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Reconciling Tradeoffs in Wilderness Management: A Comparison of Day and Overnight Visitors' Attitudes and Preferences Concerning Management of the Okefenokee Swamp Wilderness

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Decisions about how to manage wilderness involve balancing tradeoffs among the social, resource, and managerial conditions of the wilderness setting (Cole 2000; Lawson and Manning 2001). Efforts to optimize one desirable attribute of the wilderness setting may mean having to compromise one or more of the other important attributes of wilderness. For example, having minimal or no restrictions on travel itineraries may increase visitors' sense of freedom, but this might simultaneously result in more encounters with other users. Conversely, regulating travel itineraries might reduce encounters, but would diminish visitors' sense of freedom and spontaneity (Cole 2000).

Recent research has used stated preference methods (e.g., stated choice and conjoint analysis) to examine visitors' attitudes concerning tradeoffs among social, resource, and related management conditions of the recreation setting (Lawson and Manning 2001, 2002, 2003; Cahill et al., in review). Stated preference study results provide quantitative estimates of the relative importance visitors place on selected attributes of the recreation setting and the extent to which they support alternative management practices designed to optimize tradeoffs related to recreation management.

To date, most applications of stated preference methods to park and wilderness management have implicitly treated all visitors within a study area as a homogeneous group by reporting study results for the sample as a whole. However, previous research suggests that wilderness recreationists evaluate wilderness conditions and management differently depending on a number of factors, including mode of travel (e.g., motorboat versus paddle canoe), length of stay (e.g., day versus overnight trip), and type of group (guided or nonguided) (Hall and Shelby 1996; Manning 1999). The purpose of this study is to extend existing applications of stated preference methods by examining the attitudes and preferences of selected subgroups of visitors to the Okefenokee Swamp Wilderness, Georgia, USA. In particular, this study uses conjoint analysis to examine three pairs of visitor subgroups' attitudes and preferences for wilderness conditions and management: day and overnight visitors; motorized and nonmotorized visitors; and guided and nonguided visitors.

Okefenokee Wilderness

The Okefenokee Wilderness was designated in 1974. At 353,981 acres, it is the third largest wilderness area east of the Mississippi River. It is administered by the U.S. Fish and Wildlife Service as part of the 396,000-acre Okefenokee National Wildlife Refuge. The refuge was established in 1937 to protect the unique environmental qualities of the Okefenokee Swamp ecosystem.

Approximately 120 miles of water trails are maintained within the refuge. Access to the water trails in the Okefenokee Swamp Wilderness is provided from the Suwannee Recreation Area, Stephen C. Foster State Park, and Kingfisher Landing. Nonmotorized use of the water trails is primarily by paddle canoe and kayak. The use of powered watercraft, propelled by motors of ten or less horsepower, is permitted on a portion of the wilderness water trails. Canoe and motorboat rentals as well as guided tours are offered by a cooperating partner at the Suwannee Recreation Area and by state park staff at Stephen C. Foster State Park. Individuals can also use their own canoes, kayaks, and small motorboats.

Overnight camping in the Okefenokee Swamp Wilderness is permitted at seven designated campsites. Most of the campsites within the swamp consist of raised wooden platforms located in the water with little or no land surrounding them. A wilderness permit is required for overnight stays in the swamp; these are available by phone up to two months in advance of the trip, and the limited permits are often taken within minutes of their becoming available each day. Permitees are given an assigned travel route and camp locations, at which they must arrive by sunset and stay only one night. While there is no fee for day use of the Okefenokee Swamp Wilderness water trails, overnight visitors pay a $10 per-person per-night use fee. Motorboats are prohibited on overnight-use water trails, and overnight visitors typically travel by canoe.

Study methods

Conjoint analysis. Conjoint analysis was originally developed to study individuals' preferred consumption levels and relative importance of the multiple attributes of market goods (Green and Srinivasan 1978, 1990; Louviere 1998). For example, marketing studies have used conjoint analysis methods to assess how important various features of automobiles (e.g., color, horsepower, automatic locks, etc.) are to consumers. Conjoint analysis has since been extended to study public attitudes and preferences concerning the provision and management of public goods (Teisl et al. 1996; Dennis 1998). Within conjoint analysis studies of public goods, respondents are presented with a series of alternative management profiles and asked to rank the profiles or rate the desirability or acceptability of each profile on a numerical scale.

In this study, Okefenokee Swamp Wilderness visitors were asked to rate a series of wilderness setting profiles using a scale ranging from 1 ("Unacceptable) to 10 ("Ideal"). The profiles included in this study describe varying conditions or levels of six wilderness setting attributes relevant to the management of the Okefenokee Swamp Wilderness. Analysis of respondents' ratings (i.e., conjoint ratings) provides information concerning visitors' preferred conditions of the wilderness setting attributes and their relative importance to subgroups of visitors. The statistical model derived from respondents' conjoint ratings can also

be used to estimate visitor subgroups' relative support for wilderness management alternatives (Teisl et al. 1996). The following sections of this paper describe the design and analysis of the conjoint profiles used in this study.

Design of the wilderness setting profiles. As noted in the previous section of this paper, the wilderness setting profiles used in this study are composed of varying conditions or levels of six wilderness attributes. The attributes and their levels or conditions are presented in Table 1. Selection of the attributes for this study was based on a review of previous research concerning backcountry and wilderness recreation experiences (Manning 1999), and consultation with refuge staff.

A fractional factorial design was used to combine the attributes at varying levels into a total of 80 wilderness setting profiles. The profiles were blocked into eight questionnaire versions, each containing ten unique setting profiles. An example of a representative Okefenokee Swamp Wilderness setting profile is presented in Figure 1.

Survey administration. The conjoint procedure was conducted as part of a larger survey of Okefenokee Swamp Wilderness visitors from October 1999 through May 2000. An

Table 1. Okefenokee Swamp wilderness setting attributes and levels.

Number of other boats seen per day:
Encounter 5 other boats per day
Encounter 15 other boats per day
Encounter 30 other boats per day
Amount of facility development along water routes:
No developments along the water routes for the visitor
A few simple facilities like existing pit toilets and camping/rest platforms
A few simple facilities like pit toilets, boardwalks, observation platforms, and screened-in camping/rest platforms
Cost of boat trip per day:
No user fee to travel the swamp
$10 fee to travel
$20 fee to travel
Percent of wilderness water trail miles open to motorboat use :
Five percent of trail miles open to motorboats
Twenty-five percent of trail miles open to motorboats
Fifty percent of trail miles open to motorboats
One-hundred percent of trail miles open to motorboats
Regulation of travel itineraries for water trails:
Assigned entry and assigned travel route
Assigned entry and freedom to travel where one wants
Freedom to enter where one wants and assigned travel route
Freedom to enter and travel where one wants
Amount of information provided along water trails:
No information, except maps
Only minimal information, like maps and simple directional and distance signs
Much information, like maps and educational materials about Swamp history and ecology

Instructions: Please rate your personal preference for the scenario on a scale of 1 to 10 (where 1 = unacceptable and 10 = ideal).

- You see about 15 boats per day.
- No developments are provided along Swamp routes for visitors.
- You pay $0 per day.
- About 50% of water trail miles are open to motorboats.
- You may enter where you want and travel where you want.
- Only minimal information, like maps and simple directional and distance signs are provided along Swamp routes.

Rating Scale:	1	2	3	4	5	6	7	8	9	10
	unacceptable				fair					ideal

Your Rating:_____

Figure 1. Example of an Okefenokee wilderness setting profile.

on-site contact sheet was used to collect mailing addresses from visitors entering or exiting the wilderness from one of three public access points. Visitors also recorded information about their visit on the contact sheet, including whether they were on a day or overnight trip, using a motorized or nonmotorized boat, and on a guided or nonguided trip. Questionnaires containing the conjoint procedure and other questions were mailed to the addresses of visitors recorded on the on-site contact sheet. Recipients of the mail survey were randomly assigned to complete one of the eight versions of the conjoint questions.

Data analysis. Responses to the conjoint questions included in the visitor survey were analyzed using ordinary least squares regression with the conjoint rating as the dependent variable and the six wilderness setting attributes as the independent variables. Three of the independent variables—number of boats seen per day, percent of water trails open to motorboats, and cost of boat trip per day—were coded as continuous variables and the other independent variables were entered into the regression model using effects coding. To test whether attitudes and preferences for wilderness setting conditions and management differ among subgroups of Okefenokee Swamp Wilderness visitors, separate regression models were estimated for each of the visitor subgroups mentioned earlier in the paper.

Results

A total of 770 visitors agreed on site to participate in the survey and were sent a questionnaire by mail. The response rate to the mail survey was 68.1%, resulting in a total of 524 completed questionnaires. The results of the regression analyses for day and overnight visi-

tors to the Okefenokee Swamp Wilderness are reported in Table 2. Regression models were also estimated to compare visitors traveling in motorized and nonmotorized boats, as well as visitors on guided versus nonguided trips. The scope of this paper is limited to discussing the results of the analysis for the day and overnight visitors.

Variable	Day Coefficient t-statistic		Overnight Coefficient t-statistic	
Number of other boats seen per day	–0.05	****	–0.06	****
	–13.14		–6.23	
Amount of facility development along water routes				
No developments along the water routes for the visitor	–0.35		–0.41	***
	–6.13		–3.17	
Few simple facilities: existing pit toilets, platforms	0.18	****	0.21	*
	3.20		1.63	
Few simple facilities: pit toilets, boardwalks, screened-in platforms	0.17	***	0.20	
	2.83		1.51	
Cost of boat trip per day	–0.03	****	–0.02	**
	–5.31		–2.03	
Percent of water trail miles open to motorboat us	–0.01	****	–0.04	****
	–6.88		–12.84	
Regulation of travel itineraries for water trails				
Assigned entry and assigned travel route	–0.20	***	–0.33	**
	–2.80		–2.00	
Assigned entry, freedom to travel where one wants	0.27	****	0.21	
	3.93		1.37	
Freedom to enter where one wants, assigned travel route	–0.24	***	0.22	
	–2.96		1.19	
Freedom to enter and travel where one wants	0.17	**	–0.11	
	2.34		–0.65	
Amount of information provided along water trails				
No information, except maps	–0.35	****	–0.16	
	–5.75		–1.13	
Maps and simple directional and distance signs	0.00		0.11	
	0.06		0.84	
Maps and educational materials	0.35	****	0.05	
	5.80		0.38	

* p<0.10, ** p<0.05, *** p<0.01, **** p<0.001

Table 2. Regression results for day and overnight subgroups.

The regression coefficients reported in Table 2 provide insight into the effect of the attributes on visitors' ratings of alternative wilderness profiles and the preferred levels of the attributes. For example, the negative coefficients in both regression models on "Number of boats seen per day" suggest that both day and overnight visitors prefer to see fewer boats while visiting the swamp and that as the number of boats seen increases, the ratings of the wilderness setting diminishes. Similarly, the positive coefficients in both regression equations on "A few simple facilities such as existing pit toilets and camping/rest platforms" suggest that the presence of these facilities in the Okefenokee Swamp Wilderness is desirable to both day and overnight visitors.

The t-statistics reported in italics in Table 2 provide insight into the relative importance of the wilderness setting attributes to day and overnight visitors and are suggestive of how

they might prefer to balance tradeoffs associated with Okefenokee Swamp Wilderness management. That is, while the coefficients of the regression models indicate the preferred levels of the wilderness attributes, the t-statistics provide managers with a sense of which wilderness attributes visitors would prefer them to emphasize and which to compromise when multiple wilderness attributes come into conflict (e.g., unrestricted travel itineraries versus few encounters with other boats). The values of the t-statistics suggest that the two most important attributes for both day and overnight visitors to the Okefenokee Swamp Wilderness are the percent of water trails open to motorboats and the number of boats seen per day, and that they prefer lower levels of both. The least important attribute for day visitors is the amount of information provided within the swamp. For overnight visitors, the amount of information provided and the amount of regulation of visitors' travel routes in the swamp are the least important attributes.

The regression models reported in Table 2 were used to estimate the relative support of day and overnight visitors for the status quo and two alternative wilderness management strategies. Profiles of the status quo conditions of the Okefenokee Swamp Wilderness for day and overnight visitors are presented in Table 3. The status quo profiles for day and overnight visitors, which are based on existing management practices and use levels of the wilderness, are similar for the two subgroups, but differ with respect to the number of other boats seen, the amount of use fees charged, and management of travel itineraries. An alternative emphasizing freedom from management was evaluated by setting the management of travel itineraries at its least restrictive level (i.e., "free to enter and travel where you want") and the number of boats seen at 30 boats per day, while holding all other attributes at their status quo levels. An alternative emphasizing solitude was evaluated by setting the management of travel itineraries at its most restrictive level (i.e., "assigned entry, assigned travel route") and the number of boats seen at 0 boats per day, while holding all other attributes at their status quo levels. This analysis is based on the assumption that if travel itineraries were regulated more strictly, the number of encounters among visitor groups would decrease.

Day and overnight visitors' average ratings for the status quo and the two management alternatives were estimated by inserting the appropriate attribute codes into the two regression equations presented in Table 2. For example, the following equations illustrate the method used to calculate day and overnight visitors' average ratings for the status quo. The numbers outside of the parentheses are the regression coefficients and the numbers in parentheses are codes for the status quo levels of the wilderness attributes.

$$\text{Rating}_{\text{day}} = 6.25 + 11(-0.05) + 0(-0.03) + 0.18 + 50(-0.01) + 0.27 + 0.35 = 6.00$$
$$\text{Rating}_{\text{overnight}} = 7.46 + 8(-0.06) + 10(-0.02) + 0.21 + 50(-0.04) + 0.22 + 0.11 = 5.32$$

The preferred alternative for overnight visitors is to maintain the status quo, while day visitors would prefer managers to adopt the solitude-oriented alternative (Figure 2). However, the results of the analysis suggest that neither day nor overnight visitors have a strong preference between the status quo and the solitude-oriented alternative. Overnight visitors, however, are substantially more supportive of the status quo than the freedom-oriented alternative. That is, overnight visitors would prefer managers to continue regulating travel itiner-

Day	Overnight
Visitors see about 11 boats per day.*	Visitors see about 8 boats per day.*
Pit toilets, camping/rest platforms are provided along water routes.	Pit toilets, camping/rest platforms are provided along water routes.
Visitors pay $0 per day to travel water trails.	Visitors pay $10 per day to travel water trails.
About 50% of water trails miles are open to visitors for motorboat use.	About 50% of water trails miles are open to visitors for motorboat use.
Visitors are free to enter and travel the swamp without a permit.	Visitors have an assigned travel route required by permit.
Maps are available for visitors.	Maps are available for visitors.

* Number of boats seen per day was obtained by averaging results from a survey question that asked respondents to indicate the number of other boats they encountered that day.

Table 3. Status quo profiles for day and overnight subgroups.

aries to some degree than to have increased freedom from management but see other boats in the swamp more frequently than they currently do.

Discussion and conclusions

The results of this study suggest that while there are subtle differences between day and overnight visitors' attitudes concerning management of the Okefenokee Swamp Wilderness, they generally agree on which attributes of the wilderness included in this study are most important and the conditions they prefer for those attributes. Both day and overnight visitors rank the number of boats seen per day and the percent of water trails open to motorboats as the most important attributes of the Okefenokee Swamp Wilderness included in this study, and they prefer fewer of both.

Furthermore, estimates of day and overnight visitors' relative support for the status quo, a solitude-oriented management alternative, and a freedom-oriented alternative suggest more similarities than differences between the two visitor subgroups. Results of the tradeoff analysis suggest both day and overnight visitors prefer the status quo and solitude-oriented alternative more or less equally, and are less supportive of the freedom-oriented management alternative. The overnight group, however, was substantially less supportive of the freedom-oriented alternative than day visitors.

The findings from this study suggest that coming to consensus between day and overnight visitors on Okefenokee Swamp Wilderness management may not be as challenging as one would expect. The results of the conjoint analysis can assist managers by identi-

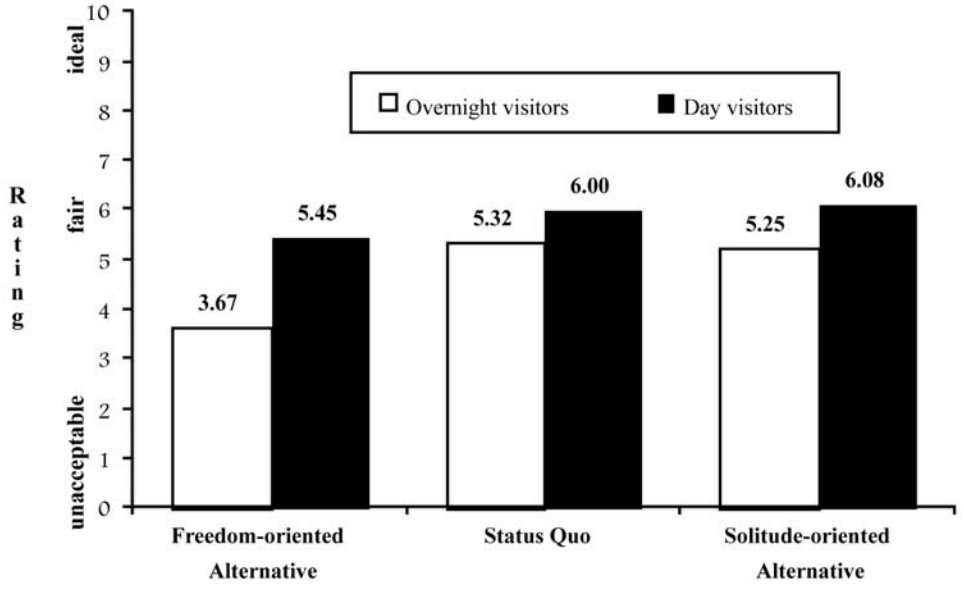

Figure 2. Day and overnight visitor's ratings of three Okefenokee Swamp wilderness management alternatives.

fying common ground between day and overnight visitors and areas where these subgroups differ in their preferences and attitudes for wilderness settings and management alternatives.

While the results of this study suggest that day and overnight visitors have similar attitudes and preferences concerning the attributes of the Okefenokee Swamp Wilderness included in this study, the way the subgroups were defined may be a limitation. In particular, the day and overnight subgroups here are mutually exclusive, but may not be homogeneous subgroups. For example, day visitors may travel through the swamp in a motorized or nonmotorized boat, may be from the local area or have traveled a long distance to get to the swamp, and may be visiting the swamp for the first time or be a repeat visitor. Consequently, differences between day and overnight visitors might be masked by differences within the subgroups as they are defined in this study. Future research should focus on further refining how discrete subgroups are differentiated in studies of visitors' attitudes and preferences concerning outdoor recreation management.

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