Editor's Note:

I am pleased to report that articles appearing in the Journal of Interpretation Research will now be abstracted in ERIC's Current Index to Journals in Education. This abstracting service will make it easier for students, teachers, scientists, and practitioners to learn about articles published in the Journal of Interpretation Research. This is an important step in increasing the visibility of JIR and, more importantly, the visibility of the authors who contribute to the journal. I want to thank one of our associate editors, Dr. Rob Bixler, for providing leadership in this effort to become part of the ERIC system.

Ted T. Cable
Editor

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NEW MODEL FOR ECOSYSTEM MANAGEMENT INTERPRETATION: TARGET AUDIENCES ON MILITARY LANDS

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Abstract:
New interpretation models are necessary to address the human dimensions of ecosystem management goals. A model focusing on audience characteristics guided the development of an ecosystem management interpretive program targeting military leaders and planners at Eglin Air Force Base in northwest Florida. Interpretive objectives and content areas were established with input from natural resource managers and data from baseline surveys of military decision makers. Key content areas for the interpretive program were (a) native and endangered species, (b) fire ecology, (c) ecosystems, and (d) forest resources and habitats. Interpretive media tested included print mass media, a color poster, golf course signs, a series of color brochures with a participatory component, and a video. Evaluative surveys showed significantly improved knowledge and attitudes in several content areas despite a high turnover of individuals in the target populations. Mass media were the most successful interpretive approach tested, resulting in increased knowledge and enhanced attitudes for both leaders and planners. Interpretive signs on the Eglin AFB golf course, targeting military leaders who reported golf as their main outdoor activity, were successful in improving knowledge of ecosystems and attitudes toward prescribed fire. Audience monitoring provides continued feedback for the interpretive program. These findings suggest that a model of interpretation focusing on audience attributes rather than site characteristics is useful for designing effective programs.

Keywords:
Interpretation, ecosystem management, nonformal environmental education, evaluation, military lands, natural resource management, media.

Note: Accepted September 1998. The authors are grateful for the collaboration of the Eglin Air
INTRODUCTION

In recent years, the Department of Defense (DOD), the fifth largest public land manager in the United States, has enhanced efforts to protect military lands, not only to continue training and testing missions but also for future generations (Siehl, 1991). The 1993 Natural Resources Management Plan (NRMP) for Eglin Air Force Base in northwest Florida changed the management focus for the half-million-acre military reserve to an ecosystem management approach (U.S. Air Force, 1993). The DOD has subsequently shifted the direction of stewardship on all military bases to ecosystem management.

Ecosystem management is defined as a management approach that combines scientific knowledge with social values toward the long-term goal of maintaining and protecting native biodiversity (Bengston, 1994; Grumbine, 1994; Reading, Clark, & Kellert, 1994). Ecosystem management is an adaptive process, providing for continuous learning through feedback from the monitoring of management processes (Hardesty, 1994). The shift toward ecosystem management on public lands in the United States brings about changes in field practices, including the renewed application of ecosystem-level disturbances such as fire, which may engender negative public attitudes based on misunderstanding of ecological principles (e.g., Daniel, 1990). Whereas land managers previously viewed social research and environmental interpretation as auxiliary to biological management programs, these techniques now must be increasingly employed as important management tools. Innovative interpretive programs can address the growing pressures on public lands by modifying outdoor recreation behaviors, shifting attitudes, and bolstering public support for ecosystem management and protection policies (Cable & Knudson, 1983).

Traditional models of interpretation must be updated to encompass interpretive needs for ecosystem management. A traditional interpretation model is shown in Figure 1a, based on Veverka (1994) and Cherem (1977). In this model, the site (e.g., park) or subject matter (e.g., marsh) dictates the objectives and techniques. The audience is interpreted to, and subsequent feedback reveals whether program objectives are achieved. In the proposed model (Figure 1b), the audience is the central element of the framework, and audience characteristics (e.g., knowledge levels, attitudes, behaviors, interests, and activities) dictate plans for the interpretive techniques and services. This shift in focus from site to audience is particularly important for ecosystem management interpretation. Ecosystem management blurs

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Force Base Natural Resources Branch and Environmental Public Affairs staff, especially our project coordinator, C. Petrick, as well as R. McWhite, S. Seiber, D. Green, L. Ballard, D. Atencio, and J. Tucker. Eglin Eagle editors L. Lincoln and K. Howard provided valuable assistance in publishing the feature articles about Eglin's natural resources. NRB staff N. Reece, L. Hansen, and S. Dildine provided important logistical help. Thanks to H. F. Percival and B. Fesler of the Cooperative Fish and Wildlife Research Unit at the University of Florida and to the Public Lands Program of The Nature Conservancy for making this work possible. We thank A. Lyons, M. McDuff, T. Cable, and three anonymous reviewers for insightful review of this manuscript, and A. Gilcher for secretarial support. Funding for this work was provided by the Legacy Resource Management Program of the Department of Defense. This is Florida Agricultural Experiment Station Journal Series No. R-05801.
land boundaries, incorporates diverse audiences, and integrates ecosystem processes and multiple uses into management objectives. The new model begins with management goals and the audiences that affect these goals, and intervenes with interpretive techniques and services to shift or foster existing knowledge, attitudes, or behaviors of the audiences. Program evaluation focusing on audience changes and achievement of management goals provides feedback to continually modify and improve a program.
Traditional interpretation, focusing on visitors to protected areas, is not broad enough to fulfill ecosystem management objectives. For example, Ham and Krumpe (1996) outline three general types of audiences for site-based interpretation programs: (a) on-site visitors, (b) local communities, and (c) remote audiences. These categories do not allow for the diversity of audiences that must be considered in many ecosystem management plans. Use of the audience-focused interpretation model resulted in the identification of a new target audience for interpretive materials at Eglin AFB. Interpretive materials had previously been designed and implemented for the three audience types suggested by Ham and Krumpe (Jacobson & Marynowski, 1997; Marynowski & Jacobson, in press). Yet, based on the old model of interpretation, an important audience was overlooked.

The new model suggested that a key audience for ecosystem management interpretation was military personnel. Their short tenure at Eglin AFB, their unfamiliarity with the area, and the potential for their decisions to greatly impact the base's natural resources as they pursue the military mission make them a critical audience. This group was further segmented into two target publics: military leaders, who set operational policies, and unit environmental coordinators, who manage the environmental review process for Eglin operations. Access by Eglin natural resource managers to upper-level military decision makers generally is limited to formal briefings of predetermined content. Interaction with environmental coordinators is within the framework of the environmental review process. Therefore, it is crucial to reach military leaders and environmental coordinators with more general information about Eglin's ecosystems and ecosystem management—outside of ordinary workday interactions. Although this example occurs on Department of Defense lands, this study reveals that a focus on management goals and audience attributes, rather than a site per se, will be helpful in revealing new audiences and techniques for many interpretive programs.

Grumbine (1994) calls for experimental verification of the value of interpretation to ecosystem management programs. Much research has explored interpretive programs geared toward park visitors or other recreational groups (e.g., Cable, Knudson, Udd, & Stewart, 1987; Duda & Young, 1993; Enck & Decker, 1991; Olson, Bowman, & Roth, 1984). However, little research focused on nontraditional audiences involved in ecosystem management. Based on our audience-focused model for interpretation, a quasi-experimental study was designed to develop and evaluate a multitrait interpretive program for decision makers on military lands.

Using the model, we surveyed military leaders (MLs) and unit environmental coordinators (UECs) to gain a baseline understanding of their knowledge, attitudes, interests, and demographics. From these results, we identified specific interpretive objectives and designed and implemented an interpretive program for MLs and UECs. The interpretive program was designed to promote an understanding of how ecosystem management serves both the military mission and natural resource conservation goals, and to increase awareness of the natural history and significance of the base's biodiversity and ecosystems. It was predicted that the interpretive approaches targeted at the military audiences would improve knowledge of and attitudes toward ecosystem management topics and goals. A posttreatment survey examined the effects of the interpretive materials and compared methods of communication about topics related to ecosystem management.
METHODS

Study Site
At 185,600 ha (464,000 ac), Eglin AFB is one of the largest forested military installations in the western hemisphere. The base includes over half of Florida’s 81 natural community types (Florida Natural Areas Inventory, 1994) and protects one of the largest remaining contiguous longleaf pine (Pinus palustris) forests, a critically endangered ecosystem of the southeastern United States (Noss, Laroe, & Scott, 1995). Wildlife at Eglin AFB includes 22 animal and 67 plant species that are endangered, threatened, rare, or of special concern (U.S. Air Force, 1993). The military mission at Eglin AFB is to develop and test conventional munitions and sensor systems for the U.S. Air Force and to provide areas for Department of Defense practice and training operations. All testing and training missions that are proposed for Eglin’s land, sea, or air space undergo environmental review, and missions that are likely to impact natural resources or endangered species go through an in-depth environmental consultation process with personnel in Eglin’s Natural Resources Branch (NRB). Each Eglin AFB unit has UECs assigned to manage the environmental review process.

Eglin AFB receives approximately 1,000 new residents and 21,000 trainees each year and has 29,000 permanent residents on the base. More than half a million people reside in the surrounding four-county area, many of them dependent on the military economy. Approximately 60% of Eglin AFB is open for public recreation, providing opportunities for hiking, hunting, fishing, picnicking, canoeing, bicycling, and nature observation. Eglin’s NRB issues approximately 15,000 recreational permits each year, and Eglin’s forests receive approximately 20,000 user visits per year, including visits from military personnel who live on the base.

Research Design
The study follows a systematic model of interpretation development and evaluation that is based on management goals and audience attributes (Jacobson, 1990, 1991). Similar to the way in which ecosystem management has been applied at Eglin, this model takes an adaptive approach to developing, implementing, evaluating, and learning from the interpretive program (Figure 1b). Feedback provides data to continually modify the program to achieve goals and appropriately address audience attributes.

The target populations for the research are upper-level military leaders (MLs) and unit environmental coordinators (UECs) in the major military units who reside at Eglin Air Force Base. Upper-level leaders are defined as the commanders, vice commanders, executive officers, and/or chiefs of each of Eglin’s operational units. These MLs are either civilian defense employees or military officers (usually at or above the rank of lieutenant colonel). UECs are the primary and alternate staff members (usually civilian) in each unit assigned to handle the mission environmental review process.

The research followed a one-group, pretreatment/posttreatment research design (e.g., Mason & Bramble, 1989). All MLs and UECs were part of a treatment group. It was not possible to establish a control group because the audience was relatively small, the end goal was to educate the audience, and broadly distributed
print media were used. Interpretive objectives were identified for MLs and UECs in consultation with NRB staff and outside experts, and through a review of ecosystem management interpretive needs identified in Eglin’s NRMP.

Survey Instruments
The pre- and posttreatment surveys were designed according to standard survey research methods and built upon previous surveys of Eglin’s recreational users and neighboring citizens (Jacobson & Marynowski, 1997). Objectives and content for the surveys were defined through a combination of interviews with Eglin AFB natural resource personnel, review of the 1993 NRMP, and consultation with external scientists and educators. An iterative survey design process was used to establish survey content, draft questions, format the questionnaire, review the survey, pretest the instrument with military personnel, implement the pretreatment survey, and revise the survey for the posttreatment evaluation of the interpretive program.

Survey questions were designed to measure attitudes and knowledge about four content areas defined through baseline research and review: native and endangered species, fire ecology, ecosystems, and forest resources and habitats. Attitude questions were designed around a symmetric, 5-point Likert-type scale (1=strongly disagree to 5=strongly agree), which provides a central, neutral category. Knowledge questions were designed to measure awareness or familiarity in a true-false format.

The surveys consisted of four sections: (a) 15 attitude questions, (b) 12 knowledge questions, (c) 4 questions about outdoor recreation behaviors and interests, and (4) 8 sociodemographic questions. The posttreatment survey incorporated an extra section allowing respondents to report which interpretive media they saw. Additional questions were included on both surveys to address specific NRB concerns but were not relevant to this study. The surveys also included several open-ended questions to solicit comments and thoughts about natural resources and ecosystem management from respondents.

A factor analysis of responses to the core attitude questions indicated that the items could be grouped into four composite scores matching the four content areas (Marynowski, 1995). Attitude scores were calculated overall and for each of the four content areas. The dichotomous knowledge data were grouped into a parallel set of four composite scores (Table 1).

Implementation of the 1995 pretreatment survey and 1996 posttreatment survey followed standard methods for survey research. Surveys were sent out in two mailings, three weeks apart, accompanied by a cover letter explaining the purpose of the survey and soliciting cooperation (Dillman, 1983). Returned surveys were received at the NRB for approximately six weeks after the initial survey mailing.

The population for the pretreatment (PRE) and posttreatment (POST) surveys was the same: all upper-level MLs at Eglin (N$_{POST}$=39, N$_{PRE}$=48) and all primary (N$_{POST}$=96, N$_{PRE}$=96) and alternate (N$_{POST}$=18, N$_{PRE}$=20) UECs in the major military units housed at Eglin. Due to military restructuring, total numbers of military units and personnel changed slightly from the pre- to posttreatment survey, but both surveys assessed all members of the target audience.
Table 1. Survey knowledge and attitude questions grouped by composite content areas (actual questions and statements included positive and negative wording)

Native and endangered species composite

Attitudes:
- Eglin’s endangered plant and animal populations should be increased
- Eglin managers should focus on conserving native plants and animals
- More money should be spent on management of endangered species at Eglin
- Some secondary roads on Eglin should be closed to improve native wildlife habitat
- Eglin is important in the Southeast for native plants and animals
- Large animals like bears would benefit if Eglin were better connected to neighboring natural areas
- Eglin managers should focus on conserving native pine forests

Knowledge:
- The most widespread native pine tree on Eglin is the longleaf pine
- Thinning of pine forests can be helpful to endangered plants and animals
- Eglin animals that are endangered or threatened include alligator snapping turtle, bald eagle, black bear, indigo snake, fox squirrel, gopher frog, gopher tortoise, Okaloosa darter, red-cockaded woodpecker
- Eglin’s endangered woodpeckers nest in live trees
- Eglin’s endangered woodpeckers nest in trees older than 80 years old

Fire ecology composite

Attitudes:
- Eglin should burn forests despite potential air pollution
- Fire is beneficial to the native trees and plants of Eglin
- More areas of Eglin should be burned to increase wildlife

Knowledge:
- Fire is beneficial to Eglin’s native plants
- Regular fire maintains a natural balance of pine and oak trees
- Regular fire is a characteristic of old-growth (mature) pine forests
- Pine forests burned every few years are useful to game and wildlife

Ecosystems composite

Attitudes:
- Eglin managers should have a broader focus than increasing game animals
- Eglin managers should focus on whole forests rather than specific species
- Negative recreational impacts to Eglin’s ecosystems should be controlled or limited

Knowledge:
- Forests along streams and rivers are necessary for traveling wildlife

Forest resources and habitats composite

Attitudes:
- Wildlife prefer areas that have some pine forests and some hardwood forests
- Enough timber is being harvested on Eglin

Knowledge:
- Old-growth (mature) pine forests are characterized by snags and logs, many nuts and berries, large pine trees, abundant wildlife, little underbrush, thick grasses
- The main cause of deer mortality on Eglin is hunters
Interpretive Program Development

Results of the pretreatment surveys of MLs and UECs were combined with an assessment of interpretive needs for ecosystem management to develop the interpretive program for military leaders and planners. Because MLs and UECs displayed similar demographic profiles on the pretreatment surveys, they were targeted with similar interpretive activities.

Interpretive materials were designed to address knowledge with factual information about ecological relationships and attitudes with persuasive communications that included color photographs and video images (Hungerford, 1996). Interpretive materials were designed using proven strategies for effectiveness, such as organized structure, repetitive message presentation, and source credibility and expertise (e.g., Cable et al., 1987; Ham, 1992; Vaughn, 1983). Visually the materials were colorful and attractive, including color photographs and video where affordable. Interpretive materials included information about principles of ecosystem management, communities and species present on Eglin, the role of disturbances such as fire in ecosystem function and restoration, characteristics of mature longleaf pine forests, human uses and behaviors compatible with Eglin’s ecosystems, information to facilitate outdoor recreation and wildlife observation, and recommendations for environmentally friendly actions.

Specific interpretive media were selected to reach the geographically dispersed military audience within existing programmatic constraints. Media chosen could be broadly disseminated and were cost effective and easily implemented within the experimental time frame and with no on-site interpretive staff. Therefore interpretive methods and media selected for the program were representative of a number of mass interpretation techniques:

- A full-color poster of Eglin’s main ecosystems and endangered species was coupled with a calendar to make it more useful and appealing to busy military professionals.
- Color brochures covered (a) Eglin’s ecosystems, (b) the role of fire in the restoration and ecology of Eglin’s forests, (c) Eglin’s native and endangered species, and (d) a “welcome” brochure geared toward existing and new military residents discussing how Eglin’s forests serve the military mission, recreation, and wildlife habitat. All of the brochures underwent expert review for technical accuracy and artistic review before publication. To encourage involvement, a draft of the “welcome” brochure was sent to UECs for review with a letter requesting their feedback and suggestions.
- A 4-minute video focusing on Eglin AFB ecosystem restoration efforts, with vivid scenes of prescribed fire, was presented on a continuous loop all day at an annual Eglin Open House.
- Interpretive signs were designed for every other hole of Eglin’s two golf courses, where 51% of MLs and 33% of UECs reported playing golf. The signs were screen-printed in four colors on aluminum for long-term durability. Several signs described the longleaf pine and creek ecosystems that meander through the golf course, the native and endangered species that inhabit those ecosystems, the role of fire in longleaf pine forest maintenance.
and restoration, and the compatibility of ecosystem management with the military mission (Figure 2).

- A series of three full-length feature articles with photographs appeared in the Eglin Eagle base newspaper covering (a) ecosystem management and multiple uses of Eglin's forests; (b) longleaf pine forest ecology and restoration practices, including the use of prescribed fire; and (c) native and endangered plants and animals of Eglin AFB. More than half (52%) of MLs and 57% of UECs reported using military news sources on the baseline survey.

Program Evaluation and Statistical Analysis

The distribution of interpretive media was assessed by asking survey respondents which interpretive media they had seen or heard. While self-reporting can be inaccurate, it was the only method available within the context of the setting to assess who viewed the video loop, golf course signs, and print media coverage of natural resource issues in the Eglin Eagle. The poster and brochure were mailed to all respondents, but with turnover of military personnel it was not possible to definitively know who had seen these directly delivered media.

The results of a posttreatment survey of knowledge and attitudes were compared to pretreatment measurements to evaluate the effectiveness of the interpretive program using t test (for ML data) and paired t test (for UEC data) procedures (SAS Institute, 1988). We also evaluated the effectiveness of the individual interpretive media by using knowledge and attitude scores as dependent variables in a series of analyses of variance (ANOVAs). Because some respondents had seen more than one type of media, the media were evaluated as a group of dichotomous

Figure 2. Golf was the top outdoor recreational activity for military leaders, so this audience was targeted with interpretive signs on Eglin's two military golf courses. (Photograph: S. K. Jacobson.)
independent variables (i.e., whether or not a participant had been exposed to a given medium). Pretreatment data tests showed no two-way interactions between media variables, so each ANOVA tested only for the main effects of interpretive media on knowledge or attitude scores of respondents who saw the media, even though there may not have been significant changes in the overall population. Media tested as independent variables were (a) brochure, (b) poster, (c) golf course signs, (d) video, and (e) print media. Statistically significant results are reported at the $p \leq 0.10$ level.

RESULTS

Response Rates
We sampled the entire population of MLs and UECs. The overall response rate for the 1994–1995 pretreatment survey was 68% ($N=99, 2\%$ undeliverable), reflecting a rate of 65% for MLs ($N=31$) and 70% for UECs ($N=68$). The overall response rate on the posttreatment survey was 50% ($N=64, 6\%$ undeliverable), which represents a 73% response for MLs ($N=27$) and a 40% response for UECs ($N=37$). In the pre- and posttreatment measurements, a high proportion of the 18 to 20 military units ($N_{post} = 85\%, N_{pre} = 89\%$) had at least one member responding to the survey. Nonresponse bias was not measured because of the context of the military setting.

Demographics
The ML and UEC audiences were relatively homogeneous. MLs and UECs were almost all Caucasian, male, and college educated (Table 2); values for demographic variables measured by the posttreatment survey were similar to those measured by the pretreatment survey. For example, on the posttreatment survey, just over half (52%) of MLs reported interacting with the NRB, compared to 57% who reported interacting on the pretreatment survey. For UECs, those reporting interaction rose to 70% from the pretreatment 56%, indicating a higher number of interacting UECs responding to the posttreatment survey. An additional demographic difference between UECs and MLs was their turnover rates. Turnover was nonexistent among UECs between the pre- and posttreatment measurements but was 89% in MLs because of military restructuring during the period. Thus, tenure of MLs throughout the entire interpretive program was not ensured, and media exposure was determined based on self-reporting because it was unknown whether new MLs were exposed to all the media. MLs were nearly identical demographically on the pre- and posttreatment surveys, but paired $t$ test statistics could not be used to compare ML scores because of the high turnover.

Interpretive Program Coverage
The most frequently viewed media for MLs were print media, followed by the brochures, the golf course signs, and the poster (Figure 3). Among UECs, the poster was the most frequently viewed medium, followed by the brochures and print media. Few MLs and UECs reported seeing the video, whereas 63% of MLs and 24% of UECs had seen the interpretive signs on the golf course.
Table 2. Demographic characteristics of military leaders (MLs) and unit environmental coordinators (UECs) responding to the pretreatment survey

<table>
<thead>
<tr>
<th>Demographics</th>
<th>MLs</th>
<th>UECs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male/female</td>
<td>93%/7%</td>
<td>89%/11%</td>
</tr>
<tr>
<td>Caucasian/other</td>
<td>100%</td>
<td>83%/17%</td>
</tr>
<tr>
<td>Highest education level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduate degree</td>
<td>96%</td>
<td>31%</td>
</tr>
<tr>
<td>Four-year degree</td>
<td>4%</td>
<td>17%</td>
</tr>
<tr>
<td>High school diploma/some college</td>
<td>0%</td>
<td>53%</td>
</tr>
<tr>
<td>Average years working at Eglin</td>
<td>3.6</td>
<td>10.0</td>
</tr>
<tr>
<td>Past professional interaction with natural resource branch</td>
<td>52%</td>
<td>70%</td>
</tr>
<tr>
<td>Main outdoor recreational activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31% golf</td>
<td>26% walk</td>
<td></td>
</tr>
<tr>
<td>15% walk</td>
<td>23% fish</td>
<td></td>
</tr>
<tr>
<td>15% swim</td>
<td>11% golf</td>
<td></td>
</tr>
<tr>
<td>12% beach</td>
<td>11% sightsee</td>
<td></td>
</tr>
<tr>
<td>8% boat</td>
<td>9% bicycle</td>
<td></td>
</tr>
<tr>
<td>Total who play golf as main or secondary activity</td>
<td>69%</td>
<td>30%</td>
</tr>
</tbody>
</table>

Knowledge and Attitudes
MLs had significantly improved knowledge overall ($t=1.74, p=.0876$) and about ecosystems ($t=1.85, p=.0697$) after exposure to the media (Figure 4). Leaders showed no significant changes in attitudes as a result of the ecosystem interpretive program. Overall attitude scores were 3.5 on a scale of 1=strongly disagree to 5=strongly agree.

UECs showed significantly improved knowledge of native and endangered species topics (paired $t=2.12, p=.0435$) (Figure 5). UEC attitudes toward fire improved significantly (paired $t=1.86, p=.0437$), but UEC attitudes in other areas did not shift significantly (Figure 6).

Effects of Interpretive Media
Individual interpretive media were evaluated based on self-reporting by respondents. ANOVAs revealed which media had significant effects on the knowledge (Table 3) and attitude scores (Table 4) of individuals who saw the media. For MLs, print media had a significant effect on knowledge about ecosystems, overall attitudes, attitudes about fire, and attitudes about ecosystems. The golf course signs had a significant influence on ML knowledge of ecosystems and attitudes about fire. Print media also had significant effects for UECs, resulting in significantly im-
Figure 3. Media viewed by evaluative survey respondents.

Figure 4. Knowledge levels of military leaders (MLs). Bullets indicate statistically significant differences.
Figure 5. Knowledge levels of unit environmental coordinators (UECs). Bullet indicates statistically significant differences.

Figure 6. Attitude levels of unit environmental coordinators (UECs). Bullet indicates statistically significant differences.
Table 3. Effective interpretive media for improving knowledge levels of military leaders (MLs) and unit environmental coordinators (UECs) at Eglin Air Force Base. Values in each cell are reported for respondents who were/were not exposed to the interpretive media. A perfect knowledge score equals 100. Only statistically significant scores are shown.

<table>
<thead>
<tr>
<th></th>
<th><strong>Species</strong></th>
<th><strong>Fire</strong></th>
<th><strong>Systems</strong></th>
<th><strong>Forests</strong></th>
<th><strong>Overall</strong></th>
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<td>UECs</td>
<td>MLs</td>
<td>UECs</td>
<td>MLs</td>
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<td>96/60</td>
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| Statistic  | **F=2.30** | **F=2.18** | **F=4.03** | **F=2.52** |
|            | 0.069       | 0.095       | 0.006       | 0.05        |

Table 4. Effective interpretive media for increasing positive attitude scores of military leaders (MLs) and unit environmental coordinators (UECs) at Eglin Air Force Base. Values in each cell are reported for respondents who were/were not exposed to the interpretive media. The most positive attitude score equals 5. Only statistically significant scores are shown.

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<th><strong>Species</strong></th>
<th><strong>Fire</strong></th>
<th><strong>Systems</strong></th>
<th><strong>Forests</strong></th>
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<td>UECs</td>
<td>MLs</td>
<td>UECs</td>
<td>MLs</td>
</tr>
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<tr>
<td>Signs</td>
<td>3.8/3.2</td>
<td></td>
<td>3.6/3.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Video</td>
<td></td>
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<td></td>
<td></td>
<td>3.8/3.2</td>
</tr>
</tbody>
</table>

| Statistic  | **F=2.97** | **F=2.45** | **F=3.81** | **F=2.93** |
|            | 0.035       | 0.056       | 0.013       | 0.01        |

proved overall knowledge, knowledge of species, knowledge of ecosystems, and attitudes about fire. Brochures were effective with UECs, leading to significantly increased knowledge about native and endangered species. Similar to the MLs, the UECs who reported viewing the golf course signs showed increased attitude scores regarding prescribed fire. UECs who viewed the video also displayed significantly higher attitude scores regarding fire.

**DISCUSSION**

The ecosystem management interpretive program for military leaders and planners
at Eglin AFB resulted in improved knowledge and attitudes in several content areas. Evaluative surveys showed significantly improved ecosystem knowledge and overall knowledge for MLs, and improved knowledge of fire ecology and attitudes about native species for UECs. Despite the 89% turnover rate in MLs between the pre- and posttreatment surveys, the high response rates for MLs and positive results of the ecosystem interpretation program suggest that materials targeting specific attributes of the military decision makers were effective.

Newspapers were relatively the most successful interpretive approach tested, resulting in increased knowledge and enhanced attitudes in a number of areas for both MLs and UECs. Colorful signs on the Eglin AFB golf course, which were targeted at the high proportion of MLs who indicated golf was their main outdoor activity, were successful in improving knowledge about ecosystems and attitudes toward prescribed fire. Printed publications (brochures, posters) were less successful among this audience, possibly because the audience members are busy professionals. This reinforces the model’s emphasis that interpretive approaches as well as content must target audience attributes. The brochures did result in improved knowledge of wildlife among UECs, perhaps because UECs provided feedback and suggestions on a draft of the brochure as a participatory component of the interpretive program. The video was successful in improving UEC attitudes about prescribed fire but was seen by few respondents because it was aired at only one event.

**Influencing Knowledge and Attitudes**

Interpretive media were particularly effective in influencing (a) knowledge about ecosystems for MLs, (b) overall knowledge for MLs, (c) knowledge about native and endangered species for UECs, and (d) attitudes about fire for UECs. For example, as part of their overall improvement in knowledge, MLs showed greater recognition of key Eglin endangered species (such as the red-cockaded woodpecker, Okaloosa darter, bald eagle, and gopher tortoise) and greater knowledge of the natural history of those species (e.g., that red-cockaded woodpeckers nest in live trees). After the educational program, more MLs identified longleaf pine as Eglin’s most widespread native tree and recognized regular fire as a component of mature longleaf pine forests that benefits native plants and wildlife habitat.

Many knowledge responses showed improvement, high levels of preexisting knowledge, or both. Some responses reflected the relatively low levels of basic ecological understanding described by many researchers for other public audiences (e.g., Gigliotti, 1990; Kellert, 1980; Manfredo, Fishbein, Haas, & Watson, 1990). For example, few UECs identified regular fire and thick grasses as components of Eglin’s old-growth pine forests. Few MLs knew black bear or fox squirrels were endangered species on Eglin AFB, despite the fact that black bear are the subject of major research at the base. The low levels of ecological awareness of Eglin’s pine forests, fire ecology, and endangered species underscore the need for front-end evaluation, as emphasized in the model, to develop appropriate interpretive messages targeting existing knowledge levels.

Many of the UEC knowledge improvements measured on the posttreatment survey were in the area of native and endangered species, which is the most frequent topic of environmental consultation with the NRB. In addition, fewer UECs
responding to the posttreatment survey thought that endangered species protection was a barrier to planning military missions. These results suggest that UECs may have developed more favorable attitudes toward the environmental review process and were focusing on the interpretive information that related most closely to the daily demands of their jobs.

UEC attitudes about prescribed fire improved significantly after the interpretive treatment. Attitudes about fire improved for respondents exposed to newspapers, the golf course signs, and the video. Although UEC recognition of regularly occurring fire as an ecological process in longleaf pine forests did not increase, their attitudes toward fire as a management and restoration tool improved. These attitude shifts are important because they concern the acceptance of fire, which sometimes conflicts with the timing of military operations, yet is critical to restore Eglin’s longleaf pine ecosystems.

The more positive attitudes recorded in several content areas suggest that the ecosystem management interpretive program may have reached beyond increased knowledge to promote favorable attitudes and potentially behaviors, as recommended by a number of conservation education and interpretation researchers (e.g., Francis, Banner, & Rasmussen, 1993; Gigliotti, 1990; Pomerantz, 1991). Marcinkowski (1993) notes that improved knowledge leads to increased environmental sensitivity and may influence environmental attitudes and behaviors.

Overall, both MLs and UECs expressed relatively supportive attitudes on the pre- and posttreatment surveys and displayed the phenomenon of attitude moderation that was seen in surveys of Eglin recreationists and neighboring citizens who were previously targeted with interpretive programs (Marynowski & Jacobson, in press). The least positive pretreatment attitudes for both MLs and UECs showed improvement, and the most positive pretreatment attitudes did not change. Moderated attitudes are predicted as one potential outcome of improved knowledge as the result of targeted interpretive programs (Shrigley, Koballa, & Simpson, 1988). This underscores the sometimes indirect relationship between knowledge and attitude that results from interpretive programs.

Effective Media
A previous study concluded that Air Force personnel are “voracious information seekers” (Wirthlin Group, 1991). In particular, it found that (1) 48% of Air Force personnel, particularly younger members of the service, are electronic media users, relying primarily on broadcast (television) or video media; (2) 27% of Air Force personnel are multimedia users, relying on a variety of print and broadcast/video media news, particularly military officers considered to be the “gatekeepers of information”; and (3) 25% of Air Force personnel, particularly junior officers, are non–media users, relying on word-of-mouth news sources.

The MLs and UECs targeted at Eglin AFB fall in the “gatekeepers of information” multimedia user category. Therefore, Eglin’s MLs and UECs could be reached by a variety of print and video media. The Wirthlin Group (1991) reported that Air Force personnel are likely to use military news sources if those sources are widely distributed and readily available to them. The base newspaper, *Eglin Eagle*, is distributed weekly to all units on Eglin AFB free of charge. The *Eagle* is a dependable
and popular source of news to Eglin AFB military personnel, a result supported by our research, which showed that newspaper articles were effective in improving knowledge and attitudes in a number of content areas and were the most effective interpretive medium employed. The positive effects of newspapers on MLs’ knowledge and attitudes are important because MLs prefer them, and newspapers are the most often seen medium (Wirthlin Group). The effects of newspaper articles on UECs also are significant, affecting many knowledge and attitude areas. These results point to the importance of print media over any other media tested, particularly for enhancing attitudes.

Although the MLs and UECs were demographically similar, the pattern of who saw which media is indicative of the different roles of the two groups. MLs depended most on newspapers for their information, whereas UECs depended more on interpretive publications such as the poster and brochures for their information. Several MLs commented on the survey that they do not have time to read “interpretive materials,” but they do use television, radio, and newspapers in their work. The brochures and posters were more effective for UECs, who have bureaucratic or administrative jobs that call for the understanding and analysis of background materials. UECs showed improved knowledge as a result of the interpretive brochures and could continue to be targeted by printed interpretive materials.

The golf course interpretive signs reached MLs at 3 times the rate of UECs, who had not reported playing golf as often as MLs on the baseline survey. However, this targeted medium was effective with members of both groups who viewed the signs. The signs were important in improving attitudes about fire, one topic that is colorfully portrayed and described on the signs. This demonstrates the efficacy of an interpretive effort targeted to reach an audience involved in a specialized activity. Although the traditional model of interpretation might have suggested that interpretive signs be posted on a “nature trail” that epitomized an ecosystem management effort, the audience model focuses on attributes and activities of the audience. If the audience spends its time outdoors on the golf course, that is where interpretation should take place.

The video was viewed by relatively few respondents because it was aired only at the annual Eglin Open House event. As a result, the video was the least successful medium. However, UECs who did see the video loop had improved attitudes about fire, which is vibrantly shown in the video format. This suggests that video may be an effective interpretive tool, and the barrier to success in this case was a lack of audience exposure. Copies of interpretive videos are now being distributed directly to military personnel.

One crucial element of Eglin’s ongoing programs is monitoring, which provides regular measures of knowledge, attitudes, and satisfaction levels for program improvement and modification. Just as monitoring of biological systems is a component of ecosystem management programs, social monitoring must be used by managers to reexamine interpretive program goals and objectives, to identify variables related to long-term program success, to improve stakeholder involvement, and to increase audience acceptance of and satisfaction with new ecosystem management directions. Some researchers have found that, although knowledge and attitude changes may not immediately develop as a result of interpretive programs,
levels sometimes improve over 1- to 6-years’ time (e.g., Hanson, 1993; Perdue & Warder, 1981). Heightened awareness and supportive attitudes fostered by interpretive techniques can gradually erode back to baseline conditions if not reinforced by the cumulative effects of multiple exposures to interpretive media (DeYoung, 1993). Continuity and repetition are key elements in the success of interpretation endeavors addressing knowledge, attitudes, and behaviors (e.g., Dwyer et al., 1993; Hanson, 1993; Hungerford & Volk, 1990). Now that evaluative research has validated Eglin's ecosystem management interpretation efforts, additional interpretive materials can be designed for the military and other audiences with subsequent results monitored by Eglin’s Natural Resources Branch. The audience-focused model used to guide this program reiterates for interpreters Freeman Tilden’s (1957) first principle of interpretation: “Any interpretation that does not somehow relate what is being displayed or described to something within the personality or experience of the visitor will be sterile.” Ecosystem management goals cannot reach fruition through sterility.

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ECOLOGY VERSUS ISSUE INTERPRETATION:
THE ANALYSIS OF TWO DIFFERENT MESSAGES

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Abstract:
An important goal for environmental interpretation is to attempt to change a constituent's knowledge, attitude, and/or behavior toward the park site and beyond. This study evaluated the impact of two different interpretive experiences on elementary students' environmental knowledge, attitude, and behavior. Each program represented a major variable associated with the attitude/behavior change goals supported by interpreters. These programs were administered and evaluated during the 1995–96 school year at the Paul H. Douglas Environmental Education Center at Indiana Dunes National Lakeshore. The first interpretive experience, offered during the fall, was dedicated to ecological information, whereas the second program was conducted in the spring and was based on environmental issues associated with the site. Results of this quantitative analysis show significant gains in knowledge and little impact on attitude/behavior. The authors recommend multiple research methods to better evaluate effect and behavior changes following an interpretive experience.

Keywords:
Environmental interpretation, visitor behavior, environmental education.

INTRODUCTION

Throughout the nation, thousands of interpreters prepare for their programs. The participants for these interpretive experiences may be students, families, scouts, local community groups, and a variety of other visitors. The interpreter's site may

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Note: Accepted September 1998.
be a state park, national monument, nature preserve, cultural landmark, or a variety of other facilities. Interpreters face consistent challenges regarding their visitors and their interpretive sites. One such universal question is: “What do I interpret when I only have an hour and a half with people who may never come back to the resource site?”

The answer to this question can be quite complex, with interpreters having their own rationale for what they interpret. Despite the possible range of views, a significant proportion of interpreters believe that they must disseminate an environmental message (Knapp, 1994). Specifically they want to deliver an interpretive message that may change the knowledge, attitude, and/or behavior of the visitor toward the resource site (Ham & Krumpe, 1996; Shively, 1995; Zuefle & Beck, 1996). The message these interpreters deliver can be considered environmental interpretation—a communication process for revealing meanings and information of natural resources and their relationships with humans with an ultimate aim of producing an environmentally responsible individual.

To achieve environmental interpretation’s behavior change objective, several important variables must be considered. These variables and their associated characteristics include general awareness of a resource site (i.e., local ecology), understanding of environmental issues associated with the site, the skills necessary to investigate these issues, and the knowledge/skills necessary to act on solving these environmental issues (Knapp, 1994).

In acknowledging these important variables associated with environmental behavior change, the question regarding what to interpret in a short time period becomes a more difficult challenge. If interpreters only have a certain amount of time and they want to impact a visitor’s environmental literacy, what is the best strategy to attain this goal? What variable or variables associated with behavior change could/should be addressed in these interpretive experiences?

This study evaluated the impact of two different interpretive experiences on elementary students’ knowledge, attitude, and behavior toward the resource site they were visiting. Each interpretive program represented a major variable related to the behavior change goal espoused by environmental interpreters. One interpretive program presented ecological information; a second program focused on environmental issues associated with the site. These programs were administered and evaluated during the 1995–96 school year at the Paul H. Douglas Environmental Education Center at Indiana Dunes National Lakeshore. This research project was funded through grants from the National Park Foundation and the National Environmental Education Training Foundation.

**Review of Related Literature**

**Behavior Change in Interpretation**

Although the goals of interpretation are eclectic, a significant percentage of interpreters believe that changing a visitor’s behavior/attitude toward the resource site is important (Knapp, 1994). In fact, manipulating behavior for direct on-site reasons, as well as beyond, is one of the most important terminal goals an interpreter may achieve (Dahlen, Larsen, Weber, & Fudge, 1996; Merriman, 1995).

Attempts have been made to evaluate such behavior change. Knudson, Cable,
and Beck (1995) cite several studies that evaluated the impact that an interpretive message may have on visitors’ action toward a resource site. Results of these studies found particular interpretive treatments (information brochures, fliers, campground programs, and signage) can have an influence on site-specific behaviors such as littering, boating safety, and campsite choices.

Despite these studies, the field of environmental interpretation lacks sufficient research to confirm or question interpretive impacts. The effectiveness of interpretive strategies (as measured for attitude and/or behavior changes) has not been well documented in the environmental literature (Morgan & Jarrett, 1994). In *Trends*, a journal published by the National Park Service, the editor communicates this lack of evaluation:

> While this [resource site management] is a growing area for using interpretive services, there is very little ‘documented’ results. We know of lots of examples where everyone knows the positive effect of interpretation as a management tool, but few of these programs have been studied thoroughly and published in academic journals (Absher, 1997, p. 9).

One hypothesis for the lack of credible research could be the lack of accountable objectives. As Nielson and Buchanan (1986) state, “Despite their potential, interpretive services have frequently been less than successful in establishing identifiable program objectives. As a result, there is little hard evidence of specific benefits to managing resource agencies” (p. 1). Griswold (1993) supports the notion of a taxonomy of objectives: “The idea of measuring interpretation through the use of cognitive levels should be investigated further. Bloom’s taxonomy provided a start. Future studies should review the education literature for other models” (p. 13).

Others believe that these objectives must be reflective of foundational theory to effect change. These objectives must be based on some theory that attempts to promote and affect behavior and attitude change (Cable, Knudson, & Theobald, 1986). Mullins also supports this view:

> A synthesis and adaptation of various theories and concepts from disciplines related to interpretation…can rapidly enhance our ability to conduct meaningful theory-based research. From this process can emerge a greater knowledge which can help interpreters evaluate the field and find direction (1985, p. 36).

There have been attempts by the interpretive field to connect learning theory with behavior/attitude change. One paradigm was introduced by Cable et al. in 1986. This model is based on the idea that interpretation is a persuasion mechanism. As the authors explain, “Interpretation often takes the form of persuasive communication, if we assume that interpreters are attempting to develop or change attitudes and behavior toward the resource base” (p. 16).

With this hypothesis in mind, Cable et al. looked to a theory of reasoned action to provide a hierarchy of objectives that could effect behavior change. They used Fishbein’s theory of reasoned action (1986), outlined below:
1. Behavior is a result of **intention**. Intentions usually guide behavior, although intervening circumstances may modify them.

2. **Intention** is a result of some combination of personal attitudes toward the behavior and subjective norms.

3. **Personal attitudes** are a function of personal beliefs and evaluation of the outcome of behavior.

4. **Subjective norms**, which also affect intentions, are determined by beliefs about what significant others think the person should or should not do (p. 190).

Cable et al. (1986) believe the key to this methodology is to identify the specific intentions and/or attitudes to be evaluated as predictors of behavior. They suggest that interpreters ask participants their attitudes or intentions before the program and then follow up with a similar “posttest” following the program. Any possible changes in their intentions could predict behavior change.

Although theoretically sound, this model, like other hypotheses, lacks substantial research support related to the interpretive experience. Ham and Krumpe (1996) promoted the use of the above theoretical framework but admitted there are several areas of research that need to be conducted for the model to be effective. Following a review of research in interpretive programming, Bixler (1991) summarized an important conclusion: “Unfortunately, research in this area seems to be declining, and there are few researchers systematically analyzing the instructional settings and methods employed by interpreters” (p. 33).

**Interpretation and Environmental Education**

It is necessary to look beyond the field of interpretation to find research and theory that relates to environmental attitude/behavior change outcomes. It requires an investigation of a related field, environmental education. The discussion of goals in environmental education has been similar to the debates related to interpretive directives. Beginning in the late 1960s, Stapp, Bennett, Bryan, and Nowak (1969) proposed that environmental education should work toward a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solutions. The call for environmental attitude and behavior change through environmental education is as prevalent today as it was 30 years ago (Bogner, 1998; North American Association for Environmental Education, 1996).

Several studies have been conducted in environmental education to analyze and identify key variables that are associated with this attitude/behavior change. Research suggests three categories of variables that contribute to environmental behavior: entry level, ownership, and empowerment variables (Borden & Powell, 1983; Hines, Hungerford, & Tomera, 1986/1987; Holt, 1988; Hungerford & Volk, 1990; Marcinkowski, 1989; Sia, Hungerford, & Tomera, 1985/1986).

In an effort to offer the interpretive field a theoretical framework of goals closely associated with the above variables, the author developed the Program Development Goals for Environmental Interpretation (1994). This set of objectives was developed through a synthesis of more than 100 goals, principles, and objectives of
interpretation and an intensive review and analysis of behavior change literature associated with the field of environmental education. The Program Development Goals were then validated through an evaluation process conducted by a panel of interpretive leaders from throughout North America (Knapp, 1994). The flow chart in Figure 1 illustrates the placement of these interpretive goals.

The most powerful use of these goals is to offer interpretive experiences that represent all three variable levels in a sequential hierarchical order. Although this may not assure attitude or behavior change in the visitor, it does offer opportunities to stimulate change. It is important to note that, with the exception of issue investigation goals, all of the directives listed in the model below are outcomes often found in the interpretive literature.

Analyzing Key Variables: Ecology and Issues

This study evaluated the effects of two of the visitor behavior change variables: awareness/understanding of the ecology of a site and awareness/understanding of the environmental issues related to the site.

Ecology of Site. The foundation of environmental interpretation is making visitors aware of the natural resources around them. Interpretation has been defined as an informal educational process that “familiarizes” visitors with environmental information (Hammitt, 1984). Tilden sees an important aspect of this awareness being achieved by “revealing” meanings and relationships in nature from firsthand experience (1957). The relationships to which Tilden refers are critical components of nature study and ecology.

In a national study evaluating the outcomes of nature centers, Simmons (1991) found that most facilities and their interpreters were engaged in subjects related to the natural sciences. A current leader in the field, Gary Machlis, not only supports the notion that interpretation should communicate ecological concepts but also argues that interpretation can be used to affect the ecology of the park:

![Figure 1. Environmental interpretation behavior change model.](image-url)
The relevancy of human ecology for interpretation should likewise be apparent. Interpretation is a park management function and as such is a component of the park ecosystem. Interpretation has the capacity to manipulate or influence the movement of people through the ecosystem (Machlis & Field, 1992, p. 229).

Promoting awareness of the natural resource site and its related ecological principles is a foundational goal of interpretation. It is a goal that is reflected in the major frameworks relating to program development in interpretation. The most recent text in the field, Interpretation for the 21st Century, outlines 15 principles that today's interpreter should follow. The second of these dictums is to reveal information pertaining to both cultural and natural history (Beck & Cable, 1998).

The initial objective of promoting awareness of the natural resource site is also prevalent in the goals and objectives for the two largest interpretive agencies in the United States: the USDA Forest Service and the National Park Service. Both institutions believe that the interpreter must inform the visitor of the agency's natural resources and help them to understand the site they are exploring. The Forest Service outlines this objective in its goals for interpretive service programs by stating, "Provide customer service through orientation, information, and interpretation so that forest visitors will have a more enjoyable experience while developing a better appreciation and understanding of the area they are visiting" (USDA Forest Service, 1990, p. 1).

The strong association between ecological awareness and interpretation has precipitated a growing interest to refocus the field's efforts to natural science goals. Weilbacher (1993) reflects this movement by stating, "To think globally, we must teach locally. Teach names. Teach life cycles. Teach life habits and histories. Restore nature study to the special place of prominence it deserves" (p. 7).

Kirkindall (1996) associates ecological awareness with effecting positive change in societal values: "By fostering awareness and respect for the value and interdependence of all aspects of ecology, we can help strengthen the vital link between society and our natural heritage" (p. 32). Since its inception, the field of interpretation has been looked upon as a medium to convey basic ecological information.

**Environmental issue awareness.** Many leaders and professionals in the field of interpretation see the outcome of an interpretive program as going beyond the "revealing" of natural resources and ecological awareness. There is a conscious motivation to educate visitors about the environmental and social issues that occur when humans interact with the environment. As early as 1953, resource agencies such as the National Park Service felt it important to inform visitors that their interactions with the natural resource site did affect the park by stating, "The visitor often requires some specific instruction regarding his own behavior. Fire prevention, proper relationship of man and wildlife,...are among the things that can be treated directly, using specific examples in the interpretive program" (Mackintosh, 1986, p. 106).

The interest in relating environmental issues and problems to the public was evident in the 1950s and 1960s but became more prevalent during the environmental awareness movement of the early 1970s. Brown (1971) believed that inter-
EcoLogic Versus Issue Interpretation

Interpretation should “stimulate discourse on environmental problems” and “encourage public probing of environmental problems” (p. 77). In fact, Fazio and Gilbert (1986) believed that analyzing resource issues is critical for natural resource agencies: “Today, the majority of public relations failures result not from the ‘public be damned’ attitude, but rather from the lack of ability to analyze issues [with the public]” (p. 3).

The support for issue awareness in environmental interpretive programs is still prevalent. The National Park Service Education Program supports the objective to “promote the parks as learning laboratories to develop greater public awareness” in environmental issues. Their first goal for program development states in part: “By interpreting local resources and issues, assist the public to see how they fit into the larger global community” (NPS, 1991, p.3).

Further evidence of the National Park Service’s interest in issue awareness comes from the Vail Agenda (NPS, 1992). This series of recommendations for future management of the National Park Service includes the following that promotes issue awareness: “We recommend that the NPS encourage managers and interpreters to better interpret controversial events and sites, and incorporate multiple points of view into interpretive programs....Public controversy over environmental issues should be thoughtfully considered” (NPS, p. 90).

The support to interpret current issues is not limited to the Park Service. Stuckey (1995) summarizes an attitude apparent to many interpreters:

Controversial issues in interpretation are often provocative and many times explosive. Emotions, values, and biases play major roles in these topics, but they can be made into interpretive tools as well. ‘Hot’ subjects should not be avoided or diluted to be discussed successfully. Given the proper attitudes, these issues can be interpreted with powerful and lasting effects (p.12).

In the recent textbook titled Interpretation of Cultural and Natural Resources (Knudson et al., 1995), the authors challenge educators to answer today’s interest of the visitor:

They want to know what to do about local problems—what will do some good. They look for an informed person to lead them to the best literature and presentations....They want an apolitical analysis of current issues and long-range trends. The interpretive center or museum has the opportunity—no, duty—to become such an information center (Knudson et al., p.156).

Methods and Procedures

This study evaluated the impact of two different interpretive experiences on elementary students’ knowledge, attitude, and/or behavior toward the resource site they were visiting. Each interpretive program represented a major variable related to the behavior change goal espoused by environmental interpreters. Subjects were taken from fourth, fifth, and sixth grades in three urban school districts in northern Indiana. The participants represented a diverse cultural and ethnic background with a predominant percentage being black and Hispanic. Approximately 1,500 students participated in both programs, representing 705 fourth-graders, 637 fifth-graders,
and 213 sixth-graders. These students were taken to the Indiana Dunes National Lakeshore for a half-day interpretive program once in the fall of 1995 and once in the spring of 1996. Both field trips were designed to be conducted in an outdoor setting and were experiential in method. The only difference between the two field trips was the content of the interpretive program. The fall session covered basic ecological concepts, whereas the spring session concentrated on environmental issues relative to the park. They both took place at the Paul H. Douglas Environmental Education Center located on the western boundary of the site.

The fall ecology program, designed and presented by interpretive rangers at Indiana Dunes National Lakeshore, included student participation in investigating differences among habitats encountered on a guided walk. The “Habitats Hike” enforced the theme that the variety of habitats at Indiana Dunes support an abundance of animal and plant life while each of these habitats contains a mixture of different conditions under which certain plants and animals can survive. At the end of the program, it was expected that students would be able to describe how light, moisture, and temperature differ in four different habitats and how this determines which animals and plants live in each of these habitats. In addition, students would be able to describe the common plants of each habitat, identify animal signs found in each habitat, and explain why species diversity is important in nature.

The spring program was based on environmental issues associated with Indiana Dunes. The program, “A Grain of Truth,” was designed to introduce the theme that the dunes at the national lakeshore are a dynamic place formed by the actions of glaciers, wind, and plants. At the end of the program, students should have been able to understand how and why humans impact the dunes and the influence humans have on the succession process of a dune ecosystem. A variety of other environmental issues was conveyed to the students during the interpretive hike.

To evaluate the impact the programs had on students’ knowledge, attitudes, and behavior toward the environment, a quasi-experimental design (Isaac & Michael, 1990) was implemented using an evaluation instrument that included 15 multiple-choice questions. This was a replication of an evaluation tool developed by Drake and Knapp (1994) and Bluhm, Hungerford, McBeth, and Volk (1995). The validity of this evaluation was established by a critique jury made up of Indiana Dunes interpreters, who confirmed that the instrument did reflect information, attitudes, and behaviors desired following a park program. During the fall, participating teachers administered the evaluation instrument 1 to 2 days prior to the “Habitats Hike” program (pretest) and after the class attended the program (posttest). During the spring, teachers were asked to administer the test twice, once before the “A Grain of Truth” program (pretest) and once after the “A Grain of Truth” program (posttest). The evaluation instrument remained the same throughout the fall and spring sessions. During the fall ecology program, 38 teachers (70%) returned the instruments for analysis. In the spring, the results of the pretest/posttest instrument were returned by 45 of the teachers (92%). All tests in the study were given in the classroom and then sent to Indiana University for analysis.

The evaluation instrument consisted of three sections: knowledge, attitude, and behavior intent. The first question determined whether the student had participated in Indiana Dunes programs the previous year. Five multiple-choice questions
evaluated the retention of key ecological concepts that were discussed during both interpretive field trips. The second set of multiple-choice questions measured potential attitude change regarding the resource site. The final questions determined whether intentions to perform positive environmental behavior increased following the interpretive experience. Figure 2 contains the evaluation instrument used in this study.

A repeated measures multivariate analysis of variance (MANOVA) was used to evaluate all 15 multiple-choice questions. This analysis was chosen to determine

<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
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<tr>
<td>1. My class visited Indiana Dunes National Lakeshore twice last year.</td>
<td>A. True B. False</td>
</tr>
<tr>
<td>2. Sand is made from _________.</td>
<td>A. rocks B. trees C. animals D. plants E. none of these</td>
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<tr>
<td>3. Which of the ways listed is NOT how sand moves?</td>
<td>A. rolling B. walking C. jumping D. flying E. skipping</td>
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<tr>
<td>4. Many different plants and animals living in an area is called _________.</td>
<td>A. adaptation B. extinction C. species diversity D. decomposition E. recycling</td>
</tr>
<tr>
<td>5. Which plant is usually first to grow on a sand dune?</td>
<td>A. oak tree B. cattails C. jack pine tree D. marram grass E. none of these</td>
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<tr>
<td>6. Which plant would you find in a marsh?</td>
<td>A. oak tree B. cattails C. jack pine tree D. marram grass E. none of these</td>
</tr>
<tr>
<td>7. Choose the face that best shows how you feel about Indiana Dunes National Lakeshore.</td>
<td></td>
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<tr>
<td>8. Choose the face that shows how you feel when you are in a forest.</td>
<td></td>
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<tr>
<td>9. Choose the face that best shows how you feel when you are on a sand dune.</td>
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<tr>
<td>10. Choose the face that best shows how you feel about this sentence: I would like to spend more time at Indiana Dunes National Lakeshore.</td>
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<tr>
<td>11. Choose the face that best shows how you feel about this sentence: I do not like to go to programs with the park rangers at Indiana Dunes National Lakeshore.</td>
<td></td>
</tr>
<tr>
<td>12. Choose the face that best shows how you feel about this sentence: When I go to a park it is important to walk only on marked trails.</td>
<td></td>
</tr>
<tr>
<td>13. Choose the face that best shows how you feel about this sentence: My own actions can help protect Indiana Dunes National Lakeshore.</td>
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<tr>
<td>Select the number of times you have done each of the following things in the past month:</td>
<td></td>
</tr>
<tr>
<td>14. Asked your family to go to Indiana Dunes National Lakeshore.</td>
<td>A. 0 B. 1 C. 2 D. 3 E. 4 or more</td>
</tr>
<tr>
<td>15. Picked up trash in your neighborhood.</td>
<td>A. 0 B. 1 C. 2 D. 3 E. 4 or more</td>
</tr>
</tbody>
</table>

Figure 2. Evaluation instrument.
whether the difference in responses over time was significant. Each question on the evaluation instrument was examined to determine whether a significant change occurred in students’ knowledge, attitudes, and/or behavior intent as a result of attending either interpretive experience. Two control classes representing approximately 70 students were evaluated and compared with the results of the experimental population during the fall session. Three control groups representing approximately 85 students were used in the spring.

Table 1. Fall mean scores

<table>
<thead>
<tr>
<th>Source</th>
<th>n</th>
<th>Pretest</th>
<th></th>
<th>Posttest</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Knowledge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
<td>695</td>
<td>2.04</td>
<td>1.31</td>
<td>2.39</td>
<td>1.32</td>
</tr>
<tr>
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<td>75</td>
<td>2.67</td>
<td>1.20</td>
<td>2.77</td>
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</tr>
<tr>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Treatment</td>
<td>760</td>
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<td>0.87</td>
<td>1.79</td>
<td>0.89</td>
</tr>
<tr>
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<td>1.71</td>
<td>0.84</td>
<td>1.65</td>
<td>0.77</td>
</tr>
<tr>
<td>Question 8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
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<td>2.07</td>
<td>1.06</td>
<td>2.02</td>
<td>1.01</td>
</tr>
<tr>
<td>Control</td>
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<td>0.96</td>
<td>2.04</td>
<td>0.85</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
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<td>0.97</td>
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<td>0.97</td>
</tr>
<tr>
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<td>1.13</td>
<td>2.05</td>
<td>1.14</td>
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<tr>
<td>Control</td>
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<td>1.02</td>
<td>2.21</td>
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</tr>
<tr>
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<tr>
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<td>3.64</td>
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<tr>
<td>Treatment</td>
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<tr>
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<td>1.13</td>
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<tr>
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<tr>
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<tr>
<td>Question 15</td>
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<tr>
<td>Treatment</td>
<td>746</td>
<td>3.31</td>
<td>1.68</td>
<td>3.30</td>
<td>1.66</td>
</tr>
<tr>
<td>Control</td>
<td>72</td>
<td>3.00</td>
<td>1.53</td>
<td>3.03</td>
<td>1.52</td>
</tr>
</tbody>
</table>
Analysis of Data
Each correct answer on the five-question knowledge portion of the instrument was awarded 1 point to create a knowledge subscale with a total possible score of 5. The attitudinal and behavioral questions were analyzed individually due to the unique content of each question. The mean and standard deviations for the fall pretest and posttest are presented in Table 1. The mean and standard deviations for the spring tests are presented in Table 2.

Table 2. Spring mean scores

<table>
<thead>
<tr>
<th>Source</th>
<th>Pretest</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Knowledge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
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</tr>
<tr>
<td>Control</td>
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<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
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<td>0.89</td>
</tr>
<tr>
<td>Control</td>
<td>2.15</td>
<td>0.87</td>
</tr>
<tr>
<td>Question 8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
<td>2.26</td>
<td>1.14</td>
</tr>
<tr>
<td>Control</td>
<td>2.15</td>
<td>0.96</td>
</tr>
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<td>Question 9</td>
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<td></td>
</tr>
<tr>
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<td>1.00</td>
</tr>
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<td>Treatment</td>
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<td>Control</td>
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<td>Question 11</td>
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<tr>
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<td>Control</td>
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<td>Control</td>
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<td>1.29</td>
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<td>1.31</td>
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<tr>
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<td></td>
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<tr>
<td>Treatment</td>
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</tr>
<tr>
<td>Control</td>
<td>3.10</td>
<td>1.56</td>
</tr>
</tbody>
</table>
A repeated measures multivariate analysis of variance (MANOVA) was conducted to test two research hypotheses: (a) the difference between the experimental and control group responses were not due to chance, and (b) the differences in responses from the pretest to the posttest were not due to chance. Table 3 presents the results of the analysis from both the fall and spring programs.

**Experimental Versus Control Groups**

Results from the between-subjects analysis indicated that for the fall program (ecology presentation) there was a significant difference ($p<0.01$) between the treatment and control groups on the knowledge portion of the instrument. Fall results also show that there was a significant difference ($p<0.01$) for one of the attitudinal questions and one of the behavioral questions ($p<0.05$).

In the spring (issue-oriented presentation), there was a significant difference

![Table 3. Multiple analysis of variance for program response](image)

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Fall</th>
<th>Spring</th>
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</tr>
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<td>2.12</td>
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<td>0.00</td>
<td>0.05</td>
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<tr>
<td>Question 9</td>
<td>1</td>
<td>0.00</td>
<td>28.01a</td>
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<td>11.95a</td>
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<td>16.49a</td>
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<tr>
<td>Question 15</td>
<td>1</td>
<td>2.53</td>
<td>4.84b</td>
</tr>
</tbody>
</table>

1Experimental vs. control groups.
2Pretest vs. posttest.
3$p<.01$.
4$p<.05$. 

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(p<0.01) between the treatment and control groups for six of the seven attitudinal questions and one of the behavioral questions (p<0.05).

**Pretest Versus Posttest**

In the fall, the within-subjects analysis indicated that there was a significant difference (p<0.01) from the pretest to the posttest on the knowledge portion of the instrument. The mean for the treatment group rose 0.35 points. There were no significant differences on the attitude and behavior sections of the instrument.

A significant difference from the pretest to the posttest on the knowledge portion of the instrument existed in the spring (p<0.01). The mean for the treatment group rose 0.67 points. There were no significant differences on the attitude and behavior sections of the instrument.

**Summary of Results**

This study looked at the difference in impact of an ecological and an issue-oriented interpretive experience. Between-subjects (treatment vs. control groups) and within-subjects (pretest vs. posttest) variables were used to analyze this impact. The fall ecology experience showed significant gains in knowledge of students who participated in the field trip versus those who did not. There were, however, no significant differences in attitude during the fall ecology program between treatment and control participants. Inversely, the spring issue-oriented programs resulted in no differences in knowledge but significant changes in attitude for the treatment group versus the control group.

A second aspect of this study involved the analysis of student responses to pre- and post-evaluations administered in both the ecology program and the issue-oriented program. The analysis of the pre- to posttest cognitive data revealed significant gains for both interpretive experiences. Students showed significant gains in resource site information following the ecology program and issue program.

On the other hand, students recorded no significant increase in attitude toward the resource site following their interpretive experiences. Both the ecological and issues program analysis showed no significant attitudinal changes from pre- to posttest. The students did not record an increase in positive attitude toward the park, the potential of spending more time in the park, or their own actions affecting the park’s protection.

The behavior intent data also showed no significant gains following either interpretive presentation. Students were not more inclined to ask their family to go to the Indiana Dunes National Lakeshore, nor did they increase their own positive environmental behavior of picking up more trash in their neighborhood.

**Discussion**

Analysis of the control and treatment groups along with pre- and posttest scores of treatment participants showed significant knowledge gains for the students who participated in the interpretive programs. The only exception to this was the results of the between-subjects group of the spring issue-oriented program. These data support the notion that an interpretive experience, whether ecologically based or issue oriented, can promote knowledge retention, and the data reinforced studies
that found students had retained information about the resource site following an interpretive experience (Koran, Koran, & Ellis, 1989; Lisowski & Disinger, 1988; Ramey, Walberg, & Walberg, 1994).

The significant gains in knowledge by students who participated in the ecology and issue-oriented programs reinforces the basic tenet of “revealing information.” In fact, this objective may truly be the most important outcome of interpretation. Today there is a growing sentiment among interpreters and environmental education professionals to return to the basics. In April 1997, a report from the Independent Commission on Environmental Education concluded that professionals in this arena should “place [their] primary emphasis on the acquisition of knowledge....Students should begin with a study of the environment before they are asked to take actions to save it” (p. 47). Weibacher (1994) brought this issue to the field when he stated, “Eight-year-olds should not be asked to become warriors or worriers. Children have much more important work to do: Watch ants. Grow flowers. Dance between raindrops” (p. 28).

Results regarding the impact on attitude and behavior were mixed. The differences detected between the experimental and control groups suggest that these interpretive programs may have an impact on attitude and behavior. In particular, the issue-oriented experience showed significant gains in attitude for students who participated in this program versus those who did not. However, the within-subjects analysis of differences from the pretest to the posttest for both ecology and issue-oriented programs did not show significant differences in attitudes and behavior.

These findings support the notion that interpretation has a more difficult time in proving its impact on attitude and behavior change (Cable et al., 1986; Gramann & Vander Stoep, 1987; Roggenbuck et al., 1982). Attitudes are conceptually complex and difficult to measure. Attitude and behavior evaluations such as the one implemented in this study require a great deal of skill, conceptualization, and analysis. In particular, the time variable becomes crucial in determining attitude changes:

The inability to demonstrate a change in attitude does not necessarily indicate an unsuccessful interpretive effort, however. An individual’s interpretive participation accumulates knowledge gradually. Every interpretive event won’t produce radical change of mind; several beliefs may have to change before an attitude changes (Knudson et al., 1995, p. 90).

The complexity of evaluating attitudes and behaviors in association with an interpretive experience suggests that qualitative and quantitative measures be pursued in future studies. Ham (1986) has suggested the use of qualitative methods such as open interviews with “audience members about their expectations, thoughts during the presentation, judgments about the content of or circumstances surrounding the presentation, and so forth” (p. 22). Triangulating studies with pre/post quantitative designs along with interview/observational strategies will improve the analysis of attitude. This new type of research agenda may help answer attitudinal/behavior impacts associated with environmental interpretation experiences. As Ham and Krumpe (1996) summarize:
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Because no single variable or measurement is sufficient to really understand the effects of a communication intervention, the use of multiple measures of impact will significantly improve our insight into how best to design and implement effective environmental education and communication interventions aimed at influencing people’s behavior (p. 21).

CONCLUSION

Many interpretation professionals believe their superordinate mission should be to change participants’ environmental behavior. As Roderick Nash (1991) states, “Interpreters have a challenge to help visitors realize the highest potential of a park or reserve…. The development of an environmental ethic might be thought of as the culmination of this process. It will be one of the most important frontiers of interpretation in the 21st century” (p. ii).

Research in interpretation and the related field of environmental education has suggested that there are three major variables associated with behavior change outcomes: entry level, ownership, and empowerment goals. This study evaluated the impact of two of these goal levels (ecological awareness associated with entry-level variables and issue awareness included in the ownership category) on students’ environmental knowledge, attitude, and/or behavior. The results supported the notion that both an ecological and an issue-oriented interpretive experience can impact knowledge. There was, however, no significant impact regarding change in effect or behavior. Participants in both the issue-oriented and ecological field trip showed no increase in effect toward the site, nor did environmental behavior increase following these experiences.

These findings promote the notion that an environmental interpretation experience can clearly fulfill the basic entry-level goals of resource site education. Whether the program involves an exploration of a park’s natural history or investigates its related environmental issues, the participant will come away with more knowledge. Unfortunately, as discussed in detail, the field is attempting to achieve much more than this basic retention of information. The justification that these types of programs can improve the way a visitor views the park—or behaves in it—is hard to attain. This should not be surprising given the formidable goal and the precious little time interpreters have to accomplish this task.

Do these results negate the importance or validity of developing interpretive programs that go beyond entry-level awareness? Should an interpreter who has only 90 minutes with his/her audience venture into the ownership/empowerment goals outlined in this paper? From these findings it could be inferred that it may be a futile course. But certainly more and different types of research must be accomplished to test this hypothesis. Conducting qualitative/observational evaluations may provide more insight into these questions and may be able to answer the dilemma presented at the outset: “What do I interpret when I only have an hour and a half with people who may never come back to the resource site?”
REFERENCES


AN ANALYSIS OF NORMATIVE MESSAGES IN SIGNS AT RECREATION SETTINGS

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Tempe, AZ

Abstract:
The reliance on signs as a mode of agency communication with visitors requires an examination of message presentation and content in order to evaluate message impact and effectiveness. This paper reports on a systematic evaluation of signs and messages at 42 recreation areas in California and Arizona. A number of factors, including type of site, managing agency, density of message locales, sign attributes, and message content, were examined. Messages addressing deprecative activities, and how those messages were framed, were of particular interest. The vast majority of messages presented behavioral commands (injunctive norms) and were negatively worded (proscriptive). This striking imbalance points to concerns in visitor information and education, allowing room for adjustments based on social-psychological principles of communication.

Keywords:
Norms, norm activation, descriptive norms, injunctive norms, proscriptive messages, prescriptive messages, interpretive effectiveness, recreation settings, persuasion, evaluation.

INTRODUCTION
Visitor information and education play an important role in natural resource management. Site information, including rules and regulations, needs to be relayed in the most effective and efficient manner possible. While face-to-face communication can be the most effective (Myers, 1990), agencies are hard pressed to support the trained personnel to provide information to on-site visitors at recreation areas.

Note: Accepted September 1998.
Signs are relied on in many recreation areas as the only contact that visitors have with the managing agency (USDA Forest Service, 1989), providing necessary information in the absence of agency employees (Shattuck, 1987). As agencies face decreasing budgets for on-site personnel, effectiveness of informational signs increases in importance. The purpose of informational signs is distinctly different from interpretive signs. Although both seek to provide an opportunity for education, the intent of compliance with regulations is implicit in the use of informational signing. Interpretive signs are a broader category of signage with varied purposes, including focusing on material that might enhance visitor appreciation of and familiarity with an area. At a minimum, informational signs provide some support to agencies when fines or penalties are applied to violators.

Effectiveness of informational signage is influenced by a multitude of factors. To have any impact on visitor behavior, signs must be noticed, read, understood, and presented in such a fashion that they have the potential to persuade individuals to conduct themselves in a desired manner (Zimbardo & Leippe, 1991). The presence of multiple signs can be problematic, such that only signs of interest in an area might be noticed and read; others will probably be ignored. It has been shown that information on rules and regulations is of little interest to recreationists (Chavez & Mainieri, 1995; Chavez, Winter, & Mainieri, 1995).

The number of messages within a sign is also important to consider. Assuming the multiple-message sign is read, it may contain more information than can be attended to and processed during a one-time reading. This would probably result in attention to only select pieces of information within a series of messages. Cole, Hammond, and McCool (1997) examined attention and comprehension of low-impact messages as a function of number of messages presented. Varying the number of messages from 2 to 8, they found that while time attended to the overall message presentation increased, attention to individual messages and message retention decreased linearly as number of messages increased.

The wording of messages presented on signs has two important implications. First, as the only contact visitors may have with the managing agency (Shattuck, 1987; USDA Forest Service, 1989), signs set the tone for the area. Signs can send a message of welcome to the recreational area, or just as powerfully they can indicate that the visitor is an unwelcome intruder who will be tolerated at best. Signs serve as one component in an area helping to establish environmental meaning (Rapoport, 1982). Second, when and if normative messages (rules and regulations fit this information type) are relayed in signs, they may be worded in a contradictory or counterproductive fashion. For example, a sign containing a message of “Please do not litter” may be paired with a graphic of a littered environment. Two messages are presented—one requesting that visitors not litter alongside another suggesting that people litter natural resource settings. The following discussion clarifies why this combination may be counterproductive.

Framing and Impact of Normative Messages
The activation of social norms is a useful tool in visitor communication and is possible through the presentation of normative messages in signs. If an agency can draw a person’s attention to what the desired behavior is through use of normative
information, an agency can often influence behavior. Norms can be relayed through directly observed action, inferred actions based on evidence of impact (e.g., presence of carving on a picnic table), and written or spoken messages (Gramann & Vander Stoep, 1987). Normative influences have been established as an important component of human behavior (Cialdini, 1993; Zimbardo & Leippe, 1991). Researchers have examined the role of social norms, distinguishing between two main types (Cialdini, Reno, & Kallgren, 1990; Cialdini, Kallgren, & Reno, 1991; Reno, Cialdini, & Kallgren, 1993). First, descriptive norms specify what most people do in a particular situation, easily understood as the “is” of behavior. They motivate by informing people of effective and adaptive action (Cialdini, 1996). Second, injunctive norms specify what is approved, or the “ought” of behavior. They are usually paired with some inference of reward or punishment for adherence to, or violation of, certain actions. Either type of norm, what is popular or what is socially acceptable, can motivate action (Buunk & Bakker, 1995; Cialdini, 1996).

Descriptive and injunctive norms can be framed in a positive or negative fashion. A descriptive norm, when framed in a positive fashion, is prescriptive and presents approved behavior through the actions of others. For example, the statement, “Most visitors dispose of trash in the receptacles,” is a prescribed-descriptive normative message. Descriptive norms, presented negatively (proscribed), offer disapproved behavior through others’ actions; an example is, “Many visitors leave litter in the campsites.” An injunctive norm, focused on prescribed behavior, presents a behavioral command, stated positively; an example is, “Please dispose of trash in the receptacles.” A proscribed-injunctive norm presents disapproved behavior; an example is, “Please do not litter” (see Figure 1).

Returning to the previous example of a sign stating, “Please do not litter,” paired with a graphic showing a littered environment, the normative perspective would contend that two contradictory messages are being presented. The sign’s

<table>
<thead>
<tr>
<th>Normative type</th>
<th>Descriptive (is)</th>
<th>Injunctive (ought)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prescriptive (positive)</td>
<td>Most visitors dispose of trash in the receptacles.</td>
<td>Please dispose of trash in the receptacles.</td>
</tr>
<tr>
<td>Proscriptive (negative)</td>
<td>Many visitors leave litter in the campsites.</td>
<td>Please do not litter.</td>
</tr>
</tbody>
</table>

Figure 1. A 2x2 matrix consisting of norms and how they are presented in recreational settings.
message requests that littering not occur while noting that littering does occur. From this perspective, a preferred approach would be to present a graphic depicting an unlittered environment, thereby aligning the injunctive and descriptive norms presented.

The implied purpose of a normative message is to inform the reader of acceptable behavior within a setting, many times only serving as a reminder to make the particular norm salient. In such cases, the message serves as a prompt. Bell, Greene, Fisher, and Baum (1996) note that prompts have been found to be most effective when they are specific rather than general, when the requested behavior is easy to comply with, and when the prompt is presented in a polite and non-demanding way.

A counterargument regarding effectiveness of prescriptive and descriptive messages can be made from the literature on fear appeals and protection motivation theory. From this perspective, negatively worded messages can be quite effective by motivating recreationists seeking to avoid physical, psychological, or social harm (Gramann, Bonifeld, & Kim, 1995). Likelihood of complying with or violating regulations was explored by Gramann and colleagues (1995) in a laboratory situation. They found that the stated likelihood of compliance was greater among those who were provided with reasons for regulations as well as those who were informed of “negative consequences for resources or for others” not obeying regulations (p. 340). Results were strongest when reasons for the regulations as well as the consequences of violating them were presented. A similar finding presenting effectiveness of stated sanctions was found in a field study conducted by Martin (1992).

It should be noted, however, that fear appeals are effective under conditions wherein the stated consequence is severe, is viewed as likely to occur in the absence of recommended action, and when the recommended action is viewed as effective (Petty & Wegener, 1998). In their contrast of positively and negatively framed messages, Petty and Wegener suggest that negatively worded messages are more effective when people are motivated to think about each piece of information in a message, whereas positively worded messages are probably more effective under situations of lesser scrutiny of wording.

Investigation into the use of various types of messages in recreation settings, and their positive or negative framing, remains underexplored. The majority of literature on fear appeals and protection motivation comes from the health arena (Petty & Wegener, 1998). Normative influences have been explored more directly through field experiments on littering conducted by Cialdini and colleagues (Cialdini, Kallgren, & Reno, 1991; Reno, Cialdini, & Kallgren, 1993). Given resource managers’ reliance on signs as an important communication device (Shattuck, 1987; USDA Forest Service, 1989), the presentation of normative information in signs at natural resource settings was explored.

AN ANALYSIS OF MESSAGE CONTENT AND PRESENTATION IN SIGNS
To examine key considerations in effectiveness of signs, including the presence and form of normative messages, a two-page coding instrument was constructed. The first page focused on aspects of the recreational site and data collection specifics, including date of coding, location name (e.g., name of park) and county, managing
agency, type of site, and density of message locales. Site was defined as an area where one or several types of settings are found, separated from other sites by at least 1/4 mile. Types of settings included campsites, information centers, lakes, picnic areas, rivers or creeks, scenic lookouts or points of interest, trails, or other. Multiple settings could be found at one site. The density of message locales was defined as the number of physically distinct locations within a setting in which messages of any type were presented. A coding rule was set such that, in addition to individual signposts being coded as unique message locales, a single signpost with messages facing opposite directions, for example, would be coded as two separate message locales because a visitor would not encounter both signs concurrently.

The second page of the coding instrument focused on the messages encountered and sign attributes, including identification of the sign (first three words of the message), whether there were multiple signs in the area that were the same, whether the sign was damaged, whether an accompanying photograph was taken of the sign (done when coding was difficult or questionable), message media density (number of signs per message locale), message density (number of deprecative messages and total number of messages per sign), location in the recreation setting, likelihood of encounter, likelihood of processing, content of message, and normative type. Likelihood of encounter and likelihood of processing were subjective judgments of recorders based on ranges in numbers of visitors who would encounter and process the information: less than 1/3, 1/3 to 2/3, and greater than 2/3. Although subjective, interrater agreement on likelihood measures, as well as all other items recorded, was at 74% or better during the pretest and reliability checks.

Forty-two sites were visited in southern California and Arizona in 1997. To capture a diversity of natural resource site types, the goal was to visit at least one campsite, information center, lake, picnic area, river or creek, scenic lookout or point of interest, and trailhead within two counties in southern California and four counties in Arizona. Sites were not randomly selected. Counties were selected based on proximity to each state’s research team location, with four counties from Arizona reflecting a larger research team in this state. The majority of locations (n=42) were at city parks (31%) or USDA Forest Service sites (26%), and 17% were other (unclassified categories), 14% state parks, 7% regional parks, 2% Bureau of Land Management sites, and 2% unknown. Types of sites included picnic sites (36%), followed by scenic overlooks or points of interest (14%), campsites (12%), information centers (12%), trailheads (12%), rivers or creeks (9%), and lakes (5%).

Average density of message locales was 17.2 across both states, though Arizona had a slightly higher average message locale density (17.6 message locales within a site vs. 13), California had a higher maximum (71 vs. 37). In total, 283 signs were analyzed. An average of 2.1 signs was found per “signpost.” Signs were most often located at the entrance to an area (35%) or near a built resource (23%) or a natural resource (14%). The likelihood of encountering signs was judged to be greater than the likelihood of processing information in the signs (Table 1). A larger percentage of signs was judged to be encountered and processed by a majority of recreationists at the Arizona sites than in California. Multiple versions of the same sign were found for almost 2/3 of the signs (60% were multiples). Differences by state were found in the use of multiple and unique signs. While Arizona signs were about half
multiple and half unique signs, the vast majority (86%) of signs at the California sites were found in multiples at the same location.

A further examination of messages on signs revealed an average of 4.4 messages per sign with wide variation (SD = 6.6). On average, 3.5 of these messages (SD = 5.5), or the majority, addressed deprecative behaviors. Thematic content of messages focused on a number of unanticipated themes, such as rollerblading, weapons, excessive noise, and gambling (coded as “other” and representing 60% of the deprecative messages in California and 29% in Arizona). Discussions among the research teams from each state pointed to a distinct site type difference for the two states such that the California sites were more urban than those visited in Arizona. Other thematic focuses encountered were messages about fire, littering, and camping (Table 2).

The distribution of normative messages focusing on deprecative behaviors, regardless of thematic content, revealed an imbalance in their framing. These messages were far more likely to be injunctive than descriptive. Descriptive messages were actually quite rare. Furthermore, among those signs relaying injunctive norms, there was a greater likelihood for messages to be prescriptive rather than prescriptive ($z = 4.41, p < .01$, combined state data). An examination of the within-state data showed more of a balance between prescriptive and proscriptive messages for Arizona than for California (Table 3), though a majority of proscriptive messages was still found (outside of conventional significance at $p < .20$).

A further difference between prescriptive and proscriptive signs, in this case related to the presence or absence of damage to the signs containing normative messages, was discovered. The percentage of damaged signs was twice as high for the signs depicting disapproved (proscribed) behaviors compared to signs depicting approved (prescribed) behaviors (12% vs. 6%, Table 4). Although the difference was not conventionally significant ($p = .15$), most likely due to the low sample size of damaged signs, it is still noteworthy.

**Summary and Conclusions**

Content and presentation of normative information through signs at recreation sites in California and Arizona were examined. Sites varied in type and were managed by a wide range of agencies. An average density of about 17 message locales
Table 2. Thematic focus of messages in signs

<table>
<thead>
<tr>
<th>Theme</th>
<th>Arizona (%)</th>
<th>California (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other*</td>
<td>29</td>
<td>60</td>
</tr>
<tr>
<td>Off-trail interactions</td>
<td>26</td>
<td>29</td>
</tr>
<tr>
<td>Fire</td>
<td>12</td>
<td>39</td>
</tr>
<tr>
<td>Camping</td>
<td>18</td>
<td>34</td>
</tr>
<tr>
<td>Littering</td>
<td>24</td>
<td>12</td>
</tr>
<tr>
<td>Pets</td>
<td>15</td>
<td>22</td>
</tr>
<tr>
<td>Removal of artifacts/veg.</td>
<td>8</td>
<td>28</td>
</tr>
<tr>
<td>Sanitation</td>
<td>13</td>
<td>4</td>
</tr>
<tr>
<td>Payment of fee/fines</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Wildlife</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

*"Other" consisted of nontraditional aspects of recreation, including rollerblading, gambling, and use of weapons.

Table 3. Forms of normative messages in signs

<table>
<thead>
<tr>
<th></th>
<th>Proscriptive (%)</th>
<th>Prescriptive (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona (n=149)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injunctive</td>
<td>56</td>
<td>44</td>
</tr>
<tr>
<td>Descriptive</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>California (n=77)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injunctive</td>
<td>81</td>
<td>17*</td>
</tr>
<tr>
<td>Descriptive</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

*z=5.66, p<.01.

Table 4. Whether signs were damaged by normative message type

<table>
<thead>
<tr>
<th></th>
<th>Damaged (%)</th>
<th>Undamaged (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proscriptive</td>
<td>12</td>
<td>88</td>
</tr>
<tr>
<td>Prescriptive</td>
<td>6</td>
<td>94</td>
</tr>
</tbody>
</table>

was discovered. Most signs were near an entrance, a built resource, or a natural resource. Hendee, Stankey, and Lucas (1990) suggested that the informing process in wilderness occur at an entrance, or outside of the wilderness setting, to preserve the recreational experience. In other areas, the intent of making the message salient where the behavior occurs might point to a different locating strategy. Slightly more visitors were likely to encounter the signs than would be expected to process, or comprehend, them. In many cases, multiple versions of the same sign were found within a site, especially in California. The majority of messages in the signs addressed depreciative behaviors, and several addressed “nontraditional” aspects of
recreation, including weapons, gambling, and rollerblading. A striking preponderance of negatively worded behavioral commands (proscriptive-injunctive) was revealed in the analysis of the messages in signs. This was especially the case for signs located in California, which were distinctly more urban. Descriptive messages were almost nonexistent. Additionally, negatively worded signs (proscriptive) were twice as likely to be damaged, probably a clear reflection of visitors’ attitudes toward them (Shattuck, 1987).

The analysis of signs presented herein points to an interesting dilemma in visitor information and education. If an area manager’s goals are to create a positive recreational experience and to gain visitor compliance with rules and regulations, then better attention to the presentation of normative information in signs is warranted. At the least, prescriptive messages should predominate over proscriptive ones. As suggested by Martin (1992), negatively worded messages might best be saved for serious rule violations or life-threatening situations. It is our contention that while most managers might agree that a positive (proscriptive) approach is desirable and potentially more effective, we suspect that signs are created as a reaction to a problem or the probability of a problem behavior. As a result, signs are created within a negative context, which spurs a proscriptive response. The importance of visitor information and education will increase in the future (Hendee, Stankey, & Lucas, 1990), and the inclusion of the social-psychological principles outlined here can add to the effectiveness of signs (Gardner & Stern, 1996). While visitors in fact may be getting the point of a message, with the signs serving as a reminder of desired actions, issues revealed in our analysis of signs would suggest a different approach to their construction. The greater damage evoked by proscriptive signage is instructive in this regard, suggesting a negative reaction by visitors to the negatively framed messages that predominate in recreational areas. A potentially adverse reaction directed at the managing agency was also described by Martin and by Bell, Greene, Fisher, and Baum (1996) under such conditions. Additional work in progress by the authors is focused on interpreters’ perspectives on potential effectiveness of various message types as well as actual behavioral changes witnessed in the recreational setting as message type is varied.

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APPLYING SOCIAL MARKETING TO INTERPRETATION

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Interpretation is a process requiring knowledge of leisure behavior, communications theory, education theory, natural and cultural resource management, social marketing, and pertinent informational content. Unlike students in traditional classrooms, the interpretive visitor has voluntarily approached the site and is generally looking for interesting entertainment (Ham, 1992). This creates a challenge for the interpreter to plan and deliver pleasurable, relevant, thematic presentations that meet the objectives of both visitor and sponsoring organization. To accomplish these challenges, an understanding of the audience is one among many sets of knowledge that are required. Through audience analysis we come to know who our visitors are, what they expect from their leisure pursuits, and how and why they choose to engage in certain forms of recreation (Hendon, 1981).

Interpretation provides benefits to all entities involved (Knudson, Cable, & Beck, 1995). The participants gain an increased understanding and enjoyment of the world around them and their own relationship to it. Society gains from having a more informed citizenry that understands its cultural and natural environment. “Interpretation also serves the owners or managing agencies by helping people understand the needs and processes of management and developing empathy with the organization through intelligent, nonpropagandistic explanations” (Knudson et al., p.55).

Field and Waggar (1973) state that one of the problems associated with the effectiveness of interpretation is the inadequate attention paid to visitor motivation and the frequent mismatching of messages to visitors. “Interpreters who know more

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about their audiences—who they are, their needs, and their opinions—are better able to plan for and deliver effective, high-quality interpretation” (Medlin, 1994, p. 170). Meredith, Mullins, and Fortner (1995) and Atkinson (1997) are still voicing Field and Wagar’s concern nearly a quarter of a century later. They suggest that the need still exists in the interpretive arena for further development of visitor profiles to establish visitors’ motivations for interpretive participation. Hendon (1981) points out that individual consumers make choices as a result of their preferences relative to their recreation skills, age, gender, family status, and so forth. These choices also are affected by barriers and opportunities in society (demographic and geographic), so researchers must have an understanding of both the personal and social self of the individual (Hendon, 1981).

Considering the underlying principles of people’s decisions, McTeer (1972) reports that motivational choices are a factor of the organism, the environment, social relationships in the environment, internal factors (both physiological and mental), and the temporal setting (infancy, childhood, educational past, recent past, and anticipated future). To delve into personal-social motivations and human social relationships, one should consider background factors (climate, culture, and society that created and continued a community) and observe, analyze, and identify activities and expectations associated with specific situations in a community (McTeer).

Recreation behavior has much to do with McTeer’s conceptualizations. Driver and Tocher (1968, pp. 12–13) explain that “changes in tastes and preferences for different recreational engagements must be explained by learning” and that recreation can be viewed as a “response to a multitude of motivating forces which may exist independently or in some combination simultaneously.” Recreation supplies people with “interesting opportunities to engage in the most complex and ‘highest’ forms of human behavior—learning, problem solving, creativity, and self-actualization” (Driver & Tocher, p. 14). Motivations to recreate could be pursuit of social identity, a source of esteem, skill development and a need to achieve, collection of status symbols (e.g., rocks, pictures, etc.), and/or to satisfy exploratory needs. Also just having the possibility to get away from the routine is a valuable source of motivation to recreate (Driver & Tocher).

With changes in societal structure and increasing time constraints on individuals, the competition within recreational pursuits is high (Rapoport & Rapoport, 1975). For the interpreter to “capture a share of the audience,” the prospective clients must deem the interpreter’s message to have value (Mullins, 1984). To present a message that has value to an audience, many things have to be considered, particularly audience analysis—expectations, motivations, and the type of recreational pursuits preferred.

The social marketing approach to audience analysis provides a method for conducting audience analysis and understanding what audiences want. Social marketing approaches can be used in “building a long-term relationship between your organization and its different audiences” (Shewchuk, 1994, p. 2). This concept has been used to promote products and services in the private sector for decades, yet it is often underused by organizations providing interpretive programs.

Marketing is based on the use of the “Four Ps”—product, price, promotion, and place—with regard to the allocation of resources to them. Although most organi-
organizations have a thorough understanding of this from their perspective, applying it to the audience's perspective is where the field of interpretation needs to focus. "You can only know what's important to your audience by stepping into their shoes" (Shewchuk, 1994, p. 6). The focus should now lead to understanding consumer wants and needs, the cost on the part of the consumer to satisfy those wants and needs, convenience to obtain satisfaction from the product, and communication between the consumer and the organization (Shewchuk).

The audience can therefore be seen as "purchasers" (Fine, 1990). As such, it is crucial to determine who the clientele are and to understand their wants and needs in order to better reach them with a particular service. Clientele often are categorized through a process called market segmentation, which "divides the total market into segments consisting of customers with homogeneous needs/wants and resources" (Sheth, 1990, p. 132). Market segmentation allows an organization to use customer categories to decide whether to focus their promotional efforts on all of the segments or only specific publics. According to Sheth, segmenting the market is of particular importance when time and money resources are diverse, as is the case when making choices about recreational opportunities, including participation in interpretive activities.

The lack of application of marketing theory to social concerns such as education and interpretation may be linked to the negative concept of "hard selling." Often product marketing is still equated with the hard sell; in reality social marketing seeks to find a market niche based on need or want within some sector and providing for (selling to) those wants or needs. Of course, advertising is intended to stimulate or heighten that need/want.

This orientation to marketing can be applied to social concerns, that is, social marketing. Although the goal of social marketing is not exchange of a product for cash, interpreters still exchange services for political support, tax/funding support, and more and more frequently, cash support in private sector enterprises.

Persons wanting to explore social marketing further should read such books as Andreasen (1995); Fine (1990); Fine (1992); Goldberg, Fishbein, & Middlestadt (1997); and Kotler (1989). For example, Andreasen's work contains chapters on "customer first," "the management process," "segmentation strategies," "new behaviors," and "benefits and costs." Although these are not new concepts, when taken collectively they provide a different way of looking at our clients and what we deliver and why. The concept of social marketing ultimately moves us away from a product orientation (i.e., the program we deliver) to a process orientation that gives equal weight to who wants what when, where, and why; at what cost to whom; and to the resource—all before we define the product.

Approaching visitor analysis through social marketing provides a viable opportunity for creating distinction among visitors. It also enhances the understanding and application of the results. Longitudinal data—data gathered over time, place, and from a sample of all publics (both visiting and potential)—will yield adequate data for decision making. Furthermore, longitudinal data, properly gathered and managed, will yield a plethora of information to permit market segmentation based on numerous variables (e.g., weekend vs. weekday users, nature enthusiasts vs. picnicking publics, etc.).
We believe that, given the sophistication of research methodologies, the availability of low-cost powerful computers, and the ease of use of data analysis packages, all interpretive organizations can readily expand their emphasis on audience analysis. We offer a word of caution, however. Counting and questioning without a grounding in theory may lead to erroneous conclusions or yield sets of data without much utility. The aforementioned references provide that theoretical grounding.

As the demand for resources and recreational opportunities increases and the availability of resources per capita decreases, the connection with the community will need to increase to continue the current level of service and public support. This may require the community to have more access to information, resources, and decision making within the organization—often referred to as an ecosystem approach. The ecosystem approach stresses that our decision making, planning, and programming be viewed in a more biogeopolitical regional (ecosystem) context rather than only focusing on our organization's political boundaries. It is in this context that the role of the interpreter, especially one who knows how to link with market segments, can excel.

The call made here is for a greater understanding of our clientele. Such calls are easily dismissed as research for research's sake. Perhaps that arises from a history of too many studies yielding data that (a) are not grounded in theory and (b) have created no framework prior to the study for interpreting and applying the outcomes. Continued attention to the matter is critical as the field of interpretation moves from data, to information, to knowledge.

From theory, to concepts, to research design, to application of findings is the logical process of discovery and use of knowledge. Discovery and interpretation of new information are the hallmarks of successful enterprises. The challenge before us in the interpretive field is to shift our discovery and application energies to increased audience analysis so the programs we develop for our audiences will be well received and rewarding to our clientele, will fulfill management goals, and will provide for greater ecosystem restoration and protection.

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RESEARCH BRIEFS

A CASE STUDY OF COMMUNICATION WITH ANGLO AND HISPANIC WILDERNESS VISITORS

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Educating, interpreting for, and communicating with wilderness visitors is necessary to promote appropriate low-impact wilderness recreation. The Angeles National Forest is located northeast of Los Angeles and is surrounded by a large and ethnically diverse population that provided a potentially ethnically diverse sample of wilderness visitors for the purpose of this study. This study assessed the types of visitors coming to the Cucamonga, San Gabriel, and Sheep Mountain Wildernesses on the Angeles National Forest and provided a basis for understanding their behavior, attitudes, and needs regarding their wilderness experience.

Data collection occurred at six heavily used trailheads within the three wildernesses. On-site observation and on-site minisurveys followed by mail surveys were employed to collect information. On-site minisurveys collected limited information regarding the visitors and provided a place for willing participants to provide their address for the mail survey.

One hundred forty-one visitors returned a mail survey. Of these, 50 had visited the Cucamonga Wilderness, 69 had visited the Sheep Mountain Wilderness, and 22 had visited the San Gabriel Wilderness. Most respondents were Anglos (73%), though 12% were Hispanic, 9% were Asian, 3% were African American, and 4% chose multiple categories or “other.” Both the on-site observations and the mailed survey reflect higher levels of ethnic diversity than found on other wildernesses but lower levels of ethnic diversity than the southern California population in general (Cole, Watson, & Roggenbuck, 1995; Chavez & Parker, 1995; Winter, 1996).

Education levels of visitors were higher than the general public; this is consistent with other wilderness user studies (Cole et al., 1995). Education level did not differ significantly by ethnic group.

Only 25% of respondents had contact with the Forest Service prior to or during their visit to the wilderness. Twelve percent of Hispanic respondents and 24%

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of Anglo respondents reported contacting the Forest Service, most stopping at a ranger station (15%) or a visitor center (10%). Very few respondents contacted the Forest Service prior to visiting (4%). Friends and family were the most frequently reported source of information by both Hispanic and Anglo respondents, followed by maps and trail signs for Anglos and road signs and trail signs for Hispanics.

Both Hispanic and Anglo respondents expressed greatest interest in receiving information from printed material that they could take with them, such as maps (Hispanics 71%, Anglos 74%) and brochures (Hispanics 82%, Anglos 85%). Respondents also expressed an interest in receiving information from trail signs (Hispanics 41%, Anglos 50%) and road signs (Hispanics 41%, Anglos 30%). One-third of respondents desired personal contact with the Forest Service. Hispanics and Anglos differed slightly in their favored information media ($\chi^2$ $p=.05$, respectively). Hispanics preferred television (29%) and radio (18%) slightly more than Anglos (11% and 3%).

Respondents reported interest in a variety of topics associated with wilderness. The most frequently selected topics by Hispanics included plants and animals, trails and landscape, tips on wilderness travel, and rules and regulations. Anglos most frequently selected trails and landscape, similar places, and plants and animals.

This research represents a case study of a unique, heavily used national forest. Information from this limited study can be used to build an understanding of wilderness visitation and to develop larger and more general studies of ethnicity and communication about wilderness in the future.

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DESCRIBING TRAILS: DISTANCE OR TIME?

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During meetings of the design team for trail systems at Cleveland Metroparks, an unresolved point of discussion was how to describe trails on visitor maps. Should they be described in terms of distance only, or should “time to complete” be added? Some members of the design team were concerned that “time to complete a trail” should be added because many people from urban environments might not have an accurate concept of how long it takes to walk a mile. This study documented the degree of consensus in an urban population about travel time on foot.

In the past 20 years, studies indicate that professionals often overestimate the abilities of laypersons to understand and apply the formal knowledge of their profession. The often lengthy process of education and accumulated experience involved in becoming a professional has dual outcomes. First, the process creates a qualified professional, but it also molds a person who perceives tasks that were initially difficult as being simple. Many professionals have responded to this phenomenon by conducting evaluative research that helps them judge the appropriateness of services provided to clients. For instance, many “human dimensions of wildlife” studies document the range of attitudes people hold toward animals and what different age groups know about animals. This information is helpful to educators designing programs for people without a formal background in the biological sciences. Because many of these studies have been eye-opening, environmental educators and interpreters are increasingly asking themselves whether their audiences understand basic concepts that a few years ago interpreters assumed were common knowledge.

Members of the Cleveland Metroparks trail map design team knew that a mile of flat trail could be covered in about 20 minutes and could readily calculate how long it takes to hike a flat trail of a known length. But as professionals, they knew to question whether others accurately knew this time-distance relationship. If park visitors underestimate the time it takes to walk a trail, they will fail to reach a desired destination and probably be disappointed. Particularly in urban–wildland interface parks where visits often take place on weekday evenings, an underestimation of time can also mean a hiker may be stranded on a trail after dark. Conversely an overestimation of time to hike a trail may result in a decision not to start a hike.
A search of fitness literature provided a definition for an accepted “average” walking rate for adults for 1 level mile. Three miles per hour is considered “slow” (Joyner, 1992). The “slow” rate translates into 20 minutes to walk 1 mile. Because a further search of the literature found no references to how people perceive time and distance relationships in recreation and tourism settings, a simple study was conducted.

Adults visiting a large regional zoo were asked: “How long do you think it would take the average person to walk 1 mile over a flat route?” Every second group of zoo patrons was intercepted as they passed a point between exhibits. They were also asked if they were residents of the immediate county, the adjoining six counties, or outside the region. This question was a control for travel experience because zoos do attract out-of-region visitors who may travel more and consequently know more about distance. Gender and race were recorded by the interviewer based on visual clues. Eighteen of 305 visitors who were approached declined to participate. The study participants represent a cross section of the general population in the sense that almost everyone visits a zoo sometime in their life, but is skewed toward families with children. The zoo attracts a largely urban population of potential trail users of the park district.

The mean perceived “average time to walk a mile” was 17 minutes, and the median was 15 minutes, but the responses ranged from 1.5 to 60 minutes. The distribution of estimates was divided into quartiles. A quartile represents 25% of the distribution. The lowest quartile had a range of 1 to 9.5 minutes, the lower middle quartile had a range of 10 to 13.5 minutes, and the upper middle quartile had a range of 15 to 18 minutes. The upper quartile had a range of 20 to 60 minutes. Just over 5% of those surveyed estimated it took between 30 to 60 minutes for an average person to walk a mile. Twelve people responded that they had no idea of the correct answer. Statistical tests were conducted to determine if race, gender, or place of residence were related to the respondents’ estimates of average time to walk a mile. No significant differences were found.

Even though the mean estimated time to walk a mile was a reasonable 17 minutes, the range of answers raises some concerns. About half the sample underestimated the amount of time needed. Fifty percent of the sample thought it took an average person less than 14 minutes to walk a mile. About 5% gave estimates between 30 and 60 minutes. To the extent that the sample is representative of potential trail users, about half of all people will underestimate travel time (<14 minutes per mile), while about one in 20 will overestimate travel time (>30 minutes).

Some respondents indicated their estimate of 20 minutes was learned from fitness literature, whereas others “walked it on the treadmill.” One respondent, who answered that it took only 1.5 minutes to walk a mile, steadfastly asserted to a companion, “I know we did it!” This person may have misinterpreted a tenth of a mile marker for a full mile on a fitness trail.

What is the best way to describe a trail on a map? Including the time needed for completion, as well as distance information, may be worthwhile for parks interested in expanding the diversity of people using their facilities. Such an addition demonstrates sensitivity to the needs of novice park visitors. This information can
be added to each trail description or as a separate note near the trail descriptions suggesting an average travel time for an adult. The latter information can be used by hikers to make their own estimates. Travel time awareness can also be developed in other ways. During programs for children that involve hiking, naturalists may want to ask children to guess how long it will take to hike a trail and see who is the closest at the end of the hike. Similarly, environmental educators using across-the-curriculum strategies may want to offer mathematics problems that involve calculating travel time on hiking trails.

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By Robert Cialdini
Reading, MA: Addison-Wesley Publishing Company

Influence: Science and Practice, by Robert Cialdini, is a very readable book dealing with the principles of persuasion that one can take along for recreational reading on trips. Conversely, it presents scientifically documented research evidence on the topic, making it a work of solid academic integrity. Cialdini has achieved the nearly impossible. He has written a useful book that masterfully bridges the realm of academic research with popular literature, illustrating that works of academic importance can be made readable and fun. Perhaps this book can be viewed as a prototype for future academic writing.

This practical book thoroughly examines and explains the complex and often confusing psychology of compliance and persuasion. The first edition of this book was published to appeal to a “pop” readership. The subsequent requests from the academic community gave birth to the classroom-compatible version that includes citations for the information and examples contained in the book, making it useful for various areas of study. Personally I came across this book as a required text in a doctoral-level social-psychology course during my graduate program. The following semester, I incorporated the book as a text in undergraduate interpretation and public relations courses that I taught. Cialdini’s text consistently received the highest rating by students. Influence: Science and Practice has similar relevance for those interested in the subjects of business, marketing, journalism, psychology, management, or communication.

Influence: Science and Practice contains relevant discussions of the explanation and application of the principles of persuasion. The chapters are presented to identify and explain different psychological processes that occur when these persuasion principles are enacted, including reciprocation, consistency, social proof, liking/similarity, authority, scarcity, and psychological reactance. Chapters are filled with real-life examples to clarify the details of each principle. With examples of how people are often tricked into acting against their will, it is no wonder that Cialdini has titled his first chapter “Weapons of Influence.” In the hands of unscrupulous practitioners, these powerful psychological tools can influence people to act and think in ways controlled by someone else. Cialdini illustrates how the principles of persuasion are enacted and offers suggestions for defense against these attempts.

How can a book that explains the phenomenon of why someone winds up buying items he or she does not need at the grocery store, or how brave U.S. soldiers could have been brainwashed during the Korean War, be useful for interpreters? In the hands of an unethical communicator, the principles of persuasion

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can be weapons. In the hands of a skilled interpreter, these principles can be useful interpretive tools that can help our publics grasp a deeper understanding of the interpretive effort. For example, Cialdini details the “principle of scarcity,” where a real or contrived scarceness of a resource creates an interest in the resource. The recent rage of purchasing inexpensive but limited quantities of small stuffed animals at exorbitant prices is a good illustration of this principle. Used by interpreters, this principle may motivate visitors to focus on the importance of limited or dwindling cultural or natural resources.

*Influence: Science and Practice* is a book about the psychology of persuasion and compliance that belongs in the library of anyone interested in the art, science, or magic of communication. It is a masterful work highly significant for interpreters. We can only hope that Cialdini will produce other such works in the future.

Reviewed by Cem M. Basman, Ph.D., Department of Forestry, Southern Illinois University, Carbondale, IL 62901.

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*Recreation Programming: A Benefits-Driven Approach*

By Richard A. Kraus

Boston, MA: Allyn & Bacon, Publishers


Traditionally most interpreters have received their formal training in natural resources, history, or graphic design curricula. However, because interpretation provides recreational experiences, outdoor recreation and leisure studies curricula have much to offer interpreters. One particularly relevant body of knowledge and coursework is a recent textbook in this field titled *Recreation Programming: A Benefits-Driven Approach*. This book may be of interest to practicing interpreters and to those who train or supervise interpreters.

The purpose of this text is to encourage readers to structure recreation opportunities that achieve significant social and/or economic outcomes while simultaneously matching agency missions and enriching the lives of individual participants. The theme is pervasive throughout the decision-making process, wherein program planners are challenged to consider the many possible impacts of their choices in pursuit of specific outcomes.

This “benefits approach” entails a logical blend of key features of other common approaches, including the human services approach, the marketing approach, and the quality of life concept. Because it is a hybrid, it relieves the author from burdening the reader with complex theory, as might be necessary with a more novel idea. Enough history and theory is provided for an adequate perspective and justification of opinions but not so much as to bog down the reader.

The book is timely in its focus on benefits and does more than simply employ the popular lexicon. The text challenges programmers to explore partnerships and facilitate quality leisure experiences in both diverse and nontraditional settings.
incorporates a needed focus on intercultural understanding, including such contemporary issues as ethnicity, the special needs of women and girls, at-risk youth, rage and violence, and inclusive ideas for persons with disabilities.

As an educator, I particularly like the linkage of the learning objectives expected by the Council on Accreditation of the National Recreation and Parks Association to the content included in each chapter. This approach would be a nice addition to many texts in this field. Besides its cognitive assistance, this format supplies evidence of the text’s comprehensiveness.

One area in which the text is lacking is in its provision of the necessary tools and techniques to help the programmer actually accomplish the outcomes desired. For example, 10 program areas are covered in one chapter, leaving little opportunity for the reader to acquire a thorough understanding of any one area. While readers will gain an understanding of the value of athletic programs, they will lack an understanding of the methodology used in developing specific sport experiences.

Overall Kraus charts enough new ground in Recreation Programming that it should be part of every leisure service professional’s library. It includes well-cited examples of the prior art and broadens the reader’s concept of what quality leisure services can and should be. With supplemental coverage of tools and methods, the text will be quite adequate for the majority of recreation-programming courses.

As for interpreters, the concepts presented in this text are adaptable to interpretation settings where field interpreters, planners, and administrators strive to produce benefits associated with the delivery of high-quality, meaningful, and appropriate leisure experiences. This introduction to recreation programming and similar concepts from the field of leisure sciences will broaden traditional interpreters by giving them new tools and new perspectives on their important work.

Reviewed by Sid Stevenson, Ph.D., CLP, Department of Horticulture, Forestry and Recreation Resources, Kansas State University.
Information for Authors

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