visit the White Salmon River in southern Washington. This group includes rafters, kayakers, and canoeists. These recreationists may be visiting the river as clients of commercial outfitters or in a self-guided capacity. Survey respondents were asked about their recreation experience concerning their activity, whether their user group was commercial or private, the route they chose and when they planned this trip. In addition, the respondents were asked several questions designed to understand users’ satisfaction with the trip, normative standards concerning use levels and waiting times on the river and the amount of use and
length of waiting times they observed on the river. These recreationists were also asked about any instances of conflict they experienced on their trip. In accordance with the primary focus of the study, the majority of these survey items focused on use levels and users' corresponding normative standards concerning use levels.

**Study Area**

The White Salmon River is located in southern Washington state, within the Columbia River Gorge National Scenic Area, and the Pacific Northwest Region of the USDA Forest Service (also referred to as USDA Forest Service Region 6). The river begins near Mt. Adams (north of Troutdale, Washington). It ends at Northwestern Lake, where Condit Dam slows the flow of water into the Columbia River. The 7.7 mile section of the White Salmon between BZ Corner, Washington, and Northwestern Lake is visited by thousands of boaters each year, and hosts kayaking and riverboarding events for the Gorge Games, an action sports festival based in Hood River, Oregon. A “Mecca” of windsurfing and kiteboarding, the small city of Hood River is home to several outfitters and retailers that foster a population and culture centered around outdoor recreation pursuits. Located just one hour east of Portland, Oregon on Interstate 84, and boasting a National Scenic Area, two Wild and Scenic Rivers, and a nationally televised action sports festival, the area surrounding this river offers as many
recreation opportunities as any location in the United States.

Figure 1. Map of the Study Area
Data Collection

Data were collected from recreationists using on-site interviews at the two main takeout points on the White Salmon River. These takeouts are used by virtually all paddlers on the White Salmon, due to a float that features a fast-moving current, a short duration from start to finish, and privately-owned land bordering most of the river. As mentioned earlier, most recreation users on the White Salmon begin their trip at the BZ Corner put-in and finish at either the Husum Bridge or Northwestern Lake. Because most private kayaking trips and all commercial rafting trips on the river end at Northwestern Lake, far more users exited and were interviewed at that location than the Husum Bridge takeout.

A purposeful sampling method was utilized to obtain a total of 1166 interviews. The interviews provided 1065 useable surveys. Due to an error in the first round of data collection, 101 surveys were completed incorrectly. Some interviewers were collecting aggregate data that could not be analyzed correctly. This problem was corrected once project managers discovered the mistake.

All interviews were conducted between June 2008 and October 2009. Surveys were administered in two waves. The first wave was collected during Summer and Fall of 2008. The initial instrument was a replication of the Shelby and Wing survey instrument (1993). The second wave of data collection, conducted in Summer and Fall of 2009, included a broader range of items, including all survey items used in creating conflict, crowding and satisfaction
index variables. Due to the short length of the survey, the response rate was quite high, with an estimated 90% of respondents agreeing to be interviewed. All survey respondents were at least 18 years of age, and no users were interviewed more than once.

Instrumentation

The survey instrument measured recreation users’ perceptions concerning encounters, norms, perceived crowding, preferred experience, satisfaction, trip logistics, and any conflict experienced during the trip. The initial survey instrument was a replication of the survey instrument used by Shelby and Wing in the 1993 White Salmon River study. By replicating the items used previously, researchers are able to compare results with the study authors who recommended, “continued monitoring of use patterns and users” (Shelby & Wing, 1993).

The primary focus of this instrument concerned encounter norms (including waiting times, number of encounters, and percentage of time spent in sight of other groups), reported encounters (including waiting times, number of encounters, and percentage of time spent in sight of other groups) and perceived crowding. The survey instrument asked participants to respond to several items concerning encounters, waiting times, and participants’ standards concerning encounters and waiting times. In the Shelby and Wing (1993) report, the authors refer to these as the impacts (in the case of waiting times, percent of time spent
in sight of other groups, and number of encounters with other boats) and standards (which ask the survey respondent to indicate what they believe are reasonable waiting times, time spent in sight of other groups, and number of encounters). These items establish respondents’ normative standards by asking recreationists to indicate what they believe behavior and conditions should be. Norms were first applied to natural resource studies in the 1970s (Heberlein, 1977; Vaske, 1977) and have been used in numerous studies to understand recreation users’ encounter norms in specific settings and activities (Donnelly, Vaske, Whittaker & Shelby, 2000; Manning, Valliere, Wang & Jacobi, 1999; Manning, Valliere, Minter, Wang & Jacobi, 2000; Patterson & Hammitt, 1990; Shelby & Vaske, 1991; Shelby & Heberlein, 1986; Vaske, Donnelly & Shelby, 1993).

The on-site survey used four items to evaluate encounters. The first encounter item asked participants, “While you were on the river today, about what percent of the time were you in sight of boats from other groups?” Participants were asked to reply with a percentage from 0 to 100, in increments of 10 (10%, 20%....90%, 100%). The second encounter item was an open-ended question, asking participants to indicate how many times they saw boats from other groups while on the river. The third and fourth encounter items involved waiting times. Survey respondents were asked how long they had to wait at the launch site before they could start their trip, and how long they had to wait at
Husum Falls before they could portage or run the falls. Answers were given in the number of minutes waited. Items concerning encounters asked survey participants to indicate the number of encounters, percentage of time encountering, and length of waiting times they thought would be appropriate or “okay” during their experience on the White Salmon River. These items provided the norm variables that I will be comparing to the encounter and crowding variables. Encounters, norms and crowding have been used to describe experiences, estimate tolerable conditions and evaluate visitors’ standards in numerous crowding and carrying capacity studies (Kuss, Graefe & Vaske, 1990; Manning, 1999; Shelby & Heberlein, 1986; Vaske & Donnelly, 2002).

The survey instrument measured recreationists’ perceived crowding using a single item, 9-point Likert scale first developed by Heberlein and Vaske (1977) and used in over 180 studies (Vaske & Shelby 2008). Recreation users were asked to respond to a question regarding how crowded they felt while on the river, with a response of 1 or 2 indicating not at all crowded, 3 or 4 indicating slightly crowded, 5 - 7 indicating moderately crowded and 8 or 9 indicating extremely crowded (Shelby, Vaske & Heberlein, 1989).

As in the Shelby and Wing study instrument (1993), visitors’ experience preferences were measured using two items. The first item asked participants with which size group they would prefer to run the White Salmon River. Survey respondents could answer small (5 people or less), medium (6 - 15 people), large
The second item concerning preference asked participants, “Which category best describes the experience you think should be provided on the White Salmon River?” Survey participants chose one of the following five choices: wilderness, semi-wilderness, undeveloped recreation, scenic recreation or social recreation. Each choice was accompanied by a brief description of the label, allowing for a wide range of options that were easily interpreted by visitors.

A measure of trip quality was used to evaluate visitors’ satisfaction with their experience on the White Salmon River. Survey respondents were asked, “Overall, how would you rate your trip today?” The respondents chose one of the six following answers: poor, fair it just didn’t work out very well, good but I wish a number of things could have been different, very good but it could have been better, excellent only minor problems, or perfect. Respondents were also given the option of adding additional comments concerning the quality of their trip. This simple measure of trip quality was replicated from the Shelby and Wing (1993) survey instrument.

The survey instrument contained four items concerning trip logistics. These items were used in the Shelby and Wing (1993) study, and serve to provide investigators with information concerning the survey respondent’s user group. The first item asked visitors about their user group. Visitors indicated whether they were running the river privately or with a commercial outfitter.
Information concerning trip logistics may also serve to estimate the visitors’ user group and experience or skill level. Visitors were asked to indicate where they began their trip (BZ Corner, upstream from BZ Corner, just upstream from Husum Falls, just downstream Husum Falls, or other) and whether they portaged or ran Husum Falls. As noted above, different sections of the White Salmon provide for varying degrees of difficulty and experience. While commercial rafters run the entire section from BZ Corner to Northwestern Lake, some private kayakers seeking a more exciting and difficult experience choose to only paddle the section from BZ Corner to Husum Bridge. In addition, visitors were asked how long they had been planning their trip to the White Salmon River. Visitors were asked to indicate the number of months, weeks, days, or hours that had transpired between the times they decided to go to the White Salmon River and when they actually made the trip.

The final item on the survey asked participants, “During your trip, did you have any conflicts with other parties?” This was a yes or no question, with a follow-up item asking any respondents who experienced conflict to describe the occurrence. Visitors who reported instances of conflict were asked to describe the situation and the individuals involved.

**Testing of the Research Questions**

The following section describes the manner in which each research question was analyzed using SPSS Version 17.0. All hypotheses were tested for
statistical significance at the .05 level. Descriptive statistics (frequency
distribution, central tendency, standard deviation, etc.) for all respondents were
compiled in order to examine and clean the data.

R1: What is the level of perceived crowding among recreation users on the
White Salmon River?

A new variable was created, collapsing the 9-point crowding scores into
four categories, of which valid percentages were determined. These categories
included not at all crowded (1-2), slightly crowded (3-4), moderately crowded (5-7)
or extremely crowded (8-9). Creating this variable allows the author to
compare descriptive statistics of crowding with the Shelby and Wing (1993) study
of the White Salmon River, as well as over 180 other studies of crowding within
recreation settings (Shelby, Vaske & Heberlein, 1989). In addition to the benefit
of comparison with other studies, the categories also allow a more tangible,
descriptive understanding of visitors’ experiences on the White Salmon,
particularly for public land managers. Among recreation researchers, these
categories are the standard, accepted descriptions among within discipline.

H1: Reported encounters are a positive predictor of perceived crowding among
recreation users on the White Salmon River.
A series of simple OLS regression analyses utilizing stepwise entering method were run to determine if any of the four encounter variables (waiting time at launch, number of encounters, percent of time spent in view of other boaters, and waiting time at Husum Falls) was a predictor of crowding. The encounter variable for waiting time at Husum Falls was only collected during the first wave (2008) of surveying, and so all analyses concerning that variable were limited to data collected during the Summer and Fall of 2008.

H2: Reported encounters are a negative predictor of satisfaction among recreation users on the White Salmon River.

A multiple regression analysis were run to determine if any of the four encounter variables (waiting time at launch, number of encounters, percent of time spent in view of other boaters, and waiting time at Husum Falls) was a predictor of satisfaction. The encounter variable for waiting time at Husum Falls was only collected during the first wave (2008) of surveying, and so all analyses concerning that variable were limited to data collected during the Summer and Fall of 2008.

H3: Perceived crowding is a negative predictor of satisfaction among recreation users on the White Salmon River.
Mean scores were compared using an independent samples t-test to determine if users who reported experiencing conflict on the White Salmon River differed from those who did not report conflict concerning their perceptions of crowding on the river.

R2: Is there a relationship between perceived crowding and trip preferences, including group size preferred and experience preferred, among users on the White Salmon River?

Mean scores were compared using a one-way analysis of variance and Scheffe’s post hoc tests to determine if users who indicated different group size preferences (small group, medium group, large group or no preference) differed in their perceptions of crowding. Also, mean scores were compared using a one-way analysis of variance to determine if users who reported different preferences concerning the experience that should be provided on the White Salmon River (wilderness, semi-wilderness, undeveloped recreation, scenic recreation or social recreation) differed in their perceptions of crowding.

R3: What is the level of norm prevalence among users on the White Salmon River?

Frequency distributions and valid percents were run and reported to describe the portion of the sample who reported a normative standard for each of
the four encounter variables (waiting time at launch, number of other boats encountered, waiting time at Husum Falls and percent of time spent in sight of other boats). The encounter variable for waiting time at Husum Falls was only collected during the first wave (2008) of surveying, and so all analyses concerning that variable were limited to data collected during the Summer and Fall of 2008.

R4: What is the level of norm crystallization among users on the White Salmon River?

Cumulative frequencies and standard deviations were reported to describe the levels of norm crystallization. The concept of norm crystallization has been measured in several ways, and the most effective method is still up for debate. For this study, multiple methods were employed, as recommended by Budruk and Manning (2006). The encounter variable for waiting time at Husum Falls was only collected during the first wave (2008) of surveying, and so all analyses concerning that variable were limited to data collected during the Summer and Fall of 2008.

H4: Recreation users will report higher levels of crowding if they also report experiencing a norm violation during their visit to the White Salmon River.
A series of new variables were created, separating survey respondents into two groups for each of four encounter variables (waiting time at launch, number of other boats encountered, waiting time at Husum Falls and percent of time spent in sight of other boats). Respondents were separated based on whether or not they reported levels of encounters that exceeded their normative standards for the corresponding encounter norm variable. In addition, a new variable was created separating respondents into two groups, based on whether or not any of the four encounter variables exceeded their reported normative standard for the corresponding variable. For each encounter variable, as well as the variable for any norm violation, an independent t-test was conducted to determine if the mean scores of the two groups differed significantly. The encounter variable for waiting time at Husum Falls was only collected during the first wave (2008) of surveying, and so all analyses concerning that variable were limited to data collected during the Summer and Fall of 2008.

R5: What is the relationship between encounters, conflict, crowding, and satisfaction on the White Salmon River?

A path model was created, using a series of regression analyses, examining relationships between encounter variables (waiting times at the launch site and Husum Falls, number of encounters and percentage of time in sight of
other boats), an index of crowding variables, an index of crowding measurements
and an index of satisfaction measures (Figure 1).

**Figure 2. Traditional Crowding / Satisfaction Causal Model**

![Traditional Crowding / Satisfaction Causal Model]

**Figure 3. Proposed Model**

![Proposed Model]

In order to conduct the linear path analysis, latent variables were created
for conflict, crowding, and satisfaction. These variables were constructed using
summated 5-point Likert scales. Reliabilities were calculated for the three latent
variables, using Cronbach’s alpha statistic to measure the reliability. Reliabilities
for the crowding and conflict variables were strong ($\alpha = .75$ and $\alpha = .70$,
respectively), but the alpha statistic for the satisfaction variable is lower than
what would be considered acceptable by researchers in the recreation field($\alpha =
.53$). This statistic could be attributed to a small number of items available.

Cortina (1993) notes that reliability statistics can be affected by a small number
of items, which should be considered when measuring the reliability. The proposed model regresses satisfaction on crowding, conflict, as well as the three contact variables included in both the 2008 and 2009 waves of data collection. This model mirrors the traditional crowding – satisfaction model (Heberlein & Shelby, 1977; Graefe, Vaske & Kuss, 1984), with the addition of a conflict measure (Figure 2).

### Table 1. Reliability Analysis

<table>
<thead>
<tr>
<th>Latent Variable</th>
<th>Cronbach’s Alpha</th>
<th>Item Total Correlation</th>
<th>Alpha if Item Deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction</td>
<td>.53</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thoroughly enjoyed visit</td>
<td></td>
<td>.497</td>
<td>.373</td>
</tr>
<tr>
<td>Worth the money</td>
<td></td>
<td>.411</td>
<td>.384</td>
</tr>
<tr>
<td>Disappointed with visit (reverse coded)</td>
<td></td>
<td>.350</td>
<td>.679</td>
</tr>
<tr>
<td>Crowding</td>
<td>.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recreate without feeling crowded (reverse coded)</td>
<td></td>
<td>.417</td>
<td>.823</td>
</tr>
<tr>
<td>Avoided places because of crowding</td>
<td></td>
<td>.667</td>
<td>.551</td>
</tr>
<tr>
<td>Number of people reduced my enjoyment</td>
<td></td>
<td>.688</td>
<td>.522</td>
</tr>
<tr>
<td>Conflict</td>
<td>.70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activities on the river were not compatible</td>
<td></td>
<td>.540</td>
<td>N/A</td>
</tr>
<tr>
<td>Behavior of others interfered with my experience</td>
<td></td>
<td>.540</td>
<td>N/A</td>
</tr>
</tbody>
</table>
CHAPTER FOUR
RESULTS

The following chapter presents the results of the data analysis. Results concerning reported encounters, normative standards, norm prevalence, norm crystallization, perceived crowding, and satisfaction are discussed.

R1: What is the level of perceived crowding among recreation users on the White Salmon River?

Respondents were asked how crowded they felt during their visit to the White Salmon River on a 9-point Likert scale (Table 2). The results showed that the majority of respondents reported feeling “not at all crowded,” with a score of 1 or 2 (59.6%; n = 750). An additional 25.3% (n = 318) of respondents reported feeling “slightly crowded,” with a score of 3 or 4. These results show that 84.9 (n = 1068) percent of all users who responded to this item (1068 of 1260 users surveyed) felt either “not at all crowded” or “slightly crowded.” A smaller group of users (14.2%; n = 179) felt “moderately crowded,” with a score of 5, 6 or 7 on the 9-point scale. Finally, only 11 of the 1258 users (0.9%) who responded felt “extremely crowded,” giving a score of 8 or 9. Overall, 40.4% (n = 508) of users who responded to this item reported experiencing some level of crowding (slightly, moderately, or extremely crowded).
Table 2. Results of Frequency Distributions for Ordinal Perceived Crowding Variables

<table>
<thead>
<tr>
<th>Crowding Category</th>
<th>Frequency</th>
<th>Valid Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not At All Crowded (1 – 2)</td>
<td>750</td>
<td>59.6</td>
</tr>
<tr>
<td>Slightly Crowded (3 – 4)</td>
<td>318</td>
<td>25.3</td>
</tr>
<tr>
<td>Moderately Crowded (5 – 7)</td>
<td>179</td>
<td>14.2</td>
</tr>
<tr>
<td>Extremely Crowded (8 – 9)</td>
<td>11</td>
<td>0.9</td>
</tr>
</tbody>
</table>

H1: Reported encounters are a positive predictor of perceived crowding among recreation users on the White Salmon River.

A multiple regression analysis was conducted to determine if any of the four encounter variables predicted single-item crowding scores (Table 3). The analysis indicated a significant relationship between perceived crowding and three encounter variables, wait time at launch ($\beta = .119, p < .001$), number of other boats seen ($\beta = .207, p = .001$), and percent of time in sight of other boats ($\beta = .339, p < .001$). The predictive ability of this regression analysis was reasonable ($R^2 = .252, p < .001$).

Because one of the encounter variables (waiting time at Husum Falls) was only measured in 2008, only 185 participants responded to that item (omitting 10 participants who failed to respond). A separate OLS regression analysis was conducted for this item, regressing perceived crowding on waiting time at Husum Falls (Table 4). The analysis revealed a significant relationship between waiting
time at Husum Falls and perceived crowding (B = .155, p < .001). The explanatory ability of this regression model was notably lower than the previous model with three significant predictor variables (R² = .082, p < .001).

**Table 3. Results of Regression Analysis for Encounter Variables with Perceived Crowding**

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Dependent Variable: Perceived Crowding</th>
<th>R² = .25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wait Time at Launch</td>
<td>R: .226***</td>
<td>β: .119***</td>
</tr>
<tr>
<td>Percent of Time in Sight of Other Boats</td>
<td>R: .447***</td>
<td>β: .339***</td>
</tr>
<tr>
<td>Number of Times Other Boats Seen</td>
<td>R: .355***</td>
<td>β: .207***</td>
</tr>
</tbody>
</table>

***Significant at p < .001

**Table 4. Results of Regression Analysis for Wait Time at Husum Falls with Perceived Crowding**

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Dependent Variable: Perceived Crowding</th>
<th>R² = .08***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wait Time at Husum Falls</td>
<td>R: .286***</td>
<td>β: .155***</td>
</tr>
</tbody>
</table>

***Significant at p < .001

H2: Reported encounters are a negative predictor of satisfaction among recreation users on the White Salmon River.

A multiple regression analysis was conducted to determine if any of the four encounter variables predicted single-item satisfaction scores (Table 5). The analysis indicated a significant relationship between satisfaction and wait time at Husum Falls.
the launch ($\beta = -.098, p < .001$), as well as number of other boats seen ($\beta = -.091, p < .01$). The relationship between percent of time in sight of other boats and satisfaction was not significant ($p < .702$). The predictive ability of this regression analysis, while significant was weak ($R^2 = .019, p < .001$).

Because one of the encounter variables (waiting time at Husum Falls) was only measured in the second (2008) wave of data collection, only 185 participants responded to that item (with 10 of the 195 total participants failing to respond). A separate regression analysis was conducted for this item, regressing satisfaction on waiting time at Husum Falls (Table 6). The analysis revealed a significant relationship between waiting time at Husum Falls and satisfaction ($B = -.042, p < .05$). Despite the significant relationship, the explanatory ability was lacking ($R^2 = .028, p < .05$).

### Table 5. Results of Regression Analysis for Encounter Variables with Satisfaction

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Dependent Variable: Satisfaction</th>
<th>$R^2 = .019^{***}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wait Time at Launch</td>
<td>$-.107^{***}$</td>
<td>$-.098^{***}$</td>
</tr>
<tr>
<td>Percent of Time in Sight of Other Boats</td>
<td>$.046$</td>
<td>$.013$</td>
</tr>
<tr>
<td>Number of Times Other Boats Seen</td>
<td>$-.099^{***}$</td>
<td>$-.091^{***}$</td>
</tr>
</tbody>
</table>

***Significant at $p < .001$
Table 6. Results of Regression Analysis for Wait Time at Husum Falls with Satisfaction

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Dependent Variable: Satisfaction</th>
<th>R² = .03*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wait Time at Husum Falls</td>
<td>R</td>
<td>Beta</td>
</tr>
<tr>
<td></td>
<td>-.168*</td>
<td>-.042*</td>
</tr>
</tbody>
</table>

*Significant at p < .05

H3: Perceived crowding is a negative predictor of satisfaction among recreation users on the White Salmon River.

A regression analysis was conducted to determine if single-item crowding scores predicted single-item satisfaction scores (Table 7). The analysis revealed a significant negative relationship (B = -.094, p < .001) between perceived crowding and satisfaction. In this analysis, perceived crowding and satisfaction were weakly correlated, with crowding predicting about 6 percent (R² = .059, p < .001) of the variance in the satisfaction score.

Table 7. Results of Regression Analysis for Perceived Crowding with Satisfaction

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Dependent Variable: Satisfaction</th>
<th>R² = .06***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Crowding</td>
<td>R</td>
<td>Beta</td>
</tr>
<tr>
<td></td>
<td>-.242***</td>
<td>-.094***</td>
</tr>
</tbody>
</table>

***Significant at p < .001

R2: Is there a relationship between perceived crowding and trip preferences, including group size preferred and experience preferred, among users on the White Salmon River?
Mean scores were compared using a one-way analysis of variance test to determine if reports of crowding differed for users with varying trip preferences. Trip preference items included group size preferred (small, medium, large or no preference) and experience preferred (wilderness, semi-wilderness, undeveloped, scenic or social).

While an F test indicated that there was a significant difference between at least two of the groups, separated by group size preferred, further analysis using a Scheffe post hoc analysis indicated that no two groups were statistically different. This is likely attributed to a marginally significant F test statistic (F = 2.78, p = .04) and the additional rigor in the Scheffe’s test. To further examine this result, a less rigorous post hoc test (Tukey’s B) was conducted. This test also indicated no significant differences in group means, which eliminates the possibility that the lack of significance was due to the rigor of the Scheffe test alone. As expected, the largest mean differences were between those preferring a large group size (M = 2.96) and small group size (M = 2.53). People preferring a larger group size reported higher crowding scores. A one-way analysis of variance indicated that there was no significant difference (F = 1.669, p < .155) between the mean crowding scores of the five groups, separated by experience preferred (Table 9).
Table 8. Results of Comparisons of Means for Preferred Group Size with Perceived Crowding

<table>
<thead>
<tr>
<th>Preferred Group Size</th>
<th>Small (1-5)</th>
<th>Medium (6-15)</th>
<th>Large (16-25)</th>
<th>No Preference</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crowding</td>
<td>2.53</td>
<td>2.70</td>
<td>2.96</td>
<td>2.37</td>
<td>2.78*</td>
</tr>
</tbody>
</table>

*Significant at p < .05

Table 9. Results of Comparisons of Means for Preferred Group Size with Perceived Crowding

<table>
<thead>
<tr>
<th>Experience Preferred</th>
<th>Wilderness</th>
<th>Semi-Wilderness</th>
<th>Undeveloped Recreation</th>
<th>Scenic Recreation</th>
<th>Social Recreation</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crowding</td>
<td>2.44</td>
<td>2.68</td>
<td>2.53</td>
<td>2.87</td>
<td>2.52</td>
<td>1.67</td>
</tr>
</tbody>
</table>

*Significant at p < .05

R3: What is the level of norm prevalence among users on the White Salmon River?

The levels of norm prevalence regarding encounters and waiting times on the White Salmon River were examined using frequency distributions and valid percents (Table 10). Of the four normative survey items, three offered a “doesn’t matter to me” option. The fourth item (percent of time it is okay to see other boats while on the river) did not offer this response option. Not surprisingly, this item had the highest percentage of respondents providing a normative standard (93.8 percent). The item with the lowest percentage of respondents providing a normative standard (36.5 percent) was “number of times it is okay to see boats while on the river.” However, this was most likely the most difficult item to quantify of the four, given the nature of the recreation activity and setting. Both waiting time items (number of minutes it is okay to wait at the launch site and number of minutes it is okay to wait to run or portage Husum Falls) had percents
typical of this type of recreation activity (Donnelly, Vaske, Whittaker & Shelby, 2000). Respondents provided a normative standard prevalence of 67.5 percent for the launch wait item and 65.7 percent for the falls wait item.

Table 10. Results of Frequency Distributions for Norm Prevalence

<table>
<thead>
<tr>
<th>Normative Standard</th>
<th>Number of Respondents Reporting an Encounter Norm</th>
<th>Percent of Respondents Reporting an Encounter Norm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceptable Time to Wait at Launch Site</td>
<td>850</td>
<td>67.5</td>
</tr>
<tr>
<td>Acceptable Percent of Time in Sight of Other Boats</td>
<td>1182</td>
<td>93.8</td>
</tr>
<tr>
<td>Acceptable Number of Boats Seen</td>
<td>441</td>
<td>35.0</td>
</tr>
<tr>
<td>Acceptable Time to Wait at Husum Falls</td>
<td>828</td>
<td>65.7</td>
</tr>
</tbody>
</table>

n = 1260

R4: What is the level of norm crystallization among users on the White Salmon River?

Frequency distributions and standard deviations were conducted to examine norm crystallization among paddlers on the White Salmon River (Tables 11-15). The most tightly clustered normative standards of the four encounter variables were provided for the acceptable number of times to see other boats while on the White Salmon River. Over 90 percent of respondents provided a response between 0 and 10 times, (σ = 5.536). The variable measuring the acceptable percent of time to be in sight of other boats while on the river had the greatest amount of variance. However, even this variable had a moderate
amount of agreement, with over 60 percent of respondents providing a normative standard between 20 and 50 percent ($\sigma = 25.51$). Respondents’ normative standards concerning acceptable waiting times at the launch site and Husum Falls were comparable. Over 65 percent of respondents viewed a wait time between 10 and 20 minutes to be acceptable at the launch site ($\sigma = 9.131$). Just under 65 percent of respondents indicated that a wait time of 0 – 10 minutes would be acceptable at Husum Falls ($\sigma = 6.96$).

### Table 11. Results of Frequency Distributions for Acceptable Time to Wait at Launch Site

<table>
<thead>
<tr>
<th>Minutes</th>
<th>Frequency</th>
<th>Valid Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 9</td>
<td>172</td>
<td>20.2</td>
</tr>
<tr>
<td>10 – 20</td>
<td>576</td>
<td>67.8</td>
</tr>
<tr>
<td>25 - 30</td>
<td>84</td>
<td>9.9</td>
</tr>
<tr>
<td>35 – 60</td>
<td>18</td>
<td>2.1</td>
</tr>
</tbody>
</table>

### Table 12. Results of Frequency Distributions for Acceptable Number Boats Seen

<table>
<thead>
<tr>
<th>Number</th>
<th>Frequency</th>
<th>Valid Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 5</td>
<td>314</td>
<td>71.2</td>
</tr>
<tr>
<td>6 – 10</td>
<td>99</td>
<td>22.5</td>
</tr>
<tr>
<td>11 – 29</td>
<td>23</td>
<td>5.1</td>
</tr>
<tr>
<td>30 – 50</td>
<td>5</td>
<td>1.2</td>
</tr>
</tbody>
</table>

### Table 13. Results of Frequency Distributions for Acceptable Percent of Time in Sight of Other Boats

<table>
<thead>
<tr>
<th>Percent</th>
<th>Frequency</th>
<th>Valid Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 10</td>
<td>103</td>
<td>8.8</td>
</tr>
<tr>
<td>20 – 50</td>
<td>801</td>
<td>67.3</td>
</tr>
<tr>
<td>60 – 80</td>
<td>152</td>
<td>12.9</td>
</tr>
<tr>
<td>90 – 100</td>
<td>126</td>
<td>11</td>
</tr>
</tbody>
</table>
Table 14. Results of Frequency Distributions for Acceptable Time to Wait at Husum Falls

<table>
<thead>
<tr>
<th>Minutes</th>
<th>Frequency</th>
<th>Valid Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 10</td>
<td>528</td>
<td>63.8</td>
</tr>
<tr>
<td>11 – 20</td>
<td>253</td>
<td>30.7</td>
</tr>
<tr>
<td>21 – 30</td>
<td>42</td>
<td>5.1</td>
</tr>
<tr>
<td>31 – 60</td>
<td>5</td>
<td>0.4</td>
</tr>
</tbody>
</table>

Table 15. Standard Deviations and Means for Normative Standard Variables

<table>
<thead>
<tr>
<th>Normative Standard</th>
<th>σ</th>
<th>M</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceptable Wait at Launch Site (minutes)</td>
<td>9.131</td>
<td>14.00</td>
<td>0 – 60</td>
</tr>
<tr>
<td>Acceptable Number of Boats Seen</td>
<td>5.536</td>
<td>5.51</td>
<td>0 – 50</td>
</tr>
<tr>
<td>Acceptable Percent of Time in Sight of Boats</td>
<td>25.509</td>
<td>44.26</td>
<td>0 – 100</td>
</tr>
<tr>
<td>Acceptable Time to Wait at Husum Falls (minutes)</td>
<td>6.956</td>
<td>11.76</td>
<td>0 – 60</td>
</tr>
</tbody>
</table>

H4: Recreation users will report higher levels of crowding if they also report experiencing a norm violation during their visit to the White Salmon River.

A series of independent t-tests were conducted to examine the relationship between encounters, norms and perceived crowding. In order to conduct the analysis, new nominal variables were created. Respondents were split into two groups, with the determining factor being whether or not they reported an encounter variable greater than the corresponding normative standard they provided (hereafter referred to as a norm violation). Encounters and normative standards for waiting times at the launch site and Husum Falls, acceptable number of boats in sight, and acceptable percent of time in sight of other boats were examined. Because only respondents surveyed during the first
wave of the study were asked about their wait time at Husum Falls, analysis concerning that relationship is limited to surveys collected during the Summer and Fall of 2008. The remaining three variables were examined using surveys collected during both waves of data collection. An additional analysis was conducted, comparing respondents’ perceived crowding measures, with the determining factor being a norm violation in any of the four encounter variables (Table 16).

Examination of the relationship between waiting times at Husum Falls, the corresponding normative standard, and perceived crowding indicated no significant relationship between norm violations and perceived crowding ($t = 0.956, p = .34$). However, this finding may be a result of a small sample size ($n = 195$, compared to a sample of 1260 for the other norm violation variables). An examination of encounters, norms, and perceived crowding revealed significant negative relationships for waiting time at the launch site, acceptable number of boats seen on the river, acceptable percent of time in sight of other boats, and any norm violation. These relationships suggest that normative standards are an effective way to measure visitor experience preferences and establish management parameters that will promote for enjoyable use of this natural resource for the public. The strongest relationship was between those indicating a norm violation in any of the three encounter variables and perceived crowding ($t = -16.216, p < .001$). Of those three individual variables, all were also
significant at the .001 level, with the percent of time in sight of other boats norm violation demonstrating the strongest results \( t = -15.487, p < .001 \), followed by the number of times in sight of other boats variable \( t = -11.628, p < .001 \) and waiting time at the launch site variable \( t = -4.04, p < .001 \). These results suggest that those survey respondents whose normative standards were violated reported higher instances of perceived crowding.

### Table 16. Results for Comparison of Means of Respondents with Norm Violations

<table>
<thead>
<tr>
<th>Normative Standard</th>
<th>Mean No Violation</th>
<th>Mean Violation</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceptable Wait at Launch Site</td>
<td>2.67</td>
<td>3.89</td>
<td>-4.042***</td>
</tr>
<tr>
<td>Acceptable Number of Boats Seen</td>
<td>2.27</td>
<td>4.54</td>
<td>-11.628***</td>
</tr>
<tr>
<td>Acceptable Percent of Time in Sight of Boats</td>
<td>2.21</td>
<td>3.91</td>
<td>-15.487***</td>
</tr>
<tr>
<td>†Acceptable Time to Wait at Husum Falls</td>
<td>2.39</td>
<td>1.93</td>
<td>.956</td>
</tr>
<tr>
<td>Any Norm</td>
<td>2.16</td>
<td>3.81</td>
<td>-16.126***</td>
</tr>
</tbody>
</table>

***Significant at \( p < .001 \)
†Comparison limited to surveys administered during the first wave of data collection. \( n = 195 \).

R5: What is the relationship between encounters, conflict, crowding, and satisfaction on the White Salmon River?

A linear path analysis was conducted, examining relationships between encounters, conflict, crowding, and satisfaction among recreationists on the White Salmon River (Figure 2). As described in Chapter three, new index variables were created for conflict, crowding and satisfaction, using summated
Likert scales (Table 1). The results of the path analysis demonstrated a significant negative relationship between both crowding ($\beta = -.521$, $p < .001$) and conflict ($\beta = -.289$, $p = .000$) and the satisfaction variable ($R^2 = .58$, $p < .001$).

The relationship between conflict and satisfaction is significant, but partially mediated by crowding. Accordingly, conflict ($\beta = .684$, $p < .001$), as well as encounter variables for number of times other boats were seen by paddlers ($\beta = .110$, $p < .001$) and percent of time in sight of other boats ($\beta = .097$, $p < .001$) were significant predictors of the crowding index ($R^2 = .52$, $p < .001$). In addition, the variable measuring percent of time in sight of other boats was a significant predictor of the latent conflict variable ($\beta = .161$, $p < .001$). The relationship between percent of time in sight of other boats and perceived crowding was partially mediated by conflict. The strong statistical results of this study demonstrate the value of adding the conflict measure to the traditional crowding-satisfaction model (Heberlein & Shelby, 1977; Graefe, Vaske & Kuss, 1984).

These findings also support a conceptual argument previously proposed by Manning, Valliere, Minteer, Wang and Jacobi (2000), supporting the idea that conflict is a practically significant predictor of crowding.
Table 17. Results for Linear Regression Path Model Analysis for Encounters, Conflict, Crowding and Satisfaction

<table>
<thead>
<tr>
<th>Predictor Variables</th>
<th>Dependent Variable: Satisfaction</th>
<th>( R^2 = .58^{***} )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( R )</td>
<td>( \beta )</td>
</tr>
<tr>
<td>Perceived Crowding</td>
<td>-.732***</td>
<td>-.521***</td>
</tr>
<tr>
<td>Conflict</td>
<td>-.670***</td>
<td>-.289***</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Predictor Variables</th>
<th>Dependent Variable: Crowding</th>
<th>( R^2 = .52^{***} )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( R )</td>
<td>( \beta )</td>
</tr>
<tr>
<td>Conflict</td>
<td>.702***</td>
<td>.684***</td>
</tr>
<tr>
<td>Percent of Time in Sight of Other Boats</td>
<td>.242***</td>
<td>.097***</td>
</tr>
<tr>
<td>Number of Other Boats Seen</td>
<td>.157***</td>
<td>.110***</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Predictor Variables</th>
<th>Dependent Variable: Conflict</th>
<th>( R^2 = .023^{***} )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( R )</td>
<td>( \beta )</td>
</tr>
<tr>
<td>Percent of Time in Sight of Other Boats</td>
<td>.150***</td>
<td>.161</td>
</tr>
</tbody>
</table>

***Significant at \( p < .001 \)

Figure 4. Final Model

![Diagram](image-url)
CHAPTER FIVE
DISCUSSION

Conclusion

The primary purpose of this study was to examine visitor perceptions of crowding on the White Salmon River. This was accomplished through direct measure, as well as the examination of relationships between perceived crowding and variables that have been linked to crowding in previous studies. Visitor preferences, encounters, normative standards, satisfaction and experiences of conflict were examined in order to gain further understanding of visitors’ recreation experience on the White Salmon River. These findings were also compared to results of a previous visitor experience study on the White Salmon River (Shelby & Wing, 1993). The following chapter will serve to summarize study findings, limitations, and implications for future research.

Discussion of Perceived Crowding

on the White Salmon River

When asked about their feelings of crowding while on the White Salmon River, the majority of visitors reported feeling not at all crowded (59.6%, Table 10). Further, approximately 85 percent of those visitors surveyed reported feeling not at all crowded or only slightly crowded during their experience. About 14 percent of survey respondents reported moderate crowding, and less than 1 percent reporting extreme crowding on the river. These figures present a notable
increase from the number of visitors reporting any feelings of crowding during a previous crowding study, with 40.4% reporting some degree of crowding, versus 16 percent reported in the previous study (Shelby & Wing, 1993).

Despite this increase, the findings of this study compare favorably to previous studies of crowding, including several studies on rivers in the Northwestern United States (Shelby, Vaske & Heberlein, 1989). Only 14 of the 50 studies cited in the Shelby, Vaske and Heberlein article reported lower rates of crowding than the findings of this study. In addition, of the 14 studies cited as reporting lower rates of crowding, 9 described the timing of data collection to be during low density periods, low use periods, late season, or the midweek (with one of the remaining 5 being the previous White Salmon River study).

These results also compare favorably to a more recent study of perceived crowding that examined 181 crowding studies conducted over 30 years (Vaske & Shelby, 2008). All studies included in this meta-analysis utilized the standard 9-point crowding scale used in the current study. The percent of visitors reporting some degree of crowding in the current study (40%) was either at or below the average percent for most recent studies (40% for studies conducted between 1995 and 2005), studies in the same region (49% for Pacific U.S.) or at the national level (45% for the entire U.S.). In addition, the percent of visitors reporting some level of crowding was less than that of other non consumptive activities (45%) and comparable to other studies of rafters (35%) and kayakers.
A review of the literature reveals those recreation settings most similar to the White Salmon (whitewater boating on rivers in the Northwestern United States: the Deschutes, Rogue and Snake) displayed some of the highest perceptions of crowding. On these rivers, between 53 and 100 percent of survey respondents reported perceptions of crowding on the river (Shelby, Vaske & Heberlein, 1986).

Overall, visitors did not appear to be concerned with crowding on the White Salmon River. This finding is probably attributed to two main factors. The first factor is the physical attributes of the river itself. The White Salmon is a fast-moving river with limited opportunities to slow, stop or “play” in the rapids. The second factor can be attributed to the ability of rafting outfitters to stagger rafting trips and effectively move their clients onto, through and off of the river in a highly efficient manner. Although reports of crowding have increased since the previous study, the current state does not appear to be problematic at this time.

Discussion of Normative Standards

Visitors on the White Salmon River were asked to report their normative standards concerning waiting times, number of boats encountered and percent of time in sight of other boats while on the river. These normative standards can be effective tools for management, given that most of those surveyed are able to report a standard, and there is some level of group agreement among those
standards. These two concepts are referred to as norm prevalence and norm crystallization, respectively. Previous literature has suggested that when high levels of prevalence and crystallization exist, a social norm exists, which can be used by natural resource managers to establish appropriate standards of quality (in this case, use levels or social carrying capacity) within a recreation setting (Manning, Valliere, Wang & Jacobi, 1999).

Of the encounter variables measured, a majority of visitors were able to provide a normative standard for three of those four variables (Table 10). The fourth variable concerning an acceptable number of boats seen while on the river, is likely the most difficult of the four to quantify. The percent of respondents able to articulate a norm ranged from approximately 35 percent for acceptable number of boats seen, to approximately 65 percent for waiting times at the launch site and Husum Falls, and as much as 94 percent for percentage of time in sight of other boats.

These figures seem typical when compared to previous literature examining normative standards in outdoor recreation settings. (Donnelly, Vaske, Whittaker & Shelby, 2000). The norm prevalence for number of boats seen is somewhat low and the prevalence for percent of time in sight of other boats is relatively high. There are, however, several factors to be aware of when evaluating the prevalence of normative standards for boaters on the White Salmon River. Donnelly and others note that measures of norm prevalence are
affected by setting, type of encounter and question response format. A review of
norms literature reveals that users in backcountry settings tend to report a
normative standard more often than those recreating in the frontcountry.
Secondly, those experiencing conflict are more likely to provide a normative
standard. Finally, when respondents are given the option of indicating no norm,
e.g., “it doesn’t matter to me,” they are less likely to provide a norm. The
literature suggests that one should expect norm prevalence to be somewhat
lower among users on the White Salmon River, given that it features a
frontcountry setting and very few reports of conflict. In addition, the findings of
this study support the findings of previous research concerning question
response format. Of the four measures of encounter norms, only one item
(acceptable percent of time in sight of other boats) does not have the “doesn’t
matter to me” option. This measure has a much higher level of norm prevalence
than the other three items (94% compared to 68, 66, and 35%). Overall, levels of
norm prevalence are comparable to findings from several other studies.

Norm crystallization refers to the level of agreement among personal
norms within a given recreation activity or setting. Crystallization is one way in
which the presence of a social norm has been demonstrated in the literature.
However, the literature demonstrates an uncertainty regarding what constitutes a
significant level of crystallization. Measures of central tendency and variance are
often used to describe the level of agreement. However, this method is not as
useful when survey data is skewed, as is the case with the current study. An
examination of norm crystallization using frequency distributions suggests a
strong level of agreement for all four normative variables (Tables 11 – 14).

Overall, examinations of norm prevalence and crystallization suggest the
existence of social norms among users surveyed on the White Salmon River.
These results can provide a useful tool for resource managers to determine
acceptable levels of use on the river.

Normative standards were also examined with respect to corresponding
reports of encounter variables. For each normative item, an encounter item
asked participants to report the waiting time, number or percent for the
corresponding norm item. When a visitor’s reported encounter is greater than his
or her corresponding normative standard, that individual has experienced a norm
violation (Jackson, 1965). Visitors who experienced a norm violation while on the
river reported significantly higher crowding scores than those who did not (t = -
13.002, p < .001). More specifically, visitors who reported a norm violation
concerning waiting time at the launch site (t = -4.04, p < .001), number of boats
seen on the river (t = -11.63, p < .001) or percent of time in sight of other boats (t
= -15.49, p < .001) reported significantly higher crowding scores than those
visitors who did not. The same analysis of norm violations regarding waiting time
at Husum Falls did not reveal a significant difference, but this may be attributed
to a much smaller sample size compared to the other variables (n = 195,
compared to $n = 1260$ for other variables). Analysis of mean crowding scores in relation to norm violations supports the relationship between encounters, norms and crowding that has been presented in several studies (Vaske & Donnelly, 2002). These findings could also prove useful for resource managers by adding relevance to the idea of using visitors’ norms to establish standards of quality regarding use levels or carrying capacity.

Discussion of Visitor Experience Preferences

An additional method of surveying boaters about their experience on the White Salmon River is to ask about their experience preferences, in this study operationalized as group size preference and the wild-ness of the river experience. Survey respondents were asked about which size group they preferred to recreate with on the river. Seventy-nine percent of those surveyed indicated that they preferred a small (1 – 5) or medium (6 – 15) sized group. Only 5 percent of visitors preferred a large group size (16 – 25 people). Visitors also provided their preference for what type of experience should be provided on the river. Forty-five percent of visitors preferred a wilderness or semi-wilderness experience, which was defined to the survey respondents as an experience where solitude is part of the experience (wilderness) or where complete solitude is not expected (semi-wilderness). An additional fifty-two percent preferred an undeveloped (expecting to see other people some of the time) or scenic
(expecting to see others much of the time) experience. Under four percent of visitors preferred a social recreation experience, where seeing many people was part of the experience. These findings have two implications. The first is that managers may use them for future management plans, in order to determine what type of experience visitors prefer and what standards are associated with those experiences from the visitor’s perspective. The second implication is that these findings suggest that land managers on the river are currently providing an appropriate experience. It is logical to assume that a visitor who is provided an experience that is more developed or populated than his or her preference would be more likely to report being crowded. Because crowding scores on the river appear low to average in comparison to similar studies, one could assume that the appropriate experience is being provided to boaters on the White Salmon River.

Discussion of Inferential Relationships

A series of regression analyses examined the relationships involving both manifest and latent variables for encounters, conflict, crowding and satisfaction among visitors to the White Salmon River. Analyzing these relationships with both manifest and latent variables yielded similar results and also allowed for some additional findings that would not have been discovered otherwise. In both cases, there were limitations in using the encounter variable for waiting time at
Husum Falls because responses were only collected during the first (2008) wave of data collection (n = 195). In addition, the concept of conflict was only used in the analyses of latent variables, because only 19 of the 1260 visitors surveyed reported encountering conflict when asked directly. It appears that boaters on the river may have trouble conceptualizing conflict when asked directly, perhaps assuming it means that an argument or altercation occurred instead of the actual definition centered on goal interference.

Analyses of single-item (manifest) variables involving encounters, crowding and satisfaction revealed several significant relationships. All four encounter items were positively related to a single-item measure of crowding, with percent of time in sight of boats being the strongest predictor ($R^2 = .25$). Three of the four encounter variables were significant predictors of satisfaction, but explained very little of the variance ($R^2 = .02$). This lack of explanation is due to a partial mediation of the encounter variables by the single-item crowding item. Perceived crowding was a significant predictor of satisfaction, with this single item predicting six percent of the variance alone. These analyses provide a line of significant association from encounters to crowding and from crowding to satisfaction. Managers may benefit by giving further consideration to the relationship between these predictor variables and the satisfaction of their visitors.
The traditional model involving crowding and satisfaction presents a line of prediction from contacts or encounters to perceived crowding and from crowding to satisfaction (Heberlein & Shelby, 1977; Graefe, Vaske & Kuss, 1984). This study’s analysis of the relationships between encounter variables (manifest) and latent constructs for conflict, crowding and satisfaction supports this model (Table 17). Encounter variables for number of boats seen and percent of time in sight of boats were both significant predictors of the latent crowding variable ($\beta = .110$ and $.097$ respectively, $p < .001$). Number of boats seen was also a significant predictor of the latent satisfaction variable, but was fully mediated by the latent construct for crowding. Crowding was the most significant predictor of satisfaction ($\beta = -.52$, $p < .001$).

An additional finding of this analysis involved the latent conflict variable. Manning, Valliere, Wang and Jacobi (1999) identify type of encounter, which is encounters that do or do not involve conflict, as one of the three variables that most strongly influence perceived crowding. However, a review of the literature does not involve conflict in the manner that this study’s analysis produces. A series of multiple regression analyses produced a model in which conflict is a significant predictor of crowding ($\beta = .684$, $p < .001$), as well as satisfaction ($\beta = .289$, $p < .001$). The effects of conflict on satisfaction are partially mediated by the latent construct for conflict. These findings are significant in that the model
supports the relationships advocated by Manning and others, which has yet to be illustrated in such a manner (Figure 3).

**Limitations**

There were limitations to this study that limit the ability to generalize the results. The first limitation relates to the sampling method. This study employed a systematic sample, due to situational and time constraints. The use of a purposeful (not truly random) sample would result in a more representative sample of recreationists and greater ability to generalize and apply the results of this study. However, for a study with the situational constraints present in this setting, the researchers performed an acceptable sampling technique, interviewing one user per group and systematically selecting different types of users (by activity type, demographic characteristics, etc.).

The second limitation of this study was the lack of a use level or density measure. A measure of use level or density within the recreation area (the White Salmon River) would allow researchers to examine relationships between actual use levels and other related variables that were included in this study, such as encounters, crowding, conflict and satisfaction. This would also allow for a more comprehensive comparison between this study and similar studies, most notably the previous study of crowding on the White Salmon River (Shelby & Wing, 1993).
An third limitation of this study was the limited item pool used for latent constructs in the proposed and final models. There were several factors involved in this limitation. First, the survey was designed to be administered in a short time, due to situational constraints. Most visitors to the White Salmon were commercial users, and had limited time to interview between their exit from the river and the departure of the shuttle back to the outfitter’s facility. In addition, the reverse-coded items within these constructs demonstrated poor reliability to other items (measured with Cronbach’s Alpha). This was probably due to a less thorough interviewing technique by field staff, resulting in a misinterpretation of the item by the survey respondent. This limitation would have been managed better with improved training and monitoring of field staff, as well as a survey development that allowed for expanded item pools, despite the setting constraints.

Management Implications

The findings of this study provide managers with key information regarding the management of the recreation areas at the White Salmon River. Among managers, concern over increased use levels can often translate into a concern regarding crowding, conflict or a need for carrying capacity limitations. In the case of the White Salmon River, a steady increase in use has been documented in past studies, and continues to be a concern expressed by management.
While perceptions of crowding appear to be increasing as well, crowding does not seem to be problematic in terms of providing satisfactory recreation experiences. At this point, the only use limitations on the river are a limit on the number of commercial outfitter permits (10). Problems associated with high use appear to be reduced by the limits placed on the number of established rafting companies allowed on the river. Those outfitters are aware of use levels, and work to stagger trips, which is an effective means of reducing conflict and crowding on the river.

In light of the trend of increased use, as well as perceptions of crowding, managers should continue to monitor use levels, instances of conflict, perceptions of crowding and overall satisfaction of visitors to the White Salmon River. The findings of this study suggest that crowding is a highly significant, strong predictor of satisfaction within the context of a wildland river setting. In addition, crowding is influenced by not only the number of encounters a boater experiences, but by the types of encounter as well. According to previous studies, encounters that result in some type of conflict are more likely to increase visitors’ perceptions of crowding within the recreation setting. Further, this study found that the method through which these constructs are measured impacts the results. It appears that latent constructs can be a more effective means to measure conflict and crowding, due to the expanded underlying domains measured and the straight-forward questioning provided for survey respondents.
(who might be unsure of how to respond to the manifest item asking about crowding without explaining the terminology of the concept). Visitors seemed to be unaware of the “conflict” concept as it is defined by recreation researchers and as a result only a handful of them reported any instances of this type of encounter. However, when asked about goal interference or incompatible activities on the river, the idea became tangible and the results became much more useful. Not only should these concepts be monitored, but they should be done through multiple methods to ensure a better understanding of the visitor experience.

Summary and Future Research Directions

This study found an increased, but not necessarily problematic perception of crowding among visitors to the White Salmon River. Overall, 40 percent of survey respondents reported some level of crowding on the river, compared to 16 percent in 1993 (Shelby & Wing, 1993). While crowding has increased since the most recent study was conducted on the White Salmon 15 years prior, levels remain on par or below the findings of similar crowding studies (Vaske & Shelby, 2008).

The findings of this study support future monitoring of encounters, normative standards, conflict, crowding and satisfaction by recreation land
managers. These concepts should be measured using multiple methods, including the use of manifest and latent constructs, to ensure a more complete understanding of the visitor experience. As seen in this study, there is value in the ability of latent constructs to provide survey respondents with items they can comprehend, as well as more comprehensive measurement for the researcher. While users seemed to have difficulty understanding and responding to a single item measure of conflict, many were able to accurately respond to the specific items included in the latent construct. Future studies should expand the item pool of these latent variables to improve on the limited item pools used in the current study. Improvements made to this conceptual framework will further the framework's contribution to the literature, as well as researchers’ and professionals’ understanding of recreation users’ experience, particularly in relation to use level, encounters, conflict, crowding and satisfaction.

In particular, instances of conflict should continue to be measured, particularly in relation to other variables such as encounters, trip preferences, crowding and satisfaction. The findings of this study indicated a strong relationship between conflict and crowding, providing a new aspect to the traditional model of contacts / encounters, crowding and satisfaction. Further examination of these variables, using expanded latent constructs, may provide an improved measurement of visitor experience within several recreation contexts. In addition to the methods used in this study, future studies should
monitor use levels. The current study had no measurement of use level to compare to reports of encounters and crowding. Use levels also allow for a better comparison with past, current and future findings. Continued investigation of these concepts will provide useful insight for managers to continue to provide a quality experience for visitors to the White Salmon River, as well as other publicly managed recreation areas.
REFERENCES


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Agriculture.


APPENDIX A: 2008 Survey Instrument

Please take a few minutes to answer these questions. We are trying to learn more about the recreational use of the White Salmon River and your impressions are important to us. All answers will be kept confidential.

1. With which user group did you run the river with?
   A. _____ commercial trip (outfitter) _____ Private group
   B. _____ kayak _____ raft _____ canoe

2. Where did you begin your trip today?
   _____ BZ Corner
   _____ Husum (upstream from the Falls)
   _____ Husum (downstream from the Falls)
   _____ Upstream from BZ Corner
   _____ Other: ________________________

3. When you made plans to run the White Salmon, how far in advance did you decide to go?
   _____ months _____ weeks _____ days _____ hours

4. Overall, how would you rate your trip today?
   _____ Poor
   _____ Fair, it just didn’t work out very well
   _____ Good, but I wish a number of things could have been different
   _____ Very good, but it could have been better
   _____ Excellent, only minor problems
   _____ Perfect

   Comments:

5. At the launch site, how long did you have to wait for other parties to leave before you could start your trip?
   _____ minutes

6. Did you feel crowded while you were on the river? (circle a number)
   Not at all Slightly Moderately Extremely
   Crowded Crowded Crowded Crowded

7. While you were on the river today, about what percent of the time were you in sight of boats from other groups? (circle a number)
   0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

8a. If you began upstream of Husum Falls, did you portage or run the Falls?
   _____ I portaged the Falls
   _____ I ran the Falls
   _____ My trip began below the Falls
8b. How long did you have to wait before you could begin portaging or running the Falls?
____ minutes

9. How many times did you see boats from other groups while you were on the river?
   (If you were the same boat more than once, count each time separately)
   ____ times

10. With which size group would you prefer to run the river?
    ____ small (5 people or less)   ____ large (16-25 people)
    ____ medium (6-15 people)     ____ makes no difference to me

11. If you have to wait for other parties before you can start your trip, it would be O.K. to wait at the launch site as long as:
    ____ minutes   ____ it doesn’t matter to me

12. While on the river, how many times would it be okay to see boats from other groups?
    ____ times   ____ it doesn’t matter to me

13. What would be an acceptable percentage of time to see boats from other groups while you are on the river? (circle a number)
    0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%

14. If you have to wait for other parties to leave before you can portage or run Husum Falls, it would be O.K. to wait as long as:
    ____ minutes   ____ it doesn’t matter to me

15. Which category best describes the experience you think should be provided on the White Salmon River?
    ____ Wilderness: where solitude is part of the experience
    ____ Semi-wilderness: where complete solitude is not expected
    ____ Undeveloped recreation: where you expect to see other people some of the time
    ____ Scenic recreation: where you expect to see other people much of the time
    ____ Social recreation: where seeing many people is part of the experience

16a. During your trip, did you have any conflicts with other parties?
    ____ yes   ____ no

16b. If yes, briefly describe who was involved and the nature of the conflict.
APPENDIX B: 2009 Survey Instrument

2009 White Salmon River Survey

Please take a few minutes to answer these questions. We are trying to learn more about the recreational use of the White Salmon River and your impressions are important to us. All answers will be kept confidential.

1. Which type of user group did you run the river with? ____ Commercial trip (outfitter) ____ Private group

2. Where did you begin your trip today? ______________________________________________________________________

3. When you made plans to run the White Salmon, how far in advance did you make that decision?
   ____ months ____ weeks ____ days ____ hours

4. Overall, how would you rate your trip today?
   ___ Poor
   ___ Fair, it just didn’t work out very well
   ___ Good, but I wish a number of things could have been different
   ___ Very good, but it could have been better
   ___ Excellent, only minor problems
   ___ Perfect

Comments:

5. At the launch site, how long did you have to wait for other parties to leave before you could start your trip? ____ minutes

6. How did the number of people you saw during your visit to the White Salmon River compare with what you expected to see?
   _____ A lot less than you expected
   ____ _____ A little more than you expected
   ___ A little less than you expected
   _____ A lot more than you expected
   ___ About what you expected

Comments:

7. How crowded did you feel during your visit to the White Salmon River [Circle one number]

   1 2 3 4 5 6 7 8 9
   Not at all Crowded  Slightly Crowded  Moderately Crowded  Extremely Crowded
8. While you were on the river today, about what percent of the time were you in sight of boats from other groups? (circle a number)
   0%  10%  20%  30%  40%  50%  60%  70%  80%  90%  100%

9. How many times did you see boats from other groups while you were on the river? If you saw the same boat more than once, count each time separately
   ____ times

10. With which size group would you rather run the river?
    ____ small (5 people or less)  ____ large (16-25 people)
    ____ medium (6-15 people)  ____ makes no difference to me

11. If you have to wait for other parties before you can start your trip, it would be O.K. to wait at the launch site as long as…..    ____ minutes    ____ it doesn’t matter to me

12. While on the river, it would be O.K. to see boats from other groups…?
    ____ times    ____ it doesn’t matter to me

13. What would be an acceptable percentage of time to see boats from other groups while you are on the river? (circle a number)
    0%  10%  20%  30%  40%  50%  60%  70%  80%  90%  100%

14. If you have to wait for other parties to leave before you can portage or run the falls, it would be O.K. to wait as long as…..    ____ minutes    ____ it doesn’t matter to me

15. Which category best describes the experience you think should be provided on the White Salmon River?
    ____ Wilderness: where solitude is part of the experience
    ____ Semi-wilderness: where complete solitude is not expected
    ____ Undeveloped recreation: where you expect to see other people some of the time
    ____ Scenic recreation: where you expect to see other people much of the time
    ____ Social recreation: where seeing many people is part of the experience

16a. During your trip, did you have any conflicts with other parties?
    ____ yes    ____ no

16b. If yes, briefly describe who was involved and the nature of the conflict.
17. Is this your first visit to the White Salmon River?  ______ Yes _____ No

[If no] In what year did you make your first visit to the White Salmon River?  ______ year

17a. In a typical year, how many days do you spend recreating on the White Salmon River?  ______ days

17b. In a typical year, how many days do you spend recreating at other rivers besides the White Salmon River?

18. Is your trip today… _____ an overnight visit to this area _____ a day trip  [check one]

18a. In total, how many days (or hours) long will this trip be? ___ days ___ hours (if day trip)

19. In what activities on this list did you participate during this recreation visit to the White Salmon River?

<table>
<thead>
<tr>
<th>Question 19 answers</th>
<th>Question 20 answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camping in developed sites (family or group sites)</td>
<td></td>
</tr>
<tr>
<td>Primitive camping (motorized)</td>
<td></td>
</tr>
<tr>
<td>Backpacking, camping in unroaded areas</td>
<td></td>
</tr>
<tr>
<td>Resorts, cabins, and other accommodations on FS managed lands (private or FS)</td>
<td></td>
</tr>
<tr>
<td>Picnicking and family gatherings in developed site (family or group sites)</td>
<td></td>
</tr>
<tr>
<td>Viewing natural features such as scenery, wildlife, birds, flowers, fish, etc.</td>
<td></td>
</tr>
<tr>
<td>Visiting historic and prehistoric sites/areas (circle all that apply)</td>
<td></td>
</tr>
<tr>
<td>Viewing a nature center, nature trail, or visitor center (circle all that apply)</td>
<td></td>
</tr>
<tr>
<td>Nature study</td>
<td></td>
</tr>
<tr>
<td>General/other-relaxing, hanging out, escaping heat, noise, etc.</td>
<td></td>
</tr>
<tr>
<td>Fishing—all types</td>
<td></td>
</tr>
<tr>
<td>Hunting—all types</td>
<td></td>
</tr>
<tr>
<td>Off-highway vehicle travel (4-wheelers, dirt bikes, etc.)</td>
<td></td>
</tr>
<tr>
<td>Driving for pleasure on roads</td>
<td></td>
</tr>
<tr>
<td>Motorized water travel</td>
<td></td>
</tr>
<tr>
<td>Other motorized land/air activities (plane, other)</td>
<td></td>
</tr>
<tr>
<td>Hiking or walking</td>
<td></td>
</tr>
<tr>
<td>Horseback riding</td>
<td></td>
</tr>
<tr>
<td>Bicycling, including mountain bikes (circle all that apply)</td>
<td></td>
</tr>
<tr>
<td>Nonmotorized water travel (sailboarding, kayaking, rafting, canoe, etc.) (circle one)</td>
<td></td>
</tr>
<tr>
<td>Other nonmotorized activities (swimming, games, and sports)</td>
<td></td>
</tr>
<tr>
<td>Gathering mushrooms, berries, firewood, or other natural products</td>
<td></td>
</tr>
<tr>
<td>Climbing</td>
<td></td>
</tr>
</tbody>
</table>

20. Which of those is your primary activity for this recreation visit to the White Salmon River?

21. What do you like MOST and LEAST about the White Salmon River?

_______________________________________ MOST

_________________________________ LEAST

22. If you could ask resource managers to improve some things about the way people experience the White Salmon River, what would you ask them to do?
23. Overall, how would you rate the quality of each of the following at the White Salmon River:

<table>
<thead>
<tr>
<th></th>
<th>Awful</th>
<th>Fair</th>
<th>Good</th>
<th>Very Good</th>
<th>Excellent</th>
<th>Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health and cleanliness</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
</tr>
<tr>
<td>Safety and security</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
</tr>
<tr>
<td>Condition of facilities</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
</tr>
<tr>
<td>Responsiveness of staff</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
</tr>
<tr>
<td>Recreation setting</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>NA</td>
</tr>
</tbody>
</table>

24. Please look at this list of statements that address your feelings about this trip to the White Salmon River. Please indicate your level of agreement with each of the statements listed below.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I thoroughly enjoyed my visit to the White Salmon River</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I had the opportunity to recreate without feeling crowded</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I could find places to recreate without conflict from other visitors</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>My trip to the White Salmon River was well worth the money I spent to take it</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Recreation activities at the river were NOT compatible</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I was disappointed with some aspects of my visit to the river</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I avoided some places at the river because there were too many people there</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>There is a good balance between social and biological values in the management of the White Salmon River</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The number of people at the river reduced my enjoyment</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The behavior of other people at the river interfered with the quality of my experience [if agree, specify behavior _____________________]</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The other people at the river increased my enjoyment</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The river and its surroundings are in good condition</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
25. Here is a list of possible reasons why people recreate at the White Salmon River. Please tell me how important each item is to you as a reason for recreating at the White Salmon River.

<table>
<thead>
<tr>
<th>REASON</th>
<th>Not at all Important</th>
<th>Somewhat Important</th>
<th>Moderately Important</th>
<th>Very Important</th>
<th>Extremely Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>To be outdoors</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>For relaxation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>To get away from the regular routine</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>For the challenge or sport</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>For family recreation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>For physical exercise</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>To be with my friends</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>To experience natural surroundings</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>To develop my skills</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

26. Which of the following was the most important reason for this visit to the White Salmon River? [please check only one]
   - ___ I went there because I enjoy the place itself
   - ___ I went there because it’s a good place to do the outdoor activities I enjoy
   - ___ I went there because I wanted to spend more time with my companions
   - ___ I went there because it was close to home

The last questions are about you personally and will be used only to categorize responses for different groups of visitors. Your answers are anonymous and cannot be linked to you individually.

27. What is your home ZIP code? ______________  _____ Visitor is from another country

28. What is your age? ___ 16-20 ___ 21-30 ___ 31-40 ___ 41-50 ___ 51-60 ___ 61-70 ___ over 70

29. What is your gender. ___ Male ___ Female
30. How many people are in your group today? _______ adults _______children up to 17 years
31. How many vehicles are in your group today? _______ cars/trucks _______ trailers (any type)