AN EVALUATION OF APPALACHIAN TRAIL HIKERS' KNOWLEDGE OF MINIMUM IMPACT SKILLS AND PRACTICES

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Abstract: As the number of visitors to national parks and related areas continues to rise and the types of visitors and activities continue to diversify, educating visitors in minimum skills can help to protect parks and related areas. Educating visitors in these skills can be a challenge, especially on the Appalachian Trail (AT) that travels through state, federal, municipal and private lands. This paper examines overall minimum impact knowledge of AT hikers. Study findings will help managers to understand how much visitors know about minimum impact skills and how they can be most effective in educating hikers about minimum impact skills. Study data are drawn from a survey of nearly 2000 AT hikers in the summer and fall of 1999.

Introduction

As the number of visitors to parks and related areas continues to rise, there is increasing concern over the resource and social impacts of outdoor recreation. Research suggests that recreation visitors can significantly impact park resources through compaction and erosion of soils, trampling of vegetation, disturbance of wildlife, and pollution of streams and lakes (Hammitt & Cole, 1998). Moreover, increasing recreation use can also degrade the quality of the recreation experience through crowding and conflicting uses and through aesthetic consequences of the resource impacts noted above (Manning, 1999). Recreation managers are challenged to minimize the resource and social impacts of increasing recreation use.

The outdoor recreation literature suggests that there are a number of practices that might be used to help manage the impacts of recreation use. A conventional system of classifying recreation management practices defines such practices as direct and indirect (Gilbert et al., 1972; Peterson & Lime, 1979). Direct management practices regulate visitor behavior. As such, they limit visitors' freedom of choice in order to accomplish a desired management objective. For example, designated campsites require visitors to camp at specified locations to limit the ecological impacts associated with camping. Indirect management practices attempt to influence visitor behavior without regulating it. As such, they attempt to maintain as much visitor freedom as possible. For example, information can used to educate visitors about how to minimize the impacts of camping.

Both direct and indirect management practices have potential advantages and disadvantages. However, indirect management practices are generally preferred when they can be shown to be effective (Roggenbuck, 1992). From a theoretical standpoint, indirect management practices can be effective in addressing impacts resulting from several types of visitor behavior, including uninformed actions, careless or thoughtless behavior, and unskilled actions (Hendee, 1990). But how effective are visitor information and education programs? More specifically, how knowledgeable are visitors regarding minimum impact skills and practices? This study sought to answer this and related questions as they apply to the hikers on the Appalachian Trail.

Several studies have addressed this issue in a variety of park and related areas (Fazio, 1979; Feldman, 1978; Kernan & Drogan, 1995; Cole et al., 1997; Dowell & McCool, 1986; Jones & McAvoy, 1988; Sieg et al., 1988; Roggenbuck et al., 1992; Echelberger et al., 1978; Burde et al., 1988; Dwyer et al., 1989; Manfredo & Bright, 1991; Stewart et al., 2000; Harding et al., 2000; Cole, 1998; Christensen & Cole, 2000). For example, in a survey of visitors to the Allegheny National Forest, respondents received an average score of 48% on a 12-item true-false minimum impact quiz (Confer et al., 2000). Visitors to the Selway Bitterroot National Forest received an average score of 33% on similar quiz. However, the quizzes developed for these studies did not contain the same items nor did they use the same format.

Study Methods

Study Area

The Appalachian National Scenic Trail (AT) is a unit of the national park system. Established as the first National Scenic Trail by Congress with passage of the National Trails System Act in 1968, the AT is a continuous marked footpath extending approximately 2,160 miles across the Appalachian Mountains from the summit of Springer Mountain in Georgia to the summit of Mount Katahdin in Maine. The AT forms a greenway that connects public land areas in 14 states. These public lands include 8 national forests, 6 units of the national park system, and more than 60 state parks, forests and wildlife areas. The length and complexity of the AT suggest that visitor information and education programs are challenging.

Visitor Survey

The primary study method consisted of a survey of a representative sample of hikers along the AT. The survey addressed a wide-ranging set of issues, but for the purposes of this paper we are interested in matters regarding visitor

knowledge of minimum impact skills and practices. Several study questions were designed to address this and related issues. First, a 10-item "true or false" quiz was designed to test visitor knowledge of minimum impact skills and practices. Items included in this quiz were based on the Leave No Trace program, a formal organization and effort designed to educate outdoor recreation visitors in minimum impact skills and practices. These items were quite similar to the items used in Confer et al. (2000) described earlier. Second, respondents were asked the minimum distance that 1) human wastes should be disposed of from a stream or water source, and 2) campsites should be located from an established trail. Third, respondents were asked where they would seek information on minimum impact skills and practices. Finally, a number of visitor characteristics were measured to assess knowledge levels of selected types of visitors.

A detailed sampling plan was designed based on geographic divisions of the trail. For purposes of management, the AT is divided into four geographic regions – New England, Mid-Atlantic, Southwest Virginia, and the Deep South. To facilitate a more detailed sampling plan, the trail was further divided into twenty-two relatively homogeneous geographic segments based on physical features, park and wilderness boundaries, and volunteer hiking club jurisdictions. The regional divisions used in the sampling plan are shown in Table 1.

Table 1. Geographic/Administrative Divisions of the Appalachian Trail Study

New England	Mid- Atlantic	Southwest VA	Deep South
1. Baxter St. Park	10. New York	15. Blue Ridge Parkway	19. North of Smokies-Pisgah / Cherokee NF
2. 100 Mile Wilderness	11. New Jersey	16. Outing Club of VA Tech	20. Smoky Mtns.
3. Western Maine	12. Pennsylvania	17. Catawba	21. NC-Nantahala NF
4. NH-Mahoosucs	13. Maryland	18. Mount Rogers	22. Georgia
5. NH-White Mtns.	14. Shenandoah		
6. NH-South			
7. Vermont			
8. Massachusetts			
9. Connecticut			

Sampling was conducted by a combination of employees, volunteers of local trail-maintaining clubs and the ATC, and staff hired specifically for this study. Sampling consisted of approaching randomly selected AT visitors, briefly explaining the study, and asking if visitors would be willing to participate in the study by providing their name and address and completing a mail-back questionnaire at the completion of their visit. Sampling was designed to yield approximately 100 completed questionnaires for each of the twenty-two trail segments. In addition, thru hikers (visitors hiking the entire trail in one calendar year) were purposively sampled in Baxter State Park, Maine to insure that a large enough sample of this type of hiker was obtained for analysis purposes. The sampling plan was implemented in the summer and fall of 1999. A total of 2,847 AT visitors agreed to participate in the study and were mailed a questionnaire, cover letter, and postage-paid, self-addressed return envelope shortly after their visit. One week after the initial mailing, visitors were mailed a postcard thanking them for their participation and reminding them to complete and return the questionnaire. Visitors who did not return a completed questionnaire within three weeks of the initial mailing were mailed a second questionnaire, cover letter, and postage-paid, self-addressed return envelope. Finally, at the completion of the sampling period, all non-respondents were mailed a final copy of the questionnaire, cover letter, and postage-paid, self-addressed return envelope.

This sampling procedure yielded 1,879 completed questionnaires representing a 66 percent response rate. The majority of completed questionnaires (84 percent) were obtained from summer visitors, while the remaining questionnaires (16 percent) were obtained from fall visitors.

Study Findings

Knowledge of Minimum Impact Skills and Practices

Study findings for the 10-item quiz of minimum impact skills and practices are shown in Table 2. Correct answers were coded as a 10 and incorrect answers were coded as a 0, and overall mean scores are reported on a percentage basis that ranges from a possible high of 100% to a possible low of 0%. The overall mean score of all AT hikers was 82%. This varied from a high of 86% for thru-hikers to a low of 78% for day hikers.

Scores varied substantially on individual items. Over 90% of respondents knew that 1) use should be concentrated in obviously impacted areas, 2) all terrain vehicles are not allowed on the AT, 3) mountain bikes are not allowed on the AT, 4) it is best to travel on existing trails and walk singe file, and 5) hikers should not collect plants and rocks along the AT. Between 73% and 83% of respondents knew that 1) the same rules do not apply to the entire AT, 2) when encountering a horse party, you should wait until the horses have come to stop and then move quickly past them, and 3) building temporary fire rings by moving rocks and logs at your campsite in not an accepted low impact behavior. Only 66% of respondents knew that one should not camp next to a stream. And only 48% of respondents knew that when hiking in a lightly used location, it is best to camp on a site with no evidence of previous use.

Table 2. Percentage of Visitors Who Answered Questions Correctly

Minimum Impact quiz questions and answers			Day Hikers	Overnight Hikers	Section Hikers	Thru Hikers	All Hikers
True	**False**	When selecting a campsite in obviously impacted areas you should spread activities to places that have not been disturbed.	91	90	87	90	90
True	**False**	The same rules and regulations apply to the entire Appalachian Trail.	67	71	75	87	73
True	**False**	When hiking and encountering a horse party you should wait until the horses have come to a stop and then move quickly past them.	69	76	73	74	73
True	False	I cannot ride my mountain bike on the Appalachian Trail, because it is not allowed.	86	87	95	97	90
True	False	While backpacking, you should never camp next to a stream.	64	73	64	60	66
True	**False**	If I wanted to ride my All Terrain Vehicle on the A.T. I could do so as long as I stay on the trail.	100	99	100	99	100
True	False	When hiking in remote, lightly used locations it is best to camp on a site with no evidence of previous use to minimize your impact on the wilderness environment.	37	47	49	73	48
True	**False**	Building temporary fire rings by moving rocks and logs at your campsite is an accepted low-impact behavior.	73	87	90	92	83
True	False	When traveling on existing trails it is best to walk single file and stay on the main path to minimize impact.	99	99	99	99	99
True	False	Hikers should not collect plants and rocks along the Appalachian Trail.	97	98	99	97	97
Mean			**78**	**83**	**83**	**86**	**82**

Respondent scores on the minimum distances questions also varied (Table 3). Knowledge was quite high (mean score of 87%) on the question concerning the minimum distance that human wastes should be disposed of from streams and water sources. However, knowledge was considerably lower (mean score of 63%) on the question concerning the minimum distance campsites should be located from established trails.

Table 3. Overall Percentage of Visitors Who Answered Distance Questions Correctly

		% Reporting > 100 feet				
Correct Answer	**According to accepted minimum impact practices for the AT:**	**Day Hikers**	**Overnight Hikers**	**Section Hikers**	**Thru Hikers**	**All Hikers**
>100 feet	a. How far from a stream or water source (in feet) should you dispose of human wastes?	76	91	92	97	87
>100 feet	b. How far from an established trail (in feet) should you camp?	49	69	71	74	63

Sources of Minimum Impact Information

The survey also asked visitors where they would seek information on minimum impact or LNT skills and practices. Findings from this question might help managers more effectively disseminate information on minimum impact skills and practices to AT hikers. Findings are shown in Table 4. Books and magazines (43%), trail clubs/organizations (23%), and visitor centers/ranger stations (22%) were the most frequently reported sources. Rangers/volunteers (16%) and the internet (15%) constituted a second tier of sources.

Table 4. Percentage of Visitors Who Reported That They Would Obtain Information on Low-impact Backpacking from the Sources Listed

Information Source	% of hikers who would obtain information from source
Sporting Goods Stores	7
Newspapers	2
Books and Magazines	43
Brochures	12
Trailhead and Signs	9
Ranger or Volunteer	16
Visitor Center/ Ranger Station	22
The Internet	15
Audio or Video	1
Trail Clubs/ Organizations	23

Certain information sources were more popular for some groups than others. For example, day and overnight hikers reported that they would seek information on minimum impact skills and practices from books and magazines more often than would section and thru hikers.

Who Are the Most Knowledgeable Hikers?

The survey also collected information on a variety of hiker characteristics, including gender, race, education level, income, occupation, and residence (urban, rural). As noted above, hikers were classified by type (day, overnight, section, and thru) and by trail region. Statistical tests were conducted to test for differences in knowledge of minimum impact skills and practices by these hiker characteristics. Very few statistically significant differences were found, with most differences related to hiker type and region of the trail. For example, 68% of respondents from the northern regions of the trail knew that they should camp at least 100 feet from an established trail compared to less than 50% of respondents from the southern regions of the trail. Respondents from the southern regions also scored lower (72%) than respondents from the northern regions (87%) on the questions concerning construction of temporary fire rings.

Conclusions

Information and education represent attractive management practices that can potentially reduce the ecological and social impacts of recreation while maintaining visitor freedom of choice. However, effective dissemination of information and education can be challenging, especially on the AT where visitors are widely distributed across more than 2000 miles of trail and among multiple management agencies and organizations. However, our study indicates that most hikers on the AT are relatively well-informed about a variety of minimum impact skills and practices, especially when compared to visitors in other similar studies. The average score on the 10-item quiz administered to a representative sample of hikers along the trail was 82%. This is substantially higher than similar studies administered elsewhere (e.g., Confer et al., 2000; Cole et al., 1997). This may suggest that hiker information and education programs are becoming more effective.

Despite the generally high knowledge levels of AT hikers, study findings may suggest several strategies that can continue to enhance the effectiveness of information and education programs. For example, additional emphasis might be placed on the need to disperse camping in lightly used areas and the need to camp at least 100 feet from an established trail. Books and magazines, visitor centers and ranger stations, and trail clubs may be the most effective sources of information on minimum impact skills and practices. Day use hikers and hikers in the southern regions of the AT may be especially important targets for additional information and education on minimum impact skills and practices.

Literature Cited

Burde, J., Peine, J., Renfro,J., & Curran, K. (1988). Communicating with park visitors: Some successes and failures at Great Smokey Mountains National Park (Monograph, pp. 7-12). National Association of Interpretation.

Christensen, N. A., & Cole, D. N. (2000). Leave no trace practices: Behaviors and preferences of wilderness visitors regarding use of cookstoves and camping away from lakes. In D. Cole & S. McCool (Eds.), Proceedings from the National Wilderness Science Conference, A Time of Change (Gen. Tech. Rep. RMRS-P-15-VOL-4). U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Cole, D. N. (1998, Spring). Written appeals for attention to low impact messages on wilderness trailside bulletin boards: Experimental evaluations of effectiveness. Journal of Park and Recreation Administration, 65-79.

Cole, D. N., Hammond, T., & McCool, S. F. (1997). Information quantity and communication effectiveness: Low-impact messages on wilderness trailside bulletin boards. Leisure Sciences, 19, 59-72.

Cole, D. N. (1989). Low impact recreational practices for wilderness and backcountry (Gen. Tech. Rep. INT-265). USDA, Forest Service, Intermountain Research Center.

Confer, J. J., Mowen, A. J., Graefe, A. R., & Absher, J. D. (2000). Magazines as wilderness information sources: Assessing user's general wilderness knowledge and specific Leave No Trace knowledge. In D. Cole & S. McCool (Eds.), Proceedings from the National Wilderness Science Conference, A Time of Change (Gen. Tech. Rep. RMRS-P-15-VOL-4). U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Dowell, D., & McCool, S. (1986). Evaluation of a wilderness information dissemination program. Proceedings - National Wilderness Research Conference: Current Research (Gen. Tech. Rep. INT-212, pp. 494-500). USDA, Forest Service.

Dwyer, W., Huffman, M., & Jarratt, L. (1989). A comparison of strategies for gaining compliance with campground regulations. Journal of Park and Recreation Administration, 7, 21-30.

Echelberger, H., & Moeller, G. (1978). Use and users of the Cranberry Back-country in West Virginia: Insights for eastern backcountry management (Research Paper NE-363). USDA, Forest Service.

Fazio, J. (1979). Communicating with the wilderness user (Wildlife and Range Science Bulletin No. 28). Moscow, ID: University of Idaho College of Forestry.

Feldman, R. (1978). Effectiveness of audio-visual media for interpretation to recreating motorists. Journal of Interpretation, 3, 14-19

Gilbert, C. G., Peterson, G. L., & Lime, D. W. (1972). Toward a model of travel behavior: Behavior in the Boundary Waters Canoe Area. Environment and Behavior, 4, 131-157.

Hammitt, W., & Cole, D. N. (1998). Wildland recreation: Ecology and management. New York: John Wiley & Sons.

Harding, J.A., Borrie, W. T., & Cole, D. N. (2000). Factors that limit compliance with low impact recommendations. In D. Cole & S. McCool (Eds.), Proceedings from the National Wilderness Science Conference, A Time of Change (Gen. Tech. Rep. RMRS-P-15-VOL-4). U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Hendee, J., Stankey, G., & Lucas, R.C. (1990). Wilderness management. Golden, CO: North American Press.

Jones, P., & McAvoy, L. (1988). An evaluation of wilderness user education program: A cognitive and behavioral analysis (Research Monograph, pp. 13-20). National Association of Interpretation.

Kernan, A., & Drogin, E. (1995). The effect of a verbal interpretive message on day user impacts at Mount Ranier National Park. In Proceedings of the 1994 Northeastern Recreation Research Symposium (Gen. Tech. Rep. NE-198, pp. 127-129). USDA, Forest Service.

Manning, R. E. (1999). Studies in outdoor recreation: Search and research for satisfaction (2nd ed.). Oregon State University Press.

Manfredo, M., & Bright, A. (1991). A model for assessing the effects of communication of recreationists. Journal of Leisure Research, 23, 1-20.

Peterson, G., & Lime, D. (1979). People and their behavior: A challenge for recreation management. Journal of Forestry, 77, 343-346.

Roggenbuck. J. (1992). Use of persuasion to reduce resource impacts and visitor conflicts. In Influencing human behavior: Theory and applications in recreation, tourism and natural resources (pp. 149-208). Champaign, IL: Sagamore Publishing.

Seig, G., Roggenbuck, J., & Bobinski, C. (1988). The effectiveness of commercial river guides as interpreters. In Proceedings of the 1987 Southeastern Recreation Research Conference (pp. 12-20). Athens, GA: University of Georgia.

Stewart, W., Cole. D. N., Manning, R. E., Valiere, W., Taylor, J., & Lee, M. (2000). Preparing for a day hike at Grand Canyon: What information is useful? In D. Cole & S. McCool (Eds.), Proceedings from the National Wilderness Science Conference, A Time of Change (Gen. Tech. Rep. RMRS-P-15-VOL-4). U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.