

Using Computer Simulation Modeling to Monitor the Multiple Dimensions of Wilderness Solitude in Great Smoky Mountains National Park

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Introduction

The Wilderness Act of 1964 requires that wilderness areas be managed to provide outstanding opportunities for solitude. Perhaps the most commonly used indicator to operationalize the concept of wilderness solitude has been the number of encounters visitors have with other groups (Dawson 2004, Stewart & Cole 2001). Findings from a recent study of wilderness hikers in Shenandoah National Park suggest that there may be multiple dimensions of encounters that influence the extent to which wilderness visitors experience solitude, and that indicators of wilderness solitude might include factors such as the timing and location of encounters (Hall 2001). Indicators of wilderness solitude might also include the number of encounters during different phases of the wilderness trip, for example, “entry”, “immersion”, and “exit” phases (Borrie & Roggenbuck 2001).

Monitoring encounters in wilderness and backcountry recreation areas through on-the-ground observation has proven to be difficult, given that visitor use tends to be dispersed over relatively large, remote areas that typically have multiple access points (Lawson, Itami, Gimblett & Manning, in press). Furthermore, obtaining visitor reported encounters after the fact may not be reliable due to the lack of precision in visitors’ recall process (Watson, Cole, Turner & Reynolds

2000). Using indicators of wilderness solitude that include spatial and temporal dimensions of encounters as described above presents an even greater challenge for monitoring.

Recent research suggests that computer simulation modeling may be a useful tool for monitoring “hard to measure” indicators of quality (Lawson, Manning, Valliere & Wang 2003). Computer simulation models can be developed from relatively easy to obtain information to generate spatially and temporally precise estimates of visitor use and inter-group encounters throughout a dispersed recreation area. The purpose of this study is to explore the potential utility of computer simulation modeling for assisting wilderness and backcountry managers in monitoring multiple dimensions of wilderness solitude. In particular, this study will examine the validity and reliability of computer simulation estimates of wilderness solitude indicators that account for the timing and location of hiking and camping encounters.

The study area is composed of a network of multi-use trails and backcountry campsites in the Cosby and Big Creek areas of Great Smoky Mountains National Park, USA. The Cosby and Big Creek areas are used by day use hikers, day and overnight horseback riders, and backpackers, including Appalachian Trail thru-hikers. Most of the trails and campsites in the study area fall with-

in the boundary of the park's proposed wilderness, which is managed as congressionally designated wilderness (National Park Service 1995).

Methods

Several types of visitor use data will be collected during May 2006 and used as inputs into the computer simulation model developed in this study. Route surveys will be administered to day use hikers and horseback riders at trailheads as they exit the study area to gather information regarding group size, points and time of entry and departure from the study area, travel route, and location and duration of extended stops within the study area. Trip itineraries for overnight visitors, including campsite locations, will be obtained from mandatory backcountry camping permits. Mechanical trail-traffic counters placed at each trailhead in the study area will be used to obtain counts of the number of groups entering the study area per day. Data collectors will walk portions of the trails within the study area with GPS units to gather information used to calculate hiking speeds. Collection of validation data will include the number of other encounters randomly selected people have with other groups recorded through direct observation.

Results

The data described above will be used to develop a computer simulation model of visitor use within the study area. A baseline simulation will be conducted with the model to estimate the current spatial and temporal distribution of day hiking, horseback riding, and backpacking use, as well as the multiple dimensions of inter-group encounters that account for the timing and location of interactions among visitor groups. Comparisons will be made between the results of the baseline simulation with observation data to assess the validity of model outputs. Additional simulations will be conducted to assess the effects of alternative management policies on a range of encounter-related indicators of wilderness solitude. Policy simulations might include tests of the effects of day use trailhead quotas, revised overnight permit quotas, and development of additional trails and/or campsites on indicators of wilderness solitude.

Conclusion

This paper will provide insight into the reliability and validity of computer simulation model estimates of multiple dimensions of inter-group encounters in a backcountry recreation setting. This information will improve park managers' ability to assess the extent to which visitors have opportunities to experience wilderness solitude in the parks' backcountry and proposed wilderness.

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