

Research Note

Extending the Encounter–Norm–Crowding Generalization to Angler Evaluations of Other Social and Resource Indicators

MARK D. NEEDHAM,¹ JERRY J. VASKE,²
DOUG WHITTAKER,³ AND MAUREEN P. DONNELLY²

¹Department of Forest Ecosystems and Society, Oregon State University, Corvallis, Oregon, USA

²Department of Human Dimensions of Natural Resources, Colorado State University, Fort Collins, Colorado, USA

³Confluence Research and Consulting, Anchorage, Alaska, USA

Recreationists who encounter more people than their normative tolerance for seeing others usually feel more crowded than those encountering fewer than their norm. This research note extends this observation–norm–evaluation relationship (e.g., encounter–norm–crowding) to other evaluations and indicators. Data were from a survey of anglers on the Gulkana National Wild River in Alaska (n = 288). Respondents who encountered more people than their norm felt more crowded than those encountering fewer than their norm. When impacts from other social indicators (e.g., camping within sight or sound of other groups, fishing area competition) exceeded user norms, crowding was higher and satisfaction with overall trip quality was lower than for those experiencing less than their norms. When impacts from resource indicators (e.g., litter, impacted campsites) exceeded norms, satisfaction with both environmental quality and trip quality were lower than for those experiencing less than their norms. The encounter–norm–crowding generalization, therefore, extended to other indicators and evaluations.

Keywords social and resource indicators, norms, crowding, encounters, satisfaction, river recreation, anglers

Introduction

Theory predicts that recreationists who encounter more people than their maximum tolerance for seeing others (i.e., their norm) will feel more crowded than those encountering less than their norm. A comparative analysis of 13 studies involving 10,697 recreationists

Address correspondence to Dr. Mark D. Needham, Department of Forest Ecosystems and Society, Oregon State University, 204 Richardson Hall, Corvallis, OR 97331, USA. E-mail: mark.needham@oregonstate.edu

supported this hypothesized encounter–norm–crowding relationship (Vaske & Donnelly, 2002), and more recent studies have also validated this relationship (Bell, Needham, & Szuster, 2011; Needham, 2013; Needham, Rollins, & Wood, 2004). Recreationist evaluations of settings and experiences, however, involve more than just encounters and crowding; other social (e.g., discourteous behavior, competition to access sites) and resource indicators (e.g., litter, campsite impacts) are also important (Manning, 2011; Whittaker, 1992). Indicators are social, resource, or managerial variables defining the quality of settings and experiences (Manning, 2011). Although studies have examined this encounter–norm–crowding relationship, little research has focused on these types of relationships and congruence among other evaluations (e.g., satisfaction) and other social and resource indicators (Needham, Ceurvorst, & Tynon, 2013). Understanding these relationships among concepts is important because they can inform managers about the range of impacts experienced by users and their tolerance limits for these impacts, thereby informing capacity-related planning and management (Manning, 2011; Shelby & Heberlein, 1986). This research note uses data from anglers on the Gulkana National Wild River in Alaska to examine whether this observation–norm–evaluation relationship (e.g., encounter–norm–crowding) extends to other types of evaluations and other social and resource indicators.

Conceptual Background

The Encounter–Norm–Crowding Generalization

Encounters, norms, and crowding have received substantial attention in the recreation literature (Manning, 2011; Shelby & Heberlein, 1986). Reported encounters are counts of the number of people or groups that an individual remembers observing (Vaske & Donnelly, 2002). Perceived crowding is a subjective negative evaluation that this number is excessive (Vaske & Shelby, 2008). Understanding encounters and crowding, however, may not reveal a maximum tolerable use level or an understanding of how this use should be managed (Needham et al., 2004). The concept of norms offers a theoretical and applied basis for addressing these issues (Vaske & Whittaker, 2004). One line of research defines norms as standards that individuals use for evaluating activities, management actions, or conditions as good or bad, better or worse (Shelby, Vaske, & Donnelly, 1996). Norms clarify conditions that people believe should or should not be allowed to occur in a given context (Heywood, 1996; Manning, 2011).

When users perceive a setting to be crowded, they have likely compared conditions they experienced (e.g., encounters) with their normative evaluations of conditions they would tolerate (Manning, 2011; Shelby et al., 1996). Across the studies examined by Vaske and Donnelly (2002), people who reported fewer encounters than their norm felt not at all crowded, whereas those encountering more than their norm felt slightly or moderately crowded. This pattern was evident in all 13 studies, statistically significant ($p < .05$) in 67 of 72 contexts, and the average correlation effect size was .47. These results suggest that the predictive strength of this encounter–norm–crowding relationship can be characterized as “large” (Cohen, 1988) or “substantial” (Vaske, 2008). These findings have been replicated in recent studies (Bell et al., 2011; Needham, 2013) and illustrate the concept of norm congruence, where users evaluate conditions less favorably when these conditions violate their norms (Manning, Johnson, & VandeKamp, 1996). The consistency of these findings suggests that this relationship will generalize to other locations and activities. The following hypothesis is tested for anglers on the Gulkana National Wild River:

H1: Users who encounter more people than their normative tolerance will feel more crowded compared to those encountering fewer people than their norm.

Extending the Generalization

Although several recreation studies have focused on encounters and crowding (Manning, 2011; Vaske & Donnelly, 2002; Vaske & Shelby, 2008), research has also examined other social and resource indicators. Social indicators include campsite or attraction site sharing (Shelby, 1981), waiting times to launch boats (Roggenbuck, Williams, Bange, & Dean, 1991; Whittaker & Shelby, 1988), fishing site competition (Martinson & Shelby, 1992), noise from motorized watercraft (Freimund, Vaske, Donnelly, & Miller, 2002), and discourteous behavior (Whittaker & Shelby, 1988). Resource indicators include bare ground, fire ring scars, vegetation damage, and human waste at campsites (Farrell, Hall, & White, 2001; Martin, McCool, & Lucas, 1989; Needham & Rollins, 2005; Shelby, Vaske, & Harris, 1988); trail characteristics and impacts (Lawson & Manning, 2002; Needham et al., 2011); and litter (Heywood & Murdock, 2002).

Despite several studies examining relationships among encounters, norms, and crowding, less research has addressed these types of relationships for other evaluations (e.g., satisfaction) and other social and resource indicators. It would be useful to know if users feel more crowded or become less satisfied when encountering conditions such as litter (i.e., a resource indicator) or fishing area competition (i.e., a social indicator) worse than they would tolerate (i.e., their norms). Recreation satisfaction involves positive feelings that individuals form, elicit, or gain from activities or settings; it is the degree they are content or pleased with conditions or experiences (Dorfman, 1979; Manning, 2011). Needham et al. (2013) tested these relationships for facility indicators (e.g., trash cans, signs) and found that the majority of recreationists who encountered fewer of each facility than they wanted and believed should be present (i.e., their norms) were least satisfied with the facilities. Little research, however, has examined these relationships for other social and resource indicators (i.e., reported conditions or observations), user tolerances for indicator impacts (i.e., norms), and satisfaction with conditions or experiences (i.e., evaluations). This research note addresses this knowledge gap and advances the following hypotheses to test this conceptual extension to other social and resource indicators:

H2: Users who experience more impacts from other social indicators (e.g., campsite competition) than their normative tolerances will feel more crowded compared to those experiencing fewer impacts than their norms.

H3: Users who experience more impacts from resource indicators (e.g., litter) than their normative tolerances will be less satisfied with the overall environmental conditions compared to those experiencing fewer impacts than their norms.

H4: Users who experience more impacts from both social and resource indicators than their normative tolerances will be less satisfied with their overall trip quality compared to those experiencing fewer impacts than their norms.

Methods

Data were from a survey of people visiting the Gulkana National Wild River in south-central Alaska. Most of this river has been designated as Wild within the National Wild and Scenic Rivers System. Parts of the river are accessible by road (put-in and take-out points), but there is limited development and signs of human use other than three boat launches,

approximately 100 undeveloped riverside campsites, a portage trail around a Class IV rapid, and pit toilets at a few higher use campsites. Most use occurs in the summer during the king salmon fishing season, and most users float the “Upper River” segment (from Paxson Lake to Sourdough; 46 river miles plus 4.5 miles across the lake), float the “Lower River” segment (Sourdough to Richardson Highway; 33 river miles), or use powerboats on the “Sourdough” segment (lower 10 miles of “Upper River” and approximately one mile of “Lower River”).

Names and addresses were obtained from an onsite survey of users on this river from May to September. The sample was collected on weekends and weekdays at take-out points. Follow-up questionnaires were mailed to a random sample of 469 of these users, and three mailings (first mailing, postcard reminder, final mailing) were used for administering these questionnaires. In total, 288 questionnaires were completed (61% response rate) with 92% of respondents stating that they went fishing on their last trip to this river and 86% reporting that fishing for king salmon or other species was among their most important activities on this trip. A nonresponse bias check was not conducted given this response rate and budget constraints.

Six social indicators were measured: (a) encounters with other river users—average number of groups seen per day, (b) fishing area competition—percent of times passing up fishing sites because they were occupied, (c) campsite competition—percent of times passing up campsites because they were occupied, (d) campsite encounters—percent of nights camping within sight or sound of others, (e) time in sight of other groups—percent of time within sight or sound of other groups, and (f) ATV encounters—percent of time within sight or sound of all-terrain vehicles (ATVs). In addition, three resource indicators were measured: (a) litter—percent of sites with significant litter (i.e., more than a handful), (b) human waste—percent of sites with unburied human waste or visible toilet paper, and (c) campsite impacts—percent of sites with large amounts of bare ground, fire ring scars, and cut tree branches.

Respondents reported conditions they encountered on their last trip (i.e., observations) and their tolerances (i.e., norms) for each of these indicators. Conditions experienced were measured as the “average number you saw per day on your trip” for encounters with other users, and “percent (i.e., of time(s), nights, or sites) you experienced on your trip” for the other social and resource indicators. Norms were measured as the maximum “number you will tolerate per day” for encountering other users along this river, and “percent (i.e., of time(s), nights, or sites) you will tolerate” for the other social and resource indicators along this river. Consistent with previous research (Shelby et al., 1996; Vaske & Donnelly, 2002), responses were open-ended (i.e., write a number or percent). Respondents were also given the option of reporting that these issues “do not matter” to them, but fewer than 16% selected this option for each indicator. Identical to other studies (Needham, 2013; Needham et al., 2004, 2013; Vaske & Donnelly, 2002), comparisons between these observations and norms categorized respondents as those who experienced either “more than their norm” or “less than their norm.”

There were three evaluation measures. Perceived crowding was measured for each river segment on their last trip using the 9-point perceived crowding scale of 1 “not at all crowded” to 9 “extremely crowded.” This scale has been used extensively and tested rigorously (Vaske & Shelby, 2008). Satisfaction with: (a) overall environmental conditions along the river, and (b) overall trip quality were both measured on 10-point scales of 1 “poor” to 10 “excellent.” This scale is commonly used for measuring satisfaction evaluations (Vaske & Roemer, 2013).

Results

Analysis of the encounter–norm–crowding relationship along the three segments of the river showed that 70% to 88% of respondents encountered fewer people than their normative tolerance, and 12% to 30% encountered more than their norm (Table 1). When encounters were less than norms, mean crowding scores on these river segments ranged from 2.72 to 3.58 (“not at all crowded” to “slightly crowded”). When encounters exceeded norms, crowding was significantly higher, ranging from 5.41 to 6.13 (“moderately crowded”), $t = 3.09$ to 4.76 , $p = .005$ to $< .001$. Across all segments taken together, 24% of users reported more encounters than their norm and mean crowding was significantly higher ($M = 5.49$, “moderately crowded”) compared to the 76% encountering fewer than their norm ($M = 3.35$, “slightly crowded”), $t = 6.37$, $p < .001$. The point-biserial correlation (r_{pb}) effect size ranged from .32 to .56 for each river segment, and was .44 across all three segments combined. Using guidelines from Cohen (1988) and Vaske (2008), these effect sizes suggest a “medium” to “large” or “typical” to “substantial” relationship, respectively, among encounters, norms, and crowding along this river. These findings support Hypothesis 1; users who encountered more people than their norm felt more crowded than those encountering fewer than their norm.

Between 12% and 23% of respondents experienced fishing area competition, campsite competition, camping in sight or sound of others, being in sight or sound of other groups, and being in sight or sound of ATVs more often than their norms (Table 2). Mean crowding was significantly higher for users experiencing more of these social impacts than their norms ($M = 5.10$ to 6.23 , “moderately crowded”) compared to those experiencing fewer than their norms ($M = 3.29$ to 3.50 , “slightly crowded”), $t = 3.74$ to 7.08 , $p < .001$. Effect sizes (r_{pb}) of .30 to .50 suggest “medium” to “large” (Cohen, 1988) or “typical” to “substantial” (Vaske, 2008) relationships. These results support Hypothesis 2; users who

Table 1
User encounter norms compared to perceived crowding
on the Gulkana National Wild River

	Reported encounters compared to norm ¹		Mean crowding ²		<i>t</i> - value	<i>p</i> - value	<i>r</i> _{pb}
	% Less than norm	% More than norm	Less than norm	More than norm			
Upper River segment	88	12	2.72	6.13	3.96	.004	.56
Sourdough segment	84	16	3.58	5.41	3.09	.005	.32
Lower River segment	70	30	3.42	5.83	4.76	<.001	.50
Total (3 River segments)	76	24	3.35	5.49	6.37	<.001	.44

¹Percent of respondents who encountered either “less than” or “more than” their norm for encounters.

²Mean crowding on scale from 1 (*not at all crowded*) to 9 (*extremely crowded*).

Table 2
User norms for other social indicator impacts compared to perceived crowding on the Gulkana National Wild River

	Experienced impact compared to norm ¹		Mean crowding ²		<i>t</i> -value	<i>p</i> -value	<i>r</i> _{pb}
	% Less than norm	% More than norm	Less than norm	More than norm			
Fishing area competition	78	22	3.29	5.54	6.49	<.001	.48
Campsite competition	87	13	3.41	5.78	5.90	<.001	.42
Camping within site/sound of others	88	12	3.38	6.23	7.08	<.001	.45
Being within sight/sound of other groups	77	23	3.35	5.69	6.63	<.001	.50
Being within sight/sound of ATVs	82	18	3.50	5.10	3.74	<.001	.30

¹Percent of respondents who experienced either “less than” or “more than” their norms for these impacts.

²Mean crowding on scale from 1 (*not at all crowded*) to 9 (*extremely crowded*).

experienced more impacts from these other social indicators than their norms felt more crowded than those who saw less than their norms.

In total, 42% of respondents observed more sites with litter than their norm for seeing litter, and these users rated the quality of this river’s overall environmental conditions significantly lower ($M = 7.41$) than those experiencing less litter than their norm ($M = 8.31$), $t = 4.11$, $p < .001$ (Table 3). Similarly, 35% of users observed more sites with unburied human waste than their norm and reported significantly lower environmental ratings ($M = 7.42$) than those observing less than their norm ($M = 8.22$), $t = 3.38$, $p < .001$. In addition, 24% of respondents observed more campsite impacts than their norm for these impacts, and these users rated the environmental conditions significantly lower ($M = 7.26$) than those experiencing fewer campsite impacts than their norm ($M = 8.12$), $t = 2.75$, $p = .008$. Effect sizes (r_{pb}) for these resource impacts ranged from .24 to .29, suggesting “medium” or “typical” relationships among these observations, norms, and evaluations (Cohen, 1988; Vaske, 2008). These findings support Hypothesis 3; users who experienced more resource impacts than their norms were less satisfied with overall environmental conditions than those who saw less than their norms.

Respondents who observed more of all these social and resource indicator impacts than their norms for these impacts also reported lower satisfaction with their overall trip quality compared to those who observed fewer impacts than their norms (Table 4). For example, users who experienced more occupied campsites (i.e., campsite competition) than their

Table 3
User norms for resource indicator impacts compared to overall environmental conditions on the Gulkana National Wild River

	Experienced impact compared to norm ¹		Mean environmental quality ²		<i>t</i> -value	<i>p</i> -value	<i>r</i> _{pb}
	% Less than norm	% More than norm	Less than norm	More than norm			
Significant litter	58	42	8.31	7.41	4.11	<.001	.29
Unburied human waste	65	35	8.22	7.42	3.38	<.001	.25
Campsite impacts	76	24	8.12	7.26	2.75	.008	.24

¹Percent of respondents who experienced either “less than” or “more than” their norms for these impacts.

²Mean satisfaction with overall environmental conditions on scale from 1 (*poor*) to 10 (*excellent*).

norm were significantly less satisfied with their trip ($M = 6.32$) compared to those reporting fewer than their norm ($M = 7.92$), $t = 4.05$, $p < .001$. Similar relationships and statistical differences were observed for seven of the eight indicators. Effect sizes (r_{pb}) ranged from .14 to .31. Using guidelines from Cohen (1988) and Vaske (2008), the strength of these relationships can be described as “small to medium” or “minimal to typical,” respectively. These results support Hypothesis 4; users who experienced more impacts from these social and resource indicators than their norms were less satisfied than those encountering fewer impacts than their norms.

Discussion

Taken together, these findings show that the observation–norm–evaluation relationship (e.g., encounter–norm–crowding) extends beyond encounters and crowding to other evaluations and other social and resource indicators. Respondents who encountered more people than their norm, observed other social impacts more than their norms, and reported more resource impacts than their norms felt more crowded and were less satisfied with environmental conditions and overall experiences compared to respondents whose norms were not violated. These findings have both management and research implications.

From a management perspective, fewer than 16% of users encountered more people than their norm on the “Upper River” and “Sourdough” segments, but 30% encountered more than their norm on the “Lower River.” Encounters and crowding are clearly larger issues on the “Lower River,” and may deserve attention through active monitoring to ensure that conditions do not deteriorate further. Although social impacts at campsites along the river (e.g., camping within sight and sound of others, campsite competition) were not problematic with fewer than 13% of users experiencing more of these impacts than their norms, almost twice as many (22% to 23%) experienced competition for fishing areas and being within sight and sound of other groups more often than their norms. This suggests an issue with greater social interaction at “hotspot” fishing locations, which fits anecdotal

Table 4
User norms for social and resource indicator impacts compared to overall trip quality on the Gulkana National Wild River

	Experienced impact compared to norm ¹		Mean trip quality ²		<i>t</i> -value	<i>p</i> -value	<i>r</i> _{pb}
	% Less than norm	% More than norm	Less than norm	More than norm			
Significant litter	58	42	8.04	7.33	2.83	.005	.20
Unburied human waste	65	35	7.97	7.36	2.19	.030	.16
Campsite impacts	76	24	7.89	7.17	2.12	.038	.17
Fishing area competition	78	22	7.99	6.71	4.07	<.001	.29
Campsite competition	87	13	7.92	6.32	4.05	<.001	.31
Camping within site/sound of others	88	12	7.82	6.55	3.10	.002	.24
Being within sight/sound of other groups	77	23	7.94	6.62	4.26	<.001	.31
Being within sight/sound of ATVs	82	18	7.77	7.12	1.86	.070	.14

¹Percent of respondents who experienced either “less than” or “more than” their norms for these impacts.

²Mean satisfaction with overall trip quality on scale from 1 (*poor*) to 10 (*excellent*).

information about “combat fishing” conditions during salmon season at easily accessible locations, especially on the “Lower River” segment.

Resource impacts appear to be more problematic than these social issues, with 42% of users observing more sites with litter than their norm for seeing litter, 35% reporting more unburied human waste than their norm, and 24% experiencing more campsite impacts than their norm (e.g., bare ground, fire scars, cut branches). Satisfaction with both overall trip quality and overall environmental conditions was significantly lower for these users encountering more impacts than their norms. To address these issues, managers could implement strategies such as education, regulation, restoration, and maintenance in locations with documented impacts (Manning, 2011). A revision to this river’s management plan that is partially based on this study’s findings has been implemented (BLM, 2006). The managing agency developed a “river user guide” for this river with Leave No Trace information, operated a portable toilet “loaner” program to encourage more use of human waste carry-out systems, and conducted active restoration and campsite cleanup activities. The revised plan also adopts standards for each of these indicators and requires annual monitoring to determine if standards are being violated.

From a research perspective, results from all three river segments showed that when user encounters exceeded their norms, perceived crowding was higher compared to when encounters were less than norms. These findings parallel Vaske and Donnelly (2002) and more recent studies validating this relationship among encounters, norms, and crowding (Bell et al., 2011; Needham, 2013; Needham et al., 2004). Results also showed that users who encountered impacts from other indicators (e.g., fishing area competition, litter, campsite impacts) that exceeded their norms for these impacts felt more crowded and less satisfied with both the overall environmental conditions and their overall trip quality. Needham et al. (2013) found similar patterns of results for facility indicators (e.g., trash cans, signs) where users who encountered fewer of each facility than the number they believed should be present (i.e., their norm) were least satisfied with the facilities. Taken together, the findings presented here and in other studies (Needham et al., 2013; Vaske & Donnelly, 2002) are consistent with the concept of norm congruence and suggest that this observation–norm–evaluation relationship generalizes beyond just encounters and crowding to other evaluations and other social, facility, and resource indicators. These findings also highlight the importance of measuring all three dimensions within this relationship. Observations of indicators such as encounters describe existing conditions, and evaluative dimensions such as crowding and satisfaction further describe user feelings about existing impacts. By themselves, however, these observations and evaluations do not facilitate an understanding of appropriate and inappropriate conditions. Norms help to address this issue and provide a basis for informing management and research (Manning, 2011; Shelby et al., 1996).

These results illustrate that a recreation experience involves more than just encounters and crowding; other social, resource, and managerial indicators are also important (Manning, 2011; Whittaker, 1992). Findings showed that impacts from these indicators influence evaluative outcomes such as crowding, satisfaction, and perceived environmental quality. Although research has demonstrated relationships between encounters and specific evaluations such as crowding, studies examining direct bivariate relationships between indicators (e.g., encounters, resource conditions) and broader evaluations such as satisfaction have generally been weaker or insignificant, with overall satisfaction remaining high despite substantial encounters or crowding (Manning, 2011; Stewart & Cole, 2001; Vaske & Donnelly, 2002). Although findings here also showed reasonably high trip satisfaction even for users whose norms were violated (6.32 to 7.36 on a scale where 10 is “excellent”), these ratings were significantly lower than for users who reported fewer impacts than their norms (7.77 to 8.04). Satisfaction may be less affected directly by impacts such as encounters and resource conditions, and more strongly influenced in a complex multivariate context by the relationship between encounters and norms, with norms playing mediation or moderation roles between these observations and evaluations. Recent path analyses have shown that norms can mediate relationships between observed encounters and evaluations such as crowding and satisfaction (Kim, Shelby, & Needham, 2014; Vaske, 2008).

To increase the generalizability of these findings, several issues deserve attention in future research. First, consistent with previous research, this study used written formats for measuring observations of indicator impacts (e.g., encounters, litter) and norms for these impacts (Shelby et al., 1996; Vaske & Donnelly, 2002). Recent research, however, has used visuals (e.g., photographs, videos) for measuring indicators because they are often considered to provide more realistic depictions of impacts, making it easier to specify norms (Manning & Freimund, 2004). In this study, however, fewer than 16% of users said the indicators “do not matter” and were unable to specify a norm, suggesting that most users were able to answer the written questions.

Second, identical to some studies, norms were based on tolerance for indicator impacts (see Manning, Valliere, Wang, & Jacobi, 1999 for a review). Some research, however, has used other measures of norms and it would be beneficial to develop greater clarity among measures such as “tolerance” and “acceptance” (which arguably may be equivalent), “preference” (conditions that are often considered to be better than tolerable or acceptable levels), “management action” (when an agency should take action), and “displacement” (when a respondent would leave or no longer return because of impacts). Data from several studies suggest that users can distinguish among these measures (Lawson, Newman, Choi, Pettebone, & Meldrum, 2009; Manning et al., 1999; Whittaker & Shelby, 2012) and they are useful for informing management (Whittaker, Shelby, Meldrum, DeGroot, & Bacon, 2012).

Third, the data were drawn from a larger study and lengthy questionnaire examining a range of issues along the Gulkana National Wild River. This length and complexity necessitated questionnaire administration by mail instead of other approaches (e.g., onsite survey) where questionnaires are usually shorter to reduce respondent burden (Vaske, 2008). This approach may have created some recall bias given the time between visiting the river and completing questionnaires shortly afterward. Research assessing the extent of any recall bias could be useful.

Finally, results are limited to anglers visiting this one particular river and may not generalize to other areas and activity groups. The Gulkana National Wild River is a moderate use river with floating and powerboat opportunities similar to several rivers in other western states (e.g., Main Salmon in Idaho, Deschutes and Rogue in Oregon), as well as rivers with higher seasonal salmon angling use (e.g., several coastal rivers in countries such as Canada, New Zealand, and the United States). Applicability of findings to other activities and geographical settings, however, remains a topic for further empirical investigation.

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References

- Bell, C., Needham, M., & Szuster, B. (2011). Congruence among encounters, norms, crowding, and management in a marine protected area. *Environmental Management, 48*, 499–513.
- Bureau of Land Management (BLM). (2006). *Gulkana National Wild River record of decision, final environmental assessment, and revised river management plan*. Glennallen, AK: USDI Bureau of Land Management.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ: Erlbaum.
- Dorfman, P. (1979). Measurement and meaning of recreation satisfaction: A case study in camping. *Environment and Behavior, 11*, 483–510.
- Farrell, T., Hall, T., & White, D. (2001). Wilderness campers' perception and evaluation of campsite impacts. *Journal of Leisure Research, 33*, 229–250.
- Freimund, W., Vaske, J., Donnelly, M., & Miller, T. (2002). Using video surveys to access dispersed backcountry visitors' norms. *Leisure Sciences, 24*, 349–362.
- Heywood, J. (1996). Conventions, emerging norms, and norms in outdoor recreation. *Leisure Sciences, 18*, 355–363.
- Heywood, J., & Murdock, W. (2002). Social norms in outdoor recreation: Searching for the behavior-condition link. *Leisure Sciences, 24*, 283–296.

- Kim, S., Shelby, B., & Needham, M. (2014). Effects of facility developments and encounter levels on perceptions of settings, crowding, and norms in a Korean park. *Environmental Management*, *53*, 441–453.
- Lawson, S., & Manning, R. (2002). Tradeoffs among social, resource, and management attributes of the Denali wilderness experience: A contextual approach to normative research. *Leisure Sciences*, *24*, 297–312.
- Lawson, S., Newman, P., Choi, J., Pettebone, D., & Meldrum, B. (2009). Integrated transportation and user capacity research in Yosemite National Park: The numbers game. *Transportation Research Record: Journal of the Transportation Research Board*, *2119*, 83–91.
- Manning, R. (2011). *Studies in outdoor recreation: Search and research for satisfaction*. Corvallis, OR: Oregon State University Press.
- Manning, R., & Freimund, W. (2004). Use of visual research methods to measure standards of quality for parks and outdoor recreation. *Journal of Leisure Research*, *36*, 557–579.
- Manning, R., Johnson, V., & VandeKamp, M. (1996). Norm congruence among tour boat passengers to Glacier Bay National Park. *Leisure Sciences*, *18*, 125–141.
- Manning, R., Valliere, W., Wang, B., & Jacobi, C. (1999). Crowding norms: Alternative measurement approaches. *Leisure Sciences*, *21*, 97–115.
- Martin, S., McCool, S., & Lucas, R. (1989). Wilderness campsite impacts: Do managers and visitors see them the same? *Environmental Management*, *13*, 623–629.
- Martinson, K., & Shelby, B. (1992). Encounter and proximity norms for salmon anglers in California and New Zealand. *North American Journal of Fisheries Management*, *12*, 559–567.
- Needham, M. (2013). Encounters, norms, and crowding at six coastal and marine areas in Hawaii. *Tourism in Marine Environments*, *9*, 19–34.
- Needham, M., Ceurvorst, R., & Tynon, J. (2013). Toward an approach for measuring indicators of facility carrying capacity in outdoor recreation areas. *Journal of Leisure Research*, *45*, 345–366.
- Needham, M., & Rollins, R. (2005). Interest group standards for recreation and tourism impacts at ski areas in the summer. *Tourism Management*, *26*, 1–13.
- Needham, M., Rollins, R., Ceurvorst, R., Wood, C., Grimm, K., & Dearden, P. (2011). Motivations and normative evaluations of summer visitors at an alpine ski area. *Journal of Travel Research*, *50*, 669–684.
- Needham, M., Rollins, R., & Wood, C. (2004). Site-specific encounters, norms and crowding of summer visitors at alpine ski areas. *International Journal of Tourism Research*, *6*, 421–437.
- Roggenbuck, J., Williams, D., Bange, S., & Dean, D. (1991). River float trip encounter norms: Questioning the use of the social norms concept. *Journal of Leisure Research*, *23*, 133–153.
- Shelby, B. (1981). Encounter norms in backcountry settings: Studies of three rivers. *Journal of Leisure Research*, *13*, 129–138.
- Shelby, B., & Heberlein, T. (1986). *Carrying capacity in recreation settings*. Corvallis, OR: Oregon State University Press.
- Shelby, B., Vaske, J., & Donnelly, M. (1996). Norms, standards, and natural resources. *Leisure Sciences*, *18*, 103–123.
- Shelby, B., Vaske, J., & Harris, R. (1988). User standards for ecological impacts at wilderness campsites. *Journal of Leisure Research*, *20*, 245–256.
- Stewart, W., & Cole, D. (2001). Number of encounters and experience quality in Grand Canyon backcountry: Consistently negative and weak relationships. *Journal of Leisure Research*, *33*, 106–120.
- Vaske, J. (2008). *Survey research and analysis: Applications in parks, recreation and human dimensions*. State College, PA: Venture.
- Vaske, J., & Donnelly, M. (2002). Generalizing the encounter-norm-crowding relationship. *Leisure Sciences*, *24*, 255–270.
- Vaske, J., & Roemer, J. (2013). Differences in overall satisfaction by consumptive and nonconsumptive recreationists: A comparative analysis of three decades of research. *Human Dimensions of Wildlife*, *18*, 159–180.

- Vaske, J., & Shelby, L. (2008). Crowding as a descriptive indicator and an evaluative standard: Results from 30 years of research. *Leisure Sciences, 30*, 111–126.
- Vaske, J., & Whittaker, D. (2004). Normative approaches to natural resources. In M. Manfredo, J. Vaske, B. Bruyere, D. Field, & P. Brown (Eds.), *Society and natural resources: A summary of knowledge* (pp. 283–294). Jefferson, MO: Modern Litho.
- Whittaker, D. (1992). Selecting indicators: Which impacts matter more? In B. Shelby, G. Stankey, & B. Shindler (Eds.), *Defining wilderness quality: The role of standards in wilderness management—a workshop proceedings* (pp. 13–21). Fort Collins, CO: USDA Forest Service Pacific Northwest Research Station.
- Whittaker, D., & Shelby, B. (1988). Types of norms for recreation impacts: Extending the social norms concept. *Journal of Leisure Research, 20*, 261–273.
- Whittaker, D., & Shelby, B. (2012). *Boats, beaches, and river banks: Visitor evaluations of recreation on the Merced River in Yosemite Valley*. Anchorage, AK: Confluence Research and Consulting.
- Whittaker, D., Shelby, B., Meldrum, B., DeGroot, H., & Bacon, J. (2012). Transportation, recreation, and capacities in Yosemite National Park. *George Wright Forum, 29*, 338–350.