Silvia Kainzinger  
West Virginia University  
6125 Percival Hall  
Morgantown, WV 26506-6125  
silvia.kainzinger@gmail.com

Robert Burns  
West Virginia University

Arne Arnberger  
University of Natural Resources and Life Sciences, Vienna

Abstract  
The study focuses on water-based recreational use on the North Umpqua Wild and Scenic River (OR, USA). Rivers with the “Wild and Scenic” designation are to provide certain recreation experience. The concept of social carrying capacity was applied to determine users’ satisfaction level and crowding perception. On-site interviews with visitors (N=364) were conducted during the summer of 2012. Based on their setting preferences, recreationists were divided in two preference groups: wilderness and developed area. More than half of the recreationists interviewed participated in boating, while the remaining were anglers. About 53% of the visitors preferred developed settings, whereas 47% expressed wilderness setting preferences. Anglers were slightly more likely to prefer developed areas than boaters. Overall, most visitors were not crowded. Anglers were more likely to feel crowded by other anglers. The results show that visitors who prefer developed areas are more sensitive to crowding. The setting plays a relevant role regarding trip experience and satisfaction. This river seems to provide a high quality recreation experience because most visitors were very satisfied.

1.0 Introduction  
Managing Wild and Scenic Rivers requires sound knowledge of social uses and the quality of the recreation experience on a regular basis. Data on river setting preferences, user satisfaction and crowding perceptions informs river management about trends in river recreation use and whether there is a need for management actions. However, such data are often missing. This study analyzed river users’ satisfaction and crowding perceptions depending on their setting preferences. This paper focused on boaters and anglers and hypothesized that visitors who prefer wilderness settings are more sensitive towards crowding and that boaters and anglers have different crowding preferences.

2.0 Literature Review  
2.1 Crowding and Satisfaction  
The concept of social carrying capacity, especially crowding preferences and satisfaction rates, has been broadly discussed in literature since the late 1960s. Lime and Stankey (1971) described perception as the way in which an individual absorbs information about the surrounding environment. All recreationists do not perceive the environment in the same way and thus may react and develop different attitudes towards the experience. The concept of crowding describes a negative evaluation of a certain visitor density or number of encounters in a given area (Schmidt & Keating, 1979; Shelby, Vaske & Heberlein, 1989). Manning (2007) sees crowding as an important indicator of the quality of the recreation experience. Research has found that crowding has a negative effect on visitors seeking solitude and silence (Shelby & Heberlein, 1986). Stewart and Cole (2001), for example, found that backpackers were negatively affected by encounters with other groups, although the reported effect was weak. It can be assumed that there is only a small decrease in the quality of experience that results from feeling crowded when compared with the benefits that occur from being able to engage in a recreational activity (Stewart & Cole, 2001). People were often not willing to give up the recreational activity because of crowding issues (Kuentzel & Heberlein, 1992).

A comparison of four different studies on the Deschutes River, OR, showed that crowding is dynamic. It varied by time, resource availability, accessibility, and management strategy (Shelby, Vaske & Heberlein, 1989). Kuentzel and Heberlein (1992) found that boaters at the Apostle Islands who were more sensitive to crowding were more likely to visit less popular areas. Another study found that the quality of experiences is more associated with group behavior and setting attributes than to crowding (Herrick & McDonalds, 1992). Tseng et al. (2009) pointed out that the feeling of crowding is influenced by the expectations for number of people. Arnberger and Mann (2008) analyzed crowding research in Europe and concluded that crowding issues may be of higher importance in the future because of population growth. Managers must consider a wide range of activities and a complex setting for social carrying capacity management. The capacity of an area is reached, when crowding standards for specific recreation activities are exceed. An example for that are the results of a study on the Nantahala River. Those show that carrying capacity should be much lower for kayakers and canoers at certain locations than for rafters (Tarrant, Cordell & Kibler, 1997).
Consequently, reducing the use level might not be the only solution to reduce the feeling of crowding (Tarrant, Cordell & Kibler, 1997). Information and services can help to prevent potential crowding conflicts (Bowes, 1997).

The concept of satisfaction has been defined by Manning (1999) as congruence between expectations and outcomes. Satisfaction rates vary between user groups and depend on the activities they are participating in. This study focuses on boaters and anglers. Those groups are considered as consumptive and nonconsumptive recreationists. Previous research has found that consumptive users reported significantly lower satisfaction rates than nonconsumptive recreationists (Vaske, Donnelly, Heberlein, & Shelby, 1982; Roemer & Vaske, 2010). Consumptive visitors make their trip satisfaction dependent on their success in fishing or hunting, but their satisfaction rate stays still lower than those indicated by nonconsumptive user groups (Vaske, Donnelly, Heberlein, & Shelby, 1982; Roemer & Vaske, 2010).

2.1 Setting Preferences
Setting is the context within which recreation takes places. However, activities and the quality of experience recreationists seek for certain setting can depend on it (McCool, Stankey & Clark, 1985). Williams, Patterson, Roggenbuck and Watson (1992) found that wilderness users are more sensitive to encounter with other hikers. Recreationists seeking for wilderness setting preferred privacy (Schneider, 2000). Recreation settings are one-of-a-kind place that cannot be designed (Williams, Patterson, Roggenbuck & Watson, 1992). It is a challenge for managers to identify the most valued and optimal combination of attributes for the visitors because different user groups vary in their objectives and their activities require different settings (Peterson, Stynes, Rosenthal, & Dwyer, 1985).

3.0 Methodology
3.1 Study area
The North Umpqua Wild and Scenic River, OR, is 110 miles long and 34 miles are designated as a Wild and Scenic River. This river is known for its high quality water and unique recreation opportunities, such as whitewater boating and fishing. It provides whitewater recreation with class I to class IV rapids. The river is habitat for summer and winter steelhead, fall and spring Chinook, Coho and sea-run cutthroat trout. The North Umpqua River runs next to Highway 138 which is a gateway corridor to Crater Lake National Park. The river has no permit system for private users, although commercial outfitters need to obtain a permit (BLM – Bureau of Land Management). The river is divided into five sections: Boulder Flat to Horseshoe Bend (Segment 1), Horseshoe Bend to Gravel Bin (Segment 2), Gravel Bin to Bogus Creek (Segment 3), Bogus Creek to Susan Creek (Segment 4) and Susan Creek to Cable Crossing/Swiftwater (Segment 5). The BLM recommends floating guidelines for boaters to promote positive encounters between anglers and boaters. No river segments should be used from 6 pm to 10 am during the high use season between July and October. Segment 3 is for fishing use only during the time period of July 15th to October 31st.

Boaters were more likely to be found on the river segments 1 and 2 between put in and take out sites Boulder Flat and Gravel Bin, whereas the anglers used the lower river sections, segment 4 and 5 from Bogus Creek to Swift water, more often. This can be explained by the floating recommendations which suggest boaters to avoid certain sections. The majority of the boaters use multiple river sections on one trip.

3.2 Sample
Data were collected from June to August 2012. Face to face interviews were conducted with 364 visitors at river access points. The 45 sampling days were stratified over weekend, weekdays and morning, mid-day and evening. The interviews were limited to individuals who were recreating on the day contacted. The surveys were conducted on iPads using the app iSurvey. The data were uploaded at the end of a sampling day and exported directly into a SPSS file. Response rate was 53%. From those 364 visitors sampled, 17 reported another primary activity beside boating and fishing. Those 17 were not included in the analyses for this paper.

3.3 Measures
The survey asked visitors to indicate what setting preference they think should be provided at the North Umpqua Wild and Scenic River. They had to choose between the following categories: wilderness, semi-wilderness, undeveloped recreation, scenic recreation, and social recreation. For analysis, the categories wilderness and semi-wilderness were combined into “wilderness”. Undeveloped recreation, scenic recreation and social recreation were also grouped together into “developed area”. The satisfaction was measured by rating the overall trip experience on a 5-point answer scale beginning with 1 “poor” to 5 “perfect”. The feeling of crowding was measured with a 9-point answer scale (1 “not at all crowded” to 9 “extremely crowded”). The recreationists had to indicate their feeling of crowding during the time on the river and at put-in and take out sites, as well as if they felt crowded by boaters or anglers. The visitors had to report the actual number of encounters with other groups and the acceptable number of encounters with other groups. The survey also asked socio-demographics such as age and gender.

3.4 Analyses
The analyses were conducted using SPSS. T-tests and chi-square analyses were conducted to determine differences between wilderness and developed area preferring users.
4.0 Results

4.1 User Characteristics
Half of the visitors were participating in boating and half in angling. The category of boaters includes private and commercial kayaking and rafting groups. Anglers were more likely to be male (93.4%) and a third of the boaters were female (33%). Close to 40% of the boaters were between the age of 21 and 30 and on average 36 years old. The mean age for the fishermen was 47 years. Most of the anglers were repeat visitors (82.7%), however, the half of the boaters were first time visitors.

4.2 Setting Preferences
A dichotomous variable was created to categorize boaters and anglers in wilderness and developed area preferred setting groups. Boaters and anglers were evenly distributed between these categories (table 1) and no significant difference was found regarding the user groups and their setting preferences.

Table 1. User Groups and Setting Preferences

<table>
<thead>
<tr>
<th></th>
<th>Boaters (%)</th>
<th>Anglers (%)</th>
<th>χ²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wilderness</td>
<td>48.7</td>
<td>44.9</td>
<td>N/S (0.503)</td>
</tr>
<tr>
<td>Developed</td>
<td>51.3</td>
<td>55.1</td>
<td></td>
</tr>
</tbody>
</table>

4.3 Satisfaction
On average, the visitors scored high on their overall trip experience with a mean of 4.32 on the 5-point answer scale. Boaters rated their trip slightly higher than anglers, regardless of their setting preference (table 2). A significant difference between the user groups was found.

Table 2. Overall Trip Experience

<table>
<thead>
<tr>
<th></th>
<th>Boaters (M)</th>
<th>Anglers (M)</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wilderness</td>
<td>4.48</td>
<td>3.97</td>
<td>4.085***</td>
</tr>
<tr>
<td>Developed</td>
<td>4.69</td>
<td>4.01</td>
<td>5.797***</td>
</tr>
</tbody>
</table>

*** Significant at the p < .001 level
Note: Answer scale 1 = 5, with 1 being “poor” and 5 being “perfect”.

4.4 Crowding and Sightings of Other Groups
Overall, the recreationists didn’t feel crowded. Anglers who preferred developed area settings felt slightly more crowded by other anglers (mean=3.3) than anglers with wilderness preferences (M=2.0). Boaters with developed area preferences also showed higher mean scores for feeling crowded at put-in/take-out sites by other boaters (M=1.9) than compared to . Wilderness setting preferring anglers felt more crowded by other anglers while on the river (M=2.0). Boaters with wilderness setting preferences reported on feeling more crowded by other boating groups (Table 3). In summary it can be said that the users felt slightly more crowded by people participating in the same activity.

Table 3. Feeling of Crowding on the River and Put-in/Take-out Sites

<table>
<thead>
<tr>
<th></th>
<th>Boaters (M)</th>
<th>Anglers (M)</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wilderness Crowded by boaters while on the river</td>
<td>1.4</td>
<td>1.1</td>
<td>3.428***</td>
</tr>
<tr>
<td>Childhood by boaters at put-in/take-out sites</td>
<td>1.6</td>
<td>1.0</td>
<td>4.714***</td>
</tr>
<tr>
<td>Crowded by anglers while on the river</td>
<td>1.2</td>
<td>2.0</td>
<td>-3.242***</td>
</tr>
<tr>
<td>Crowded by anglers at put-in/take-out sites</td>
<td>1.2</td>
<td>1.7</td>
<td>-2.495***</td>
</tr>
<tr>
<td>Developed Area Crowded by boaters while on the river</td>
<td>1.6</td>
<td>1.5</td>
<td>N/S</td>
</tr>
<tr>
<td>Childhood by boaters at put-in/take-out sites</td>
<td>1.9</td>
<td>1.4</td>
<td>2.340*</td>
</tr>
<tr>
<td>Crowded by anglers while on the river</td>
<td>1.2</td>
<td>3.3</td>
<td>-7.214***</td>
</tr>
<tr>
<td>Crowded by anglers at put-in/take-out sites</td>
<td>1.2</td>
<td>2.0</td>
<td>-3.938***</td>
</tr>
</tbody>
</table>

*** Significant at the p < .001 level
Answer scale 1 = 9, with 1 being “not at all crowded” and 5 being “extremely crowded”.

Anglers preferring developed area setting encountered more anglers (M=7.57) than what they consider as acceptable (M=5.30). Anglers with developed area settings indicated to see on average 8 other angling groups during their trip, although they accept to see 5 other groups. As such, anglers’ tolerance level to encounter other anglers was exceeded.

Boaters preferring wilderness settings saw fewer groups than boaters with developed area. Boaters regardless their setting preference saw on average 3 other boating groups during their trip. Boaters with wilderness preferences reported to tolerate seeing 7 other boating groups, while boaters preferring developed area settings tolerate to see 6 other boating groups during their trip. Boaters were more likely to report a positive impact of the encounter with other boaters.

In general, boaters had more encounters with other boaters and anglers had more encounters with other angling groups (Table 4). For most of the respondents, the encounters with other groups had no impact on their trip experience.

### Table 4. Encounter with Other Groups

<table>
<thead>
<tr>
<th>Setting</th>
<th>Boaters (Mean)</th>
<th>Anglers (Mean)</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wilderness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Times seen other boating groups</td>
<td>2.67</td>
<td>0.60</td>
<td>4.862***</td>
</tr>
<tr>
<td>Acceptable to see other boating groups</td>
<td>6.89</td>
<td>2.81</td>
<td>2.027*</td>
</tr>
<tr>
<td>Times seen other angling groups</td>
<td>0.92</td>
<td>5.71</td>
<td>-3.600***</td>
</tr>
<tr>
<td>Acceptable to see other angling groups</td>
<td>7.59</td>
<td>6.96</td>
<td>N/S</td>
</tr>
<tr>
<td>Developed Area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Times seen other boating groups</td>
<td>2.97</td>
<td>0.36</td>
<td>4.862***</td>
</tr>
<tr>
<td>Acceptable to see other boating groups</td>
<td>5.76</td>
<td>1.12</td>
<td>2.158*</td>
</tr>
<tr>
<td>Times seen other angling groups</td>
<td>0.86</td>
<td>7.57</td>
<td>-3.600***</td>
</tr>
<tr>
<td>Acceptable to see other angling groups</td>
<td>9.22</td>
<td>5.30</td>
<td>N/S</td>
</tr>
</tbody>
</table>

*** Significant at the p < .001 level

### 5.0 Discussion

This study found that user groups did not differ in their setting preferences. A previous study on river users of the North Umpqua River found that half of the respondents were preferring wilderness settings as well (Burns, 2012). In line with previous findings (Vaske, Donnelly, Heberlein, & Shelby, 1982) boaters (nonconsumptive users) showed higher satisfaction rates than anglers (consumptive users). From a management point of view that means that different user groups cannot be treated equally. They have various needs determined by the activity they are participating.

Surprisingly, users preferring developed area settings showed slightly higher crowding scores. That finding is not consistent with the findings from Williams, Patterson, and Roggenbuck (1992), who described that wilderness users are more sensitive to encounters. Most of the visitors were repeat visitors. One can assume that the recreationists knew what to expect on the North Umpqua because of their area knowledge.

Anglers preferring developed area settings were more likely to feel more crowded by other anglers and reported more actual encounters than acceptable. Anglers may feel more crowded by the same user groups as they have to share good fishing spots with each other. Being too close to each other can have a negative impact on fishing success. In addition, one reason why the same user group reported more sightings with the same user group may be the floating recommendation. Boaters used different sections than anglers, this made the chances of encountering each other low.

In summary, the results seem to indicate that the North Umpqua Wild and Scenic River is properly managed. The recreationists were satisfied with their trip and did not report major crowding issues. There were also no differences regarding crowding and setting preferences and it cannot be stated that users with wilderness preferences feel more crowded than users preferring developed setting. The management of the North Umpqua River can focus on issues other than crowding which are more important to managers, such as balancing biological with social issues. The study site may be used by other river managers as a best practice example.

### 6.0 Acknowledgements

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7.0 References


