

Magazines as Wilderness Information Sources: Assessing Users' General Wilderness Knowledge and Specific Leave No Trace Knowledge

John J. Confer
Andrew J. Mowen
Alan R. Graefe
James D. Absher

Abstract—The *Leave No Trace* (LNT) educational program has the potential to provide wilderness users with useful minimum impact information. For LNT to be effective, managers need to understand who is most/least aware of minimum impact practices and how to expose users to LNT messages. This study examined LNT knowledge among various user groups at an Eastern wilderness area and assessed which types of magazines they read on a regular basis. Findings indicate that readers of outdoor recreation (consumptive) and equine sports magazines had lower LNT scores than did readers of outdoor recreation (nonconsumptive) and environmental magazines. The implications of placing LNT messages in “offsite” publications are examined.

Social and ecological impacts continue to be a major concern among wildland resource managers (Hammit and Cole 1987; Hendee and others 1990). Such impacts have been associated with ecological degradation in many pristine areas (Hammit and Cole 1987). Altering use patterns and/or changing user behavior are major goals for the many management activities designed to minimize these undesirable impacts (Manfredo 1992). Existing wilderness management literature such as Roggenbuck (1992) encourages the use of indirect strategies (such as education) to change user behaviors over the use of direct management strategies (such as regulation and/or enforcement).

Although there have been many informal educational initiatives over the years, only recently have concerted efforts focused on an accepted set of accepted minimum impact practices. These efforts have produced formalized educational programs emphasizing minimum impact practices. One of these programs, LNT, seems poised to become a viable program to disseminate practical user information

about appropriate backcountry camping and activity behaviors (Monz and others 1994). According to Barnes and Krumpe (1995), formal educational campaigns and programs such as LNT have gained popularity among managers and the general public. For example, in 1995, LNT was ranked 6th in terms of important wilderness management topics up ten spots from its 1983 rank of 16th.

The mission of the LNT program is to promote and inspire responsible outdoor recreation through education, research and partnership. It involves the cooperation of many state and federal natural resource agencies, as well as nonprofit environmental organizations and corporate partners. The program is designed to disseminate accepted minimum impact practices at the grassroots level and to encourage common sense, context-specific decision-making rather than dogmatic adherence to rigid standards. The revised LNT principles as cited by the National Outdoor Leadership School (1999) instruct recreationists to:

1. Plan ahead and prepare.
2. Travel and camp on durable surfaces.
3. Dispose of waste properly.
4. Leave what you find.
5. Minimize campfire impacts.
6. Respect wildlife.
7. Be considerate of other visitors.

Research on user knowledge of minimum impact practices and subsequent behavioral change is sparse but growing. For example, Cole and others (1997) examined how effectively trailside bulletin boards influence knowledge of low-impact practices. While these authors did not specifically focus on LNT practices, they did find that exposure to suggestions for minimum impact behaviors (similar to LNT practices) led to increased low-impact knowledge. However, these authors discovered that not all user groups gave the onsite messages equal attention. They found that although 71% of hikers stopped and looked at the messages, only 27% of horse users stopped. Moreover, hikers attended to messages for a longer time period than horse users (22 seconds vs. 14 seconds). A subsequent study by Cole (1998) involved the placement of written appeals for attention to the minimum impact messages. These written appeals appeared to affect the length of attention given to the minimum impact messages; average attention time was higher than that for messages without written appeals and for the previous trail bulletin study (Cole 1998).

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John J. Confer is Assistant professor, Department of Recreation, Parks, and Tourism, University of Florida, P.O. Box 118209, Gainesville, FL 32611 U.S.A. Andrew J. Mowen is Manager of Research and Program Evaluation, Cleveland Metroparks, 4101 Fulton Parkway, Cleveland, OH 44144 U.S.A. Alan R. Graefe is Associate Professor of Leisure Studies, School of Hotel, Restaurant and Recreation management, The Pennsylvania State University, University Park, PA 16802 U.S.A. James D. Absher is Research Social Scientist, USDA Forest Service, PSW Research Station, 4955 Canyon Crest Drive, Riverside, CA 92507 U.S.A.

These findings are consistent with the review conducted by Vander Stoep and Roggenbuck (1995) who indicated that the effectiveness of different sources, messages, channels can vary widely across diverse user groups. Hence, there is a need to understand the specific user group that the message is targeted to and apply the appropriate educational intervention. The general consensus is that, in terms of source and channel, onsite personal contacts tend to be the most effective at influencing subsequent behavior (Vander Stoep and Roggenbuck 1995).

However, there may still be justification for communicating minimum impact practices in offsite, non-personal settings. For example, Cole (1998) said that because a large number of users will not interrupt their recreation activity to read trailside messages, other means of communication are needed. These other communication tools can include offsite communications such as special events, outreach programs and media spots (radio, television, print) used in concert with onsite methods such as signage, brochures and ranger contacts. Vander Stoep & Roggenbuck (1995) indicated that providing educational messages to recreationists before they actually visit a setting allows the visitor adequate planning time to implement the desired behavior. Vander Stoep & Roggenbuck (1995) also suggest that outreach communications can serve as a reminder to reinforce onsite educational messages and to enhance long-term awareness and adoption of behaviors.

There are several tiers to educational programming ranging from the site-specific level (where the resource manager has the most direct control to cater the message to specific user groups) to the national level (where agency and organization administrators determine policies and basic educational principles). Often, communicators are concerned not only with how well a message is received by a target group, but also by how many people are exposed to and attend to a message. Each level of communication may involve also messages with slightly different educational goals (i.e., awareness of an educational program, awareness of appropriate actions at a specific wilderness) and varying sources which best serve to deliver the message. Assael (1995) has indicated that prior exposure to a message can stimulate subsequent message recognition and comprehension when faced with a repeat exposure to the message. The implication here is that, if offsite communications places the LNT in a visitor's memory, their attention and comprehension of the message can then be reactivated when they see the message onsite.

The *Leave No Trace* organization has suggested that, to become a truly national educational program, communications must branch out beyond the use of pamphlets, brochures, onsite signage and training curricula. There is a great need for print media attention, outdoor product manufacturer involvement, and televised media attention (National Outdoor Leadership School, 1999). Simmons Market Research, a nationwide secondary data source, has also indicated that 75 - 86% of all outdoor recreationists read popular magazines (Simmons Market Research Bureau, 1994). As such, magazines can also serve as a viable platform to communicate basic information about the LNT program. Both national and regional magazines can serve to support the more in-depth onsite information being disseminated at trail heads and during personal onsite agency-visitor contacts.

However, accessing adequate magazine space can be an expensive proposition for agencies and organizations who wish to disseminate the LNT message to a broader audience. Leaders of the LNT and other wilderness education program will have to place these messages in magazines where they will make the most impact (i.e., communicate the message to those who have not heard about it or who are less aware about specific components of the program). As such, it would be helpful to understand who has a lower level of LNT knowledge and what kinds of magazines do they read. Answers to this question will help guide administrators at the nationwide level to select types of magazines for communicating LNT.

This paper seeks to expand upon the state-of-knowledge developed through the efforts of Cole and others by examining: (1) LNT knowledge among various constituents or user groups, (2) where those groups get their information about wilderness, and (3) what kinds of types of magazines these groups are likely to read. User groups with lower LNT knowledge who do not respond to onsite communications or who never get exposed to them may be reached through offsite messages placed in popular magazines if their magazine choices were known. Findings of this study should assist LNT partners and administrators as they target their messages to specific recreation audiences in specific, nontraditional message outlets. A wider constituency could then be exposed to and made aware of the program and its messages.

Methods

This study used a combination of onsite and mail surveys. The overall study area was the Hickory Creek Wilderness and Hearts Content Recreation Area in the Allegheny National Forest, located in northwestern Pennsylvania. The Hickory Creek Wilderness is one of only two congressionally designated units of the National Wilderness Preservation System (NWPS) in Pennsylvania, Ohio, New York, New Jersey and Maryland. This Wilderness encompasses 8,663 acres and contains one designated trail. Its proximity to Cleveland and Pittsburgh urban areas combined with its proximity to other front country developed recreation opportunities make it a conveniently situated urban-proximate wilderness area. Managers at this area have been observing increased site impacts as a result of improper use of facilities and resources. However, since its inclusion in the NWPS, there have been few public education or information programs developed or implemented at this site. As a result, a study was undertaken to understand and refine the effectiveness of USDA Forest Service communications and to provide generalized guidance for the development of a site-specific education plan to reduce negative visitor impacts.

While the goal of the overall study was to identify gaps in visitor knowledge, the specific objective of this research was to: (1) examine whether defined user groups had different levels of LNT knowledge and, if they did, (2) understand what kinds of magazines various user groups were most likely to read. If managers knew that certain user groups had low awareness or knowledge levels and if they knew which mass communication outlets this group utilized, they may be able to more efficiently communicate the LNT program to users who are less aware of LNT practices or who are hard to reach with an onsite communication effort.

Mass communication outlets such as magazines are an important channel to integrate into the LNT communication effort because they can also serve as a starting point to help make users aware of a national educational campaign. In other words, they can be used as a platform to help the user become aware of LNT, its logo, and its basic purpose. Follow-up messages onsite and in regional resources may then be used to build upon this basic message with more site-specific information. The LNT program is aware of this role and has several partnerships established with several of the more popular outdoor magazines. The question is whether these partner magazines draw readership from people who are already knowledgeable about the program and its message. If so, partnerships with magazines with that attract readership about less knowledgeable recreationists may be considered.

A combination of survey methods were used to collect the necessary data of this study. Hearts Content Campground, Hearts Content Scenic Area and Hickory Creek Wilderness Area users were contacted onsite during the summer season (May 25 - Sept. 14) using a two-page personal interview survey methodology with a longer, eight page follow-up mail survey sent respondents who agreed to participate. This methodology reduced the burden on the user while maximizing response rate on the follow-up mailings. Adjacent landowners, equestrian users, other users and other stakeholders that might have been missed in the onsite survey were also sampled through a mail survey methodology. A modified Dillman (1978) approach was used for all mail surveys used in this study. The additional groups receiving a mail survey were identified as:

1. Landowners from a random sample of surrounding landowners from the tax roles acquired from the assessor's office in the two counties, Warren and Forest, adjacent to the study area.
2. Equestrian users were identified from a list of attendees to an equestrian management issues meeting held by the USDA Forest Service the previous year.
3. Additional Wilderness users and stakeholders including hunting and fishing clubs; fire, ambulance, search and rescue associations; scouting groups; wilderness guides and outfitters were obtained from a list of individuals who signed the HCT trail register.

User groups were divided into the following five groups based upon their response to a classification question or from the type of sample: Wilderness Users, Scenic Area Users, Campground Users, Horse Users, and Landowners. The classification question identified users as Wilderness users, scenic area users, or campground users. This classification was based on their answer to the following question, "Which of the following reasons best describes your purpose for visiting this area: to visit the Hickory Creek Wilderness, to visit the Hearts Content Scenic Area, or to camp in the Hearts Content campground?" Of the other user groups, Horse Users were selected from public involvement meetings, Landowners from tax rolls, and additional Wilderness users from trail registers. Each of these groups were asked to: (1) list the number and title of magazines that they regularly read (up to five magazines) and (2) to complete a brief twelve item LNT quiz. This quiz was an adaptation of the one administered by Cole and others (1997), except that some site-specific questions (such as all-terrain vehicle use)

were added. Descriptive analyses (frequencies, means), chi-square analyses, and F-tests were the statistical tests used in this research.

Results

The onsite survey of wilderness users yielded a 99% onsite response rate for visitors (N = 269) and its follow-up mail survey yielded a 61% response rate (N = 155). The mail surveys distributed to the additional groups (landowners, equestrian users, and other stakeholders) yielded a 46% response rate (N = 371). Respondents across all user groups indicated that ranger contacts, brochures and trailhead signs were their primary sources of wilderness information (60%, 46% and 40% reporting that they used these resources, respectively). When focusing on offsite, nontraditional outlets, the Internet and magazines were cited as primary sources of information (60% and 29%, respectively). When asked to list magazines that they read on a regular basis, *Backpacker*, *Pennsylvania Game News*, and *Outdoor Life* received the most frequent mention out of a total of 350 different magazine titles cited. Landowners cited the most magazines and campground users the fewest (F = 15.87, p = 0.000) (table 1).

Based on this list of 330 identified magazines identified, a post-facto classification procedure was then conducted by the authors. The authors examined and classified magazines according to purpose, coverage and theme. From these discussions and from using content analysis classification procedures developed in other research (Carlson, Grove and Kangun 1993), a set of meaningful magazine categories was generated based on topic, activity and interest type. Readership of magazine type was not mutually exclusive by user type, but an additional analysis of the data indicated that certain titles of magazines were predominately read by campers, horse users, and backcountry users. Even so, any conclusions and recommendations from this study should be made with this classification issue in mind.

Wilderness users most frequently cited the outdoor recreation (nonconsumptive) magazines as those that they regularly read. Surrounding landowners cited the outdoor recreation (consumptive); scenic area users, the environment; campers, general interest; and, not surprisingly, horse users overwhelmingly read equine sports magazines (table 2). When focusing on readers of the outdoor recreation (non consumptive) magazines (a high proportion of which were defined as wilderness users), results indicated that these readers tended to be the most knowledgeable about general

Table 1—Number of magazines read by user type.

Type of user group	Average number of Magazines ^a	N
Wilderness users	1.8	183
Scenic area users	1.3	62
Campground users	1.1	108
Horse users	2.2	99
Surrounding landowners	2.6	178
All Users	1.9	630

^aF = 15.87, p = 0.000.

Table 2—Magazine readership by user type.

Magazine type	Wilderness users	Scenic area users	Campground users	Horse users	Land owners
	-----percent-----				
Outdoor recreation (nonconsumptive), N = 296	53	5	16	3	23
Outdoor recreation (consumptive), N = 96	15	2	9	12	61
Environmental/conservation, N = 173	39	19	10	8	23
General news/business, N = 109	29	8	15	9	39
General recreation and fitness, N = 92	34	9	11	13	33
Home and domestic, N = 80	21	8	6	24	41
General interest and entertainment, N = 74	22	8	16	15	39
Equine Sports (N = 132)	4	0	1	84	11
Other/unknown, N = 118	20	5	5	26	44
All respondents, N = 630	29	10	17	16	28
	(N = 122)	(N = 26)	(N = 46)	(N = 83)	(N = 144)

forest information. For example, they were the most likely to name the correct agency responsible for management of the area (86% correctly identified the USDA Forest Service). They were also the most likely to correctly identify the area as part of a National Wilderness Preservation System (82% said that the area was part of NWPS).

Next, user groups were quizzed on their knowledge of LNT practices via a brief battery of true/false questions concerning minimum impact practices and behaviors (table 3). Overall scores indicated that users were more aware of LNT practices on this 12-item quiz, with an average score of 48%, compared with Cole and others (1997) eight-item multiple-choice quiz, with an average score of 33%. However, readers are cautioned that not all quiz items were the same, nor were they presented in the same format. As

Table 3—Leave No Trace quiz items.

True or 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.
- When camping in obviously impacted areas, you should spread activities to places that have not been disturbed.
- I do not need a permit to spend the night in the Hickory Creek Wilderness.
- I cannot ride my mountain bike in the Wilderness, because it is not allowed.
- If I wanted to ride my ATV in the wilderness, I could do so as long as I stay on the trails.
- When hiking in remote, lightly used locations of the Hickory Creek Wilderness, it is best to camp on a site with no evidence of previous use to minimize your impact on the wilderness environment.
- Building temporary benches by moving rocks and logs at your campsite is an accepted low-impact behavior.
- When traveling on existing trails, it is best to walk single file and stay on the main path to minimize impact.
- In the Hickory Creek Wilderness, it is OK to camp in direct view of the trail because the area is so small.
- In the Wilderness, you should never camp next to a stream.
- When camping in the Hickory Creek Wilderness, how far from a stream or water source (in feet) should you camp? _____ Feet.
- When camping in the Hickory Creek Wilderness, how far from an established trail (in feet) should you camp? _____ Feet.

a result, differences between these two tests may also be a result of the instrument utilized. Readers of the outdoor recreation (nonconsumptive) magazines again demonstrated their wilderness knowledge and awareness with a high proportion (56%) of passing scores (60% or more). However, fewer people from other readership categories received a passing score (only 14% of equine sports magazine readers answered 60% or more correctly) (table 4). Comparisons of LNT scores by the type of user were similar, as wilderness users scored higher (62% score) than landowners and horse users (7% and 13% respectively) (table 5).

Table 4—Leave No Trace quiz results by magazine type.

Magazine type	Number ^a	Pass % ^b	Mean score ^c
Nonconsumptive	107	56%	6.9
Consumptive	102	32%	5.7
Environmental	66	45%	6.5
General recreation	23	27%	6.0
General news	36	33%	6.6
Home/domestic	27	35%	5.7
General interest	17	24%	5.2
Equine sports	14	14%	4.2
Other/unknown	25	24%	5.0
All respondents	141	33%	5.8

^a Number of people citing this type of magazine as one that they read.
^b60% = Passing score, $p = 0.006$, Chi-square = 7.50.
^c $p = 0.001$, $F = 6.76$.

Table 5—Leave No Trace quiz results by user type.

User type	N	Pass % ^a	Mean score ^b
Wilderness users	89	62%	7.7
Scenic Area users	11	37%	6.8
Campground users	34	58%	7.8
Horse users	7	7%	3.6
Landowners	23	13%	4.7
All respondents	164	33%	5.8

^a60% = Passing score, $p = 0.000$, Chi-square = 132.99.
^b $p = 0.000$, $F = 53.72$.

Discussion and Implications

Study findings indicate that readership in offsite communications, such as magazines is associated with varying LNT knowledge levels across user groups. Group comparisons show that wilderness users tended to read outdoor recreation (non-consumptive) magazines (such as, Backpacker and Outside). Given that these readers already had high knowledge and awareness of minimum impact practices, promotional efforts should concentrate on other magazines read by groups who are less involved with and knowledgeable about appropriate behaviors. While it may not be fitting to communicate LNT messages in general interest, home and domestic, and general news magazines, managers may reach a substantial portion of users by using outdoor recreation (consumptive) and equine sport magazines as a communication platform. These magazines attract advertisers whose products are used in the outdoors and who are (or should be) interested in minimizing the impacts of their products on the environment. Such companies could serve as partners in a social marketing campaign designed to communicate the LNT message. In fact, another site-impact campaign, *Tread Lightly!*, has already placed its messages in ATV manufacturer advertisements placed in such magazines (Mowen 1998). Many of the outdoor recreation (consumptive) magazines also have special regional sections. Given that the present study occurred in an Eastern wilderness area, the LNT program could place context specific information in the Eastern supplemental sections of these magazines.

The findings of this study indicated that equine users tended to have lower LNT knowledge levels. This is consistent with the research of Cole and others who found that horse users attended to messages less and had lower knowledge scores. There may be several explanations for this finding.

First, the nature of the LNT questions could be too broadly defined or not relevant for all user groups. A follow-up analysis of this sample indicated that horse users were least likely to cross over into other activities. As a result, it is possible that only LNT practices that affected horse users would catch the attention of this user group. Conversely, it is also possible that those who exclusively hike would probably be unaware of the minimum impact issues related to stock in the backcountry. Perhaps future comparisons of LNT knowledge levels across user groups could incorporate and combine *activity specific* questions with the general knowledge questions.

Second, horse users, as defined in this study, may also not be wilderness users and as a result may not be expected to have higher LNT scores exhibited by hikers who were regular users of the area and other wilderness areas. Third, onsite information currently used to promote LNT may be inadequate to communicate to equine users because the activity of horse riding may make it difficult to read onsite trail messages (Cole 1998). Offsite communications in equine magazines would help relay LNT messages, and, if such messages came from horse users themselves (persuasion through source effects) or if the content of the educational piece was keyed to horse use (persuasion through message effects), the persuasive effectiveness of the knowledge-behavior link might be strengthened. The horse users in this study almost always cited equine magazines as their first magazine and, in many cases, as the only type of magazine that they read. Therefore, any effort to build LNT awareness, knowledge and potential behavior among horse

users should emphasize such magazines as a communication platform.

Given that advertising rates can be cost-prohibitive for many natural resource agencies, LNT communications should be targeted toward specific user groups with low awareness and knowledge. This study found that readers of outdoor recreation (consumptive) and equine sports magazines had the lowest LNT scores, while readers of outdoor recreation (nonconsumptive) and environmental magazines had the highest LNT scores. Assuming that the highest scores found are acceptable to managers, efforts to concentrate communications in outdoor recreation (consumptive) and equine sports magazines should be pursued to make the LNT message available to a broader recreation clientele. Certainly, such offsite communications should be used to supplement, not supplant existing onsite signage, workshops and ranger contacts.

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