Toward Effective Interpretive Signs, Trails and Wayside Exhibits

A summary of current design techniques and future research needs

by

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Chapter 1

Problem Statement

Importance of this Study
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Problem Statement

Importance of this Study

Today's visitors to natural and historical areas come for relaxation, recreation, inspiration, and education. Naturalists or interpreters help visitors achieve these goals. They also enhance the visitor's experience at the site. Interpreters can explain historical or natural processes, events, or objects the visitor may not understand and miss. Interpretation is the communication link between the visitor and the natural, cultural, or historical resources of a site (Sharpe, 1982). It is also a method of site protection.

Interpretation can benefit the site by fostering responsible visitor behavior and, can benefit the managing agency by increasing visitation revenue and improving public image. With interpretation, the resource manager can improve public understanding of park policies and regulations (Vander Stoep, 1987). Interpretation can help people understand the dynamics of natural environments and the consequences of their actions, possibly fostering an environmentally responsible citizenry (Wagar, 1973).

There are personal and non-personal methods of interpretation. Trail walks, interpretive talks, slide shows, and campfire programs are all personal interpretive methods. Here, the interpreter is in direct contact with the visitors. When the interpreter is not available, visitors frequently encounter non-personal interpretation in the form of interpretive signs, wayside exhibits, and self-guided trails. These methods are popular with both the visitor and the interpreter because of their benefits.

Interpretive signs, trails, and waysides are relatively inexpensive to produce and maintain, are self-pacing for the visitor, and are in place at all times (Sharp, 1982). However, to be effective they must be well planned and designed.

Effective interpretive sign, trail, and wayside exhibit design, requires the talents of a writer, artist, graphic designer, historian, and researcher. Few individuals are expert in such diverse areas. Budget or personnel constraints often leave poorly trained interpreters or resource managers in charge of the production of signs, trails, and wayside exhibits.

While some research has been conducted and literature is available on interpretive sign, trail, and wayside exhibit development, it is scattered throughout a variety of disciplines. Professionals have expressed a lack of time and available resources to locate these studies on their own (Moore, 1989). A comprehensive guide, consolidating the most recent information available, would help interpreters and resource managers effectively design interpretive signs, trails, and wayside exhibits. This is only a partial solution however. Gaps in research still exist, limiting the development of effective interpretive sign, trail, and wayside exhibits.
Agencies have shown a limited ability to understand and then practically apply and implement the recommendations from research (Dick, McKee, and Wagar, 1974). This suggests miscommunication between researchers and practitioners as to what is needed. Practitioners suggest that research studies frequently do not build upon one another, address questions pertinent to the practicing professional, or offer practical applications to their discoveries (Dick, McKee, and Wagar, 1974). There is a need to identify research questions that directly apply to the infield professional (Moore, 1989). Identifying prioritized research questions related to interpretive signs, trails, and wayside exhibits from both the researcher's and practitioner's viewpoint would help bridge these gaps.

**Problem Statement and Objectives**

**Problem 1**

Information on designing and maintaining effective signs, trails, and wayside exhibits is scattered throughout professional and governmental literature. This creates a problem for the resource manager and working interpreter who needs to gain access to this information easily and quickly.

**Goal 1**

To review the most current literature available on signs, trails, and wayside exhibits and provide a summary and bibliography of these resources.

**Objectives:**

1. To review the literature related to effective sign, trail, and wayside exhibit design and maintenance techniques.
2. Using telephone interviews, obtain opinions on effectiveness of techniques currently used by interpretive businesses and/or governmental agencies.
3. To write a summary of the literature and interviews and provide a bibliography of the most valuable current resources for indepth reading on signs, on trails, and on wayside exhibits.

**Problem 2**

Research in interpretive signs, trails, and wayside exhibits must be identified and prioritized to produce results resource managers and interpretive professionals can use.

**Goal 2**

To identify research questions related to interpretive signs, trails, and wayside exhibits important to the interpretive profession and suggest priorities for future research.

**Objectives:**

1. To establish a panel of interpretive experts to assist in identifying research questions related to signs, trails, and wayside exhibits.
2. Using the Delphi method, obtain responses to preliminary questions, develop a revised set of research questions, and suggest priorities for future research related to interpretive signs, trails, and wayside exhibits.
**Assumptions and Limitations**

The following limitations were identified during the literature review and compilation of a comprehensive guide on interpretive signs, trails, and wayside exhibits.

**Problem 1: Literature Review for a Comprehensive Guide**

**Limitations**

1. Articles, master's theses, and PhD work on interpretive signs, trails, and wayside exhibits are sometimes unavailable for interlibrary loan or are unpublished.
2. Some areas of sign, trail, and wayside exhibit development lack reported research.
3. Information written prior to 1970, on interpretive signs, trails, and wayside exhibits, is used only when more current information is not available.
4. Many articles are repetitious. Only those most valuable to this study are included in the bibliographies.
5. Considerations for planning, layout, design, material selection, maintenance, and vandalism control are included. Construction techniques were not researched.

The following assumptions were made and limitations identified in using the Delphi method to recommend directions for future research.

**Problem 2: Future Research Questions Delphi Survey**

**Assumptions**

1. Delphi panel members will have expertise in the area of signs, trails, and wayside exhibits (Sprovil, 1980).
2. Delphi panel members will also have a working knowledge of research in this area.
3. Expert opinion will be better if experts respond independently (Sprovil, 1980).
4. Opinions will be improved if respondents are allowed to modify their responses after receiving feedback on how the rest of the group responded (Sprovil, 1980).
5. Several rounds of questionnaires and feedback will result in a consensus of opinions (Sprovil, 1980).

**Limitations**

1. Panel members' survey answers will be limited by personal time constraints and by the study response deadline.
2. The majority of communication between panel experts and the researcher will be by mail. This leaves opportunity for misinterpretation of survey results. However, when doubt exists over a survey answer, the researcher will question the respondent by phone.
Definition of Terms

The following are brief definitions of terms used in this report:

**interpretation** - The communication link between the visitor and the resources of a site (Sharpe, 1982). An educational activity aimed at revealing meanings and relationships through the use of original objects, firsthand experiences, and illustrative media, rather than simply communicating factual information (Tilden, 1977).

**effective** - Producing a desired result, making a striking impression (Webster, 1984). Recall of a basic message (Fine, 1963).

**exhibit** - A device that publicly displays text, photographs, and objects to inform while enhancing visitor enjoyment and appreciation of a natural or cultural resource while creating a feeling of warmth and welcome in a public place (Sharpe, 1982).

**wayside exhibit** - An outside exhibit or kiosk, usually larger than an interpretive sign, affected by environmental factors such as light, moisture, and other climatic problems (Sharpe, 1982). They interpret a unique feature, process, object, organism, or event in the same manner as interpretive signs (Sharp, 1982; Tilden, 1977). However, their theme is broader, not part of a series, and possibly displaying objects, sketches, or charts under a protective covering (Grater, 1976).

**interpretive sign** - A sign, often in a theme based series, designed to bring natural processes, historical events, physical features, objects, or organisms of the site to the visitor's attention while provoking a feeling of participation and personal discovery, revealing new information, and relating to the visitor (Sharpe, 1982; Tilden, 1977).

**administrative sign** - A sign designed to identify an entrance, orient the visitor, present information and rules, or offer direction (Sharp, 1982).

**vandalism** - Malicious or ignorant destruction of public or private property (Webster, 1984). Willful acts of destruction that lower the aesthetic or economic value of an object. Reckless destruction of property (Madison, 1970).

**interpretive trail** - A path that places visitors in direct contact with the park or forest resource and uses interpretive signs, wayside exhibits, or naturalist led hikes (Sharpe, 1982).

**self-guided interpretive trail** - An interpretive trail where visitors are guided along the trail with non-personal interpretive methods including brochures keyed to markers or landmarks, fixed signs, or audio devices (Sharpe, 1982).
Procedures and Methods

Problem 1
Literature Review Methods for a Comprehensive Guide

Library Search
A literature search was conducted to gather information on effective sign, trail, and wayside exhibit development. A computer library search identified initial information sources. Bibliographies from these sources and interpretive bibliographies and manuals, were also reviewed. A computer search was conducted by the research librarian on pertinent data base systems at the University of Wisconsin, Stevens Point. As suspected, articles describing effective sign, trail, and wayside exhibit design and maintenance techniques were scattered throughout many sources (see Appendix 1 for a list of literature review materials).

In some cases articles were very difficult to obtain. The UW-SP interlibrary loan service assisted in the acquisition of materials unavailable on this campus. Staff and researchers from Michigan State University also supplied relevant information and useful bibliographies.

Information was photocopied, filed, and subtopic areas determined. The most current and useful resources were listed in bibliographies (see Appendix 5). While this initial information search provided a great deal of background information, many sources were outdated. More current information was needed.

Telephone Interviews
In an attempt to obtain more recent information and opinions on effective techniques and materials currently used in signs, trails, and wayside exhibits, telephone interviews were conducted with various interpretive businesses and governmental agencies. Telephone interviews were selected over mail questionnaires for several reasons. Many of the questions were broad and open ended. In order to obtain clear, concise, and in-depth answers it was necessary to follow up and ask for clarification. Generally, mail questionnaires do not have a high completion and return rate. Using phone interviews increased the chances of obtaining responses (Dillman, 1978).

Interpretive consultants with expertise and a good reputation for quality work in interpretive sign, trail, and wayside exhibit planning and design were selected. Many initial contacts were made at the 1989 National Association of Interpreters (NAI) conference in St. Paul, Minnesota, November 6-10, 1989.

The interviewees were first contacted with a letter explaining the project and requesting their assistance. The telephone interview questions were included in the letter. They were contacted by phone seven days later and interviews were scheduled. All interviewees had ample time to review the questions prior to the telephone interview.
Nine interpretive consultants were interviewed, from eight separate businesses. Through these initial interviews three National Park Service professionals working on signs, trail, and wayside exhibits, were also identified, contacted, and interviewed. Interviews lasted from one hour to one hour and forty-five minutes (see Appendix 2 for phone interview results).

Journal articles, books, and diagrams were located through a university library computer search, through ERIC, Comprehensive File of Agricultural and Biological Abstracts, National Technical Information Service and CAIN AGRICOLA systems. A variety of research bibliographies, Forest Service, and Department of Natural Resources manuals were also used. This information along with the telephone interview results were compiled by subject areas, reviewed, and summarized into chapters two, three, and four (Appendix 1).

Problem 2
Future Research Questions Delphi Survey

The Delphi Method

The Delphi method was employed to identify research questions related to interpretive signs, trails, and wayside exhibits, important to the interpretive profession and to suggest priorities for future research.

The Delphi method is a systematic survey technique where a group of experts independently respond to several rounds of surveys. Typically, the Delphi panel deals with broadly defined problems. The objective of a Delphi survey is to derive a consensus of opinion regarding future events (Leitch, 1984).

Delphi Panel Selection

Critics of the Delphi technique suggest that the nature of the selection process of Delphi panelists must be identified (Leitch, 1984). In this research study, individuals, expert in one or more of the areas of interpretive signs, trails, and wayside exhibits, were identified during the literature review and by committee members. Criteria for selection of panel members included that they had:

1) knowledge of research in signs, trails, and/or wayside exhibits
2) experience conducting or participating in research
3) experience as an practitioner in the field of interpretation
4) motivation to complete several rounds of surveys regardless of the extra effort involved in a non-traditional, indepth survey of this type.

Delphi panel members were initially contacted by phone to explain the project and request their participation. Those that agreed to serve on the expert panel received a follow up letter thanking them and again, briefly explaining the project (Appendix 3). The panel
consisted of a twelve member assortment of University professors, interpretive consultants, and governmental professionals who met panel requirements (Appendix 3).

The Delphi Survey Process

A list of possible future research questions for signs, trails, and wayside exhibits was developed through the literature review and telephone interviews with interpretive businesses and governmental professionals. These were then compiled into an initial survey list of 62 questions (Appendix 3, survey round one).

In round one the panel members were asked to respond to a list of 62 research questions. They were asked if each question was valid, properly stated, and prompted other pressing research questions under the same category. Options were given to reword, add to the list in appropriate categories, or delete questions. They were asked to respond to the survey and return it within two weeks.

Round two consisted of a revised set of research questions based on the initial responses from the Delphi panel (Appendix 3, survey round two). The panel was asked to rate each question on a Likert scale from 1, minimal importance for immediate research, up to 5 for highest priority. Respondents were given 10 days to complete and return Round 2.

One of the assumptions of the Delphi method is that opinions will be improved if respondents are allowed to modify their responses after comparing them to responses from other panel members (Sprovil, 1980). Round three consisted of showing each panel member how they ranked each question and the mean score each question received from the panel (Appendix 3, survey round three). They were asked to reconsider their second round choices in light of this additional information. If they disagreed with the mean score, they were asked to state their reason. Again, respondents were given 10 days to complete and return the survey.

The resulting mean scores and a summary of the minority opinions were presented to the Delphi panel for final consideration in round four of the survey (Appendix 3, survey round four). They were asked to assign each question a final score in light of this additional information.

Chapter five provides discussion of the results of each round (Appendix 4 contains raw data), including a prioritized list of research questions related to interpretive signs, trails, and wayside exhibits.
Description of Thesis Layout

This study is laid out in a nontraditional format. The following is a description of how this book is organized.

Problem 1 - Literature Review for a Comprehensive Guide

Chapters 2, 3, and 4 are the literature review and comprehensive guide on current techniques for development of effective interpretive signs, trails, and wayside exhibits.

Appendices 1 and 2 contain sources of information used in the literature review. Appendix 1 contains the literature review materials. Appendix 2 contains a summary of the telephone interviews conducted with 10 interpretive consultants and the results of each individual interview.

Problem 2 - Future Research Questions Survey

In Chapter 5 the process of identifying future research needs in the area of interpretive signs, trails, and wayside exhibits is outlined. Results and recommendations are also presented.

Appendices 3 and 4 contain information and materials used in the development of the delphi survey to identify future research questions in the area of interpretive signs, trails, and wayside exhibits. Appendix 3 contains all four rounds of the survey. Appendix 4 contains the raw data for each round.

Chapter 6 is a summary of the entire project.

Appendix 5 is the bibliography for the entire project.
Chapter 2

Designing Effective Interpretive Signs and Wayside Exhibits
An Overview of Current Practices

Sign Functions
Design Philosophy
Planning
Principles of Good Layout
Choosing Color
Inscriptions
Sign Face Material Options
Sign Supports and Placement
Sign Functions

There are many different interpretive methods to choose from to improve the visitor's site experience. Selecting the most appropriate interpretive method for your site should be based on your site and visitor objectives. Signs and waysides are most appropriate and effective where your interpretation must be self-paced, in place at all times, easy to maintain, and relatively inexpensive. (Sharpe, 1982).

Signs are a form of visual communication that serve interpretive and administrative purposes. They can inform, direct, describe, name, beckon, and prohibit. They can improve the visitor's experience by describing and explaining features that may otherwise go unnoticed (Sternloff and Warren, 1977). Figure 3.1 shows how signs are most frequently categorized.

![Types of Signs Diagram]

Figure 2.1 - Different types of signs used in parks, recreational, and natural areas (Sharpe, 1982; Serrell, 1985; Grater, 1976; ODNR, 1989).
Interpretive Signs

Label
A label is usually a short, small interpretive message mounted on a stake and placed near the object or feature it interprets. Frequently labels are limited to a name, location, date, brief story, or caption (Grater, 1976; Serrell, 1985). Labels are often used to identify plant species or ephemeral features (Serrell, 1985).

Signs
Interpretive signs are an enlargement of the label. Effective interpretive signs act as a store window does for the storeowner. They tempt the visitor to come closer or entice them further along (Parr, 1964). The sign face is larger, has longer text and graphics telling a more complete story (Grater, 1976). Design plays an important role in the effectiveness here. The design should attract attention without overshadowing the sign contents or the site it interprets (Parr, 1964).

Wayside Exhibit
These interpretive signs are used where a more detailed complete site story is told. Objects, sketches, and charts may be exhibited. Usually, the wayside exhibit is larger than the sign. Sometimes a kiosk accompanies them to protect the exhibit against the environment and to attract the visitor (Grater, 1976; Sharpe, 1982).

Administrative

Entrance
Entrance signs provide the visitor with a first impression of the site (State of Wisconsin, 1985). Its design reflects the management philosophy of the agency. It should reflect hospitality, welcome, dignity, and concern for the site (Sternlof and Warren, 1977). The entrance sign should display site and managing agency name, logo, and hours of operation (Parr, 1964).

Figure 2.2 - Appropriate entrance signs (State of Wisconsin, 1980).
Directional

Directional signs usually follow entrance signs. They point out a direction, destination, or travel route (State of Wisconsin, 1985).

![Directional Signs](image)

Figure 2.3 - Directional signage (State of Wisconsin, 1980).

Rules

In the past rules signs have been strictly administrative, today they are becoming more interpretive. Interpreters are learning through research, that authoritative and threatening rule statements is not always effective. In fact, it may promote vandalism and other unwanted behaviors from visitors (Vander Stoep, 1988).

Use educational instead of restrictive phrases. Avoid prohibitory language. Use a courteous tone. Explain rules in terms of the resource or user benefits in terms the public can relate to. Avoid prohibitive symbols such as a red slash unless it is absolutely necessary (U.S. Forest Service, 1988; Sternloff and Warren, 1977).

<table>
<thead>
<tr>
<th>Prohibitory Rules Inscriptions</th>
<th>Interpretive Rule Inscriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stay on the Trail.</td>
<td>The Poison Oak might get you</td>
</tr>
<tr>
<td></td>
<td>if you shortcut.</td>
</tr>
<tr>
<td>Do not Feed the Deer</td>
<td>Feed the Deer? NO!</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>1. It's Hazardous</td>
<td>2. It's Harmful</td>
</tr>
<tr>
<td>These deer are not as gentle as they seem. Feeding them creates the appearance of tameness. With little fear and an aggressive interest in food, surprise attacks may occur with sharp hooves and antlers. Children can loose an eye.</td>
<td>Feeding deer disrupts their natural feeding patterns. They loose their wild integrity and become semi-domesticated with a dependence on man.</td>
</tr>
<tr>
<td>3. It's Illegal</td>
<td></td>
</tr>
<tr>
<td>Feeding any wildlife in the park is illegal.</td>
<td></td>
</tr>
<tr>
<td>No Littering</td>
<td>Resemble not the lowly snail</td>
</tr>
<tr>
<td></td>
<td>That with its slime records a trail</td>
</tr>
<tr>
<td></td>
<td>Let it be said where you have been</td>
</tr>
<tr>
<td></td>
<td>You've left Dade County nice and clean</td>
</tr>
</tbody>
</table>

Figure 2.4 - Administrative rule sign inscriptions that are interpretive, humorous, and effective.
Orientation

Many signs and displays orient the visitor to the site. They are very important to the visitor by giving them a sense of security, anticipation of choices and experiences, and a feeling of welcome (Parr, 1964). The welcoming paragraph should grab the visitor's attention. It should include a "you are here" symbol, descriptive information of what is available in terms of trails and facilities, including length, time, distance, important site features, and difficulty rating. Include a schematic drawing of the area and a trailhead register on long wilderness trails (WDNR, 1985, Veverka, 1977; Sharpe, 1982; U.S. Forest Service, 1988). Orient maps to the landscape with prominent features as visual keystones.

Administrative and Interpretive Signs

Information Boards

Bulletin boards, as they are traditionally called, often serve as an interpretive and administrative catch all. They may display a map of the area, messages, schedules of events, rules, and other information pertinent to the visitor and the site. Because of the variety of information displayed, bulletin boards can become disorganized and not catch or hold the visitor's attention. To be effective, the traditional bulletin board must be transformed into an Information Board (U.S. Forest Service, 1989). Information Boards should be designed for...

1. **Rapid Spatial Orientation** that helps visitors sort and find information quickly.

2. **Eye Appeal** through complementary colors, shapes, and sizes that draw people in.

3. **Excitement** through bright colors, large type, and provocative text that stimulates and interests the reader.

4. **Pertinence** to the site and the visitor.

5. **Easy Maintenance** so information can easily be replaced and updated.

(U.S. Forest Service, 1989)
Design Philosophy

In the Spring of 1990, eleven interpretive consultants designing interpretive signs and wayside exhibits were asked to share their design philosophies. Their views were similar in many respects and are summarized below. (Appendix 5 lists the interpretive consultants who participated in the telephone interviews.)

Interpretive Sign and Wayside Exhibits should be...

| .....fun, employ Tilden's principles, and be site specific. Each should address just one clearly defined subject. Determine what is appropriate in terms of color scale and visibility. Then determine what is appropriate to the audience. Design information in tiers. Begin with a visual. Use good, colorful graphics to help tell the story. Then incorporate creative titles that ask a question or give a provocative phrase. Finally, organize the text into short, concise, dynamic units. Address something the visitor can see or bring to life something that happened on the site. Involve the audience by asking them to do something (i.e. look for, touch, smell), help them come to a preferred conclusion, or in some way inspire them. |

Advice on designing signs and exhibits also frequently comes from the museum field. In 1978, Mark lane requested advice for the beginning designer from 100 museums. The results are applicable to interpretive signs and wayside exhibits.

Design - Consider signs in their setting, as a total unit, as a collection of details, and in the order visitors will view them. Design signs as part of the whole site interpretation. Keep it simple! Create suspense for the visitor to increase interest. Set standards for type face styles and sizes, dimensions, and colors. Continuity of style creates a sense of purpose and overall cohesion. Consider lighting. Edit and re-edit the script. Be precise. Select type faces that fit the era, period, and subject. Plan every aspect to engage the visitor. Plan, plan, plan..... then implement.

Subject - Know your subject. The more knowledge the easier it is to find what is interesting and important. Define the theme, briefly, concisely, specifically. Have a focal point in a sign or sign series. Don't over design or it can detract from the subject matter.

Creativity and Ideas - Brainstorm to come up with an initial set of ideas. Then define and refine the ones that are appropriate and feasible. Develop a workable set of plans. Remember, you don't have to reinvent the wheel or do all original work. If you are going to borrow ideas, take them from the best! Keep a daily diary of ideas, lessons and reflections.

Audience and Evaluation - Study your visitors reactions to your site. Learn what they like. Determine who your audience is and make sure your signs and waysides appeal to that audience. Hit several audiences with multi-level labeling. Be objective when criticizing your signage. Identify what needs to be corrected.
**Time and Money:** Do the job right. Don't sacrifice quality for quantity. Keep accurate records of exhibits and materials. Establish a system that works for you. Keep track of expenditures. Build a file of material sources. Design expensive, then work down to reasonable. It is usually possible to accomplish the same goals with far less money.

**Personnel:** Designate one qualified person to make final decisions.

**Quality:** Don't ever compromise quality. Watch details, they make the difference between an excellent sign or wayside and one that is just ok. Don't forget maintenance.

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Figure 2.4 - Components of Effective Interpretive Signs.
Planning Interpretive Signs and Waysides

Designing effective interpretive signs and waysides doesn't happen by chance. Rigid standards do not exist, therefore you must know your site needs and the needs of your visitors (Schuldes, 1967). What types of signs are needed at your site (State of Wisconsin, 1980)? How many signs will adequately interpret the site with minimal intrusion (Sternloff and Warren, 1977)? What are the visitor's recreational and educational objectives (U.S. Forest Service, 1988)? How do these compare or contrast with site and managing agency needs? Is the signage for vehicular traffic, pedestrian traffic, or both (State of Wisconsin, 1980)? What are your site limitations? What are the interpretive possibilities?

The following planning approach was developed by the staff at the U.S. Forest Service, Mount St. Helens National Volcanic Preserve.

The Team Approach

Often, planning interpretive signs and waysides involves a team approach. Teams should include writers, a supervisory writer, artists, and graphic designers. First, the team must determine which subjects and features will be interpreted. This usually involves site visits, brainstorming sessions, and a review of the interpretive master plan for the area. This ensures that the team will work with a common vision, an essential key to a successful interpretive writing process.

Research is vital if interpretive signs and waysides are to be accurate and interesting. Begin with a thorough search of resources (see Chapter 3, Inventory the Site). Establish a bibliography and collection of photographs and illustrations that can be used later. Establish a network of human resources. Share these findings with the entire team to reaffirm the common vision of the interpretive signage for the site.

When the research is done write a first draft. Think about how the graphics will be integrated with the text. Consult your graphics experts as you write. Ask yourself, is the text meeting the goals, objectives, and themes established for the site? At this time artists can begin to prepare thumb-nail sketches for later review.

The second draft should incorporate changes recommended from the first review. During the second review the team should consider the artwork along with the text. Again, are the goals, objectives, and themes still consistent with those desired?

The final draft should incorporate the suggested revisions in artwork and text based on the team's suggestions. The final version should be given to an editor to check spelling and punctuation.

When the Team is Just You

Too often the entire job of interpretive sign inscription research, writing, editing, and sign face design, material selection, and placement fall on one person's shoulders. It can be difficult to design an effective sign unless you have the knowledge to consider each component and compare and contrast their positive and negative effects. The rest of this chapter summarizes design considerations involved with interpretive sign and wayside exhibits for the one member team.
## Interpretive Sign and Wayside Design Considerations

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<th>Layout</th>
<th>Materials</th>
<th>Colors</th>
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</thead>
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<td>photos</td>
<td>balance</td>
<td>fiberglass</td>
<td>sign face</td>
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<td>fonts</td>
<td>line drawings</td>
<td>simplicity</td>
<td>micro-metal imaging</td>
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<td>space</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>texture</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 2.5 - What to Consider when Planning Interpretive Signs and Waysides.
Principles of Good Layout and Design

Design is a form of visual communication. Design affects how information, subliminal conditioning, or a physical appearance is presented. Design also affects the educational function of the communication process. Good design helps the visitor learn with the least amount of effort and with greater enjoyment (Dandridge, 1966).

Effective signs and waysides are appealing to the eye. The visual tools of line, shape, space, texture, and color used in association with layout principles improve the chances the interpretive sign will catch and hold the visitor’s attention (Kemp and Dayton, 1989).

Lines _______ direct the viewer, tie sign elements together, and create mood.

Strong vertical lines suggest power (Murphy, 1979). Horizontal lines suggest peace (Murphy, 1979).

Converging and Diverging lines add depth and tension (Murphy, 1979).

Texture
used visually to replace touch

can give emphasis, separation, or unity.
Interesting Shape

gives special interest to a visual when it is regulated to the site and audience (Fazio, 1973).

LEAF LITTER
- becomes new soil
- keeps the soil moist
- protects soil against erosion
- feeds plants and animals
- is a home for living things

Open Space

around visual elements and words will prevent a crowded feeling and help other elements of design become effective. Leave up to 1/3 of the design area open space (Pilley, 1990).
Natural eye movements and tendencies can also be used to capture and direct the visitor's attention. Tests have shown that most visitors make their first visual contact at a point above and to the left of the center of the observed field. Placing an interesting title, question, or visually appealing graphic gives the sign or wayside an increased chance of being read (Dandridge, 1966).

Designing the sign face with the basic principles of layout: simplicity, unity, emphasis, balance, and sequence, increases the amount of information that can be presented to the visitor in a readable, interesting, and appealing way and again improves the chances it will be read (Kemp and Dayton, 1985; Zehr, 1989).

Balance

Balance is the technique of designing visual elements in an appealing way. Every illustration and block of text carries its own "visual" weight. Larger, darker elements weigh more than smaller ones. Also, an element placed on the outer edges of a sign face has more weight than one placed in the center (Zehr, 1989).

There are two kinds of balance - formal and informal. Formal balance is where visual weight on one side is a mirror reflection of the other. Formal balance can be static and monotonous (Zehr, 1989; Kemp and Dayton, 1985). When it is necessary to reflect a dignified or conservative agency formal balance is desirable.

Informal balance is asymmetrical. Elements create an equilibrium without balancing. There may be an asymmetrical or diagonal layout. Informal balance creates visual interest (Zehr, 1989; Kemp and Dayton, 1985).

2-12
Symmetrical lettering balance in titles gives a formal feeling to the sign. Informal arrangements, when balanced with graphics, also make attractive, eyecatching titles (Kemp and Dayton, 1985).

![Symmetrical versus Informal Balance in Titles](Kemp and Dayton, 1985)

**Figure 2.8 - Symmetrical versus Informal Balance in Titles (Kemp and Dayton, 1985).**

**Simplicity**

Fewer elements on a sign are usually the more pleasing to visitors. Start with a visual appeal; Creative titles that ask a question or give a provocative phrase (Cook, 1990).

Divide large blocks of text into smaller paragraphs (Kemp and Dayton, 1985). Lay out information in tiers. Place the tiers in order of interesting and important information. Present general information first. Specifics can be placed later for visitors interested in reading further (Cook, 1990).

Avoid clutter, excessive decorative boarders, and complex types faces (Zehr, 1989). Graphics should be bold, simple, and contain only details (McHenry, 1990; Kemp and Dayton, 1985). They should only be used to help tell a story, not as decoration (Wright, 1990)

**Unity**

Unity is how well all the elements of the sign face fit together. This is the most important of the basic rules of good layout (Schuldes, 1967). To improve unity establish a basic visual theme and maintain it within the sign and those in a series (Schuldes, 1967). Use the same type style throughout the sign face and on all signs in a sign system (Zehr, 1989). Use the visual tools of line, shape, color, texture, and open space (Kemp and Dayton, 1985). Use a logo to tie a series of signs together.

![Simplicity and Unity in Design](Kemp and Dayton, 1985)

**Figure 2.9 - Simplicity and Unity in Design**

**Emphasis**

Contrast can be used to let the visitor know what the most important information is, to catch and guide their attention, and to break monotony (Schuldes, 1967). Using size relationships, perspective, and visual tools of line, shape, space, texture, and color, emphasis can be given to the most important elements (Kemp and Dayton, 1985). Emphasis, sometimes termed contrast, can make a sign face more interesting and inviting (Zehr, 1989).
Sequence

Good visual sequence is a key layout principle. Sequence guides the visitor along the sign face to take in information in the planned order. Keep in mind that readers start at the upper left corner and exit in the lower right corner, tend to move from illustrations to type, from big items to small, from color to non-color, and from unusual to usual shapes (Zehr, 1989).

Choosing Color

Colors have a psychological and visual affect on the visitor. They attract attention, improve readability, and increase memory retention. It is very important to consider all possible color options and combinations and the effect they will produce (Faber, 1961).

Colors are divided into two basic groups, those that appear "Warm" and tend to visually advance and those that appear "Cool" and seem to retreat (Neal, 1976). Warm colors, yellows and reds, are stimulating. Cool colors, blues, are more relaxing (Faber, 1961). A wide variety of colors fall inbetween these two extremes (Murphy, 1973).
Select contrasting letter and sign face colors. Some combinations are more readable than others. Here is a list of letter and background colors ranked for legibility (Murphy, 1979).

<table>
<thead>
<tr>
<th>Letter Color</th>
<th>Background Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>Yellow</td>
</tr>
<tr>
<td>Green</td>
<td>White</td>
</tr>
<tr>
<td>Red</td>
<td>White</td>
</tr>
<tr>
<td>Blue</td>
<td>White</td>
</tr>
<tr>
<td>Black</td>
<td>White</td>
</tr>
<tr>
<td>Red</td>
<td>Yellow</td>
</tr>
</tbody>
</table>

Figure 2.12 - Letter and Background Color Combinations Ranked for Legibility (Murphy, 1979).

There are many color combinations to choose from. Some colors should be avoided while others are preferred. Pale blue is hard for the eyes to focus on. Blue can cause wandering attention if not used with highly contrasting colors. Violet is neutralized by the aging of the lens within the eye in senior citizens (Murphy, 1979). Avoid using white in large amounts because it can cause glare (Peters, 1990). Also avoid "popular" colors that quickly go out of style (Dahn, 1990). There are also color preferences to consider. Males generally prefer black letters on a red background while females prefer black letters on a blue background (Murphy, 1979).

Despite all the color choices available and the influences they have on the visitor’s attention and mood, and the contents legibility, color should be selected to complement the place and thing the sign interprets.

Sign colors are often dictated by the site. Analyze the site (Veverka, 1990). What colors blend in well without becoming lost? What colors will enhance the signs readability and attract attention (Dahn, 1990)? In the National Parks and Forests earth tones are the most popular colors. When a color scheme is selected be consistent on all site signage. Consistently colored borders, logos, sign faces and fonts increase theme unity (Veverka, 1990).
Inscriptions

Whether or not a visitor will read an interpretive sign can be measured by the "fraction of selection" (Sharpe, 1982).

\[
\text{Fraction of Selection} = \frac{\text{Expectation of Reward}}{\text{Effort Required}}
\]

The higher the fraction the greater the chance visitors will read your interpretive signs. You can increase the expectation of reward by improving your writing (Sharpe, 1982). Human interest, readability, and elements of good style are writing characteristics that can be learned and practiced. You can also decrease the effort required by using the characteristics of typography wisely. This includes type face choices and arrangements.

This section describes elements of good inscription writing and layout to increase the fraction of selection for interpretive signs.

The Writing Process

Writing interesting and understandable inscriptions that still provide detailed, accurate information does not happen by chance. A great deal of thought, planning, writing, and rewriting goes into each successful inscription. Every successful writer has their own particular style for getting the job done but the basic outline for success is about the same. This process is from "Creating Environmental Publications" by Zehr, Gross, and Zimmerman, 1990.

Research - Know your subject before you start to write. Know what information you want to give the visitor. Also look for answers to the most commonly asked questions about your subject.

Brainstorm - This is a creative technique to help get your ideas flowing. List all the thoughts and ideas you have regarding a single topic. Clusters of ideas will come together. Use these to look for different angles to the story you are trying to write.

Make an Outline - Select the ideas you like and organize them into a logical order. This will guide you through the writing of the first draft.

Write the First Draft - Don't be critical of your first writing. Be creative. You can always go back and edit later. Double space your first draft to leave room for editing or additions.

Edit the First Draft - Ask yourself, "Is this the best way to say it?" The following editing tips can help polish up your writing.

- Rearrange sentences to improve readability.
- Eliminate unnecessary words.
- Locate awkward sentences by reading out loud.
- Pick more colorful and descriptive nouns and verbs.
- Use personal language.
- Cut up and rearrange the first draft if necessary.
Developing and using a plan for writing effective inscriptions is an important beginning step. There are other concerns too. Human interest, readability, good writing style and visual arrangement are key elements in writing effective sign inscriptions. Understanding how to evaluate and use these writing characteristics increases the chance your signs will be read, understood, and remembered by your visitors.

**Human Interest**

Human interest is a writing characteristic that adds warmth and familiarity to your writing. This is accomplished by engaging the reader in an active role with the inscription (Serrell, 1983). Human interest can be measured.

<table>
<thead>
<tr>
<th>Measuring Human Interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Count the number of personal words per 100 words (W).</td>
</tr>
<tr>
<td>Personal words include:</td>
</tr>
<tr>
<td>A Masculine natural words: boy, man, bull, brother, father, proper names, etc.</td>
</tr>
<tr>
<td>B. Feminine natural words: girl, mother, sister, hen, cow, aunt, etc.</td>
</tr>
<tr>
<td>C. First, second, and third person pronouns except it, its, itself, and they, them, their, theirs, and themselves when referring to inanimate objects.</td>
</tr>
<tr>
<td>2. Count the number of personal sentences per 100 sentences (S): spoken, question, command, request sentences.</td>
</tr>
<tr>
<td>3. Calculate human interest using the formula:</td>
</tr>
<tr>
<td>[ HI = 3.635 \times W + 0.314 \times S ]</td>
</tr>
<tr>
<td>4. Compare value to table:</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Human Interest Scores</td>
</tr>
<tr>
<td>-----------------------</td>
</tr>
<tr>
<td>0 - 10</td>
</tr>
<tr>
<td>10 - 20</td>
</tr>
<tr>
<td>20 - 40</td>
</tr>
<tr>
<td>40 - 60</td>
</tr>
<tr>
<td>60 - 100</td>
</tr>
</tbody>
</table>

Figure 2.13 - How to Determine Human Interest Scores (modified from Flesch, 1949; Zehr, Gross, and Zimmerman, 1990).

The following are some methods for improving human interest in text.

- **Use questions that stimulate the reader's imagination and curiosity.** Avoid asking "Why...," unless you give an answer immediately (Serrell, 1983).
- **Avoid technical or scientific jargon** (Serrell, 1983; Grater, 1976; Zehr, Gross, and Zimmerman, 1990).
- **Use quotations to add a personal touch** (Serrell, 1983).
- **Compare unfamiliar objects or experiences to familiar ones** (Serrell, 1983).
- **Invite the visitor to interact with the sign and the site.** Give hints on what to find, compare, question, look for or feel (Serrell, 1983; Veverka, 1990).
- **Capture attention with eye grabbing titles** (Serrell, 1983; Veverka, 1990).
- **Use humor and parody where appropriate** (Serrell, 1983).
Readability

Readability is a measure of reading ease for a piece of writing. Writing style, sentence length, complexity of vocabulary, and the reader's familiarity all influence readability. Formulas have been developed to help writers assess the readability of their writing. They involve counts of words, sentence lengths, and syllables to arrive at a score. Some formulas give a measure of difficulty while others give a grade school level required to understand the writing. Using readability tests can identify potential problem areas in your writing style (Serrell, 1983). The following are a variety of readability tests that can be applied to interpretive inscription writing (Murphy, 1979).

**FORCAST RGL:** Using a 150 word passage  \[ \frac{20}{10} - (\text{the number of 1 syllable words}) \]

**SMOG RGL:** Using 30 sentences  \[ 3 + (\text{the square root of the number of polysyllable words}) \]

**FLESCH:** Using a random 100 word sample  \[ 20.835 - (0.846 \times S) - (1.015 \times W) \]

\[ S = \text{the average number of syllables per 100 words} \]
\[ W = \text{The average number of words per sentence} \]

**WRITE:** Using a random 100 word sample

1. Count all 1 syllable words except: the, is, are, was, were. Give 1 point for each 1 syllable word.
2. Count the number of sentences to the nearest period or colon. Give three points for each sentence.
3. Add the 1 syllable word count and the sentence score.

Compare the readability scores to the table below

<table>
<thead>
<tr>
<th>Reading Ease Score</th>
<th>Grade</th>
<th>Type of Publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>very easy 90-100</td>
<td>5</td>
<td>comics</td>
</tr>
<tr>
<td>easy 80-90</td>
<td>6</td>
<td>pulp fiction</td>
</tr>
<tr>
<td>fairly easy 70-80</td>
<td>7</td>
<td>slick fiction</td>
</tr>
<tr>
<td>standard 60-70</td>
<td>8-9</td>
<td>digests</td>
</tr>
<tr>
<td>fairly difficult 50-60</td>
<td>10-12</td>
<td>quality</td>
</tr>
<tr>
<td>very difficult 0-30</td>
<td>college graduate</td>
<td>scientific</td>
</tr>
</tbody>
</table>

A score of 70-80 is about right for the average reader.
The Fry Graph is similar to the other readability formulas except that you plot the results on the accompanying graph to determine readability results (Murphy, 1979).

Fry Graph: Using 3 randomly selected passages of 100 words beginning with a complete sentence

1. Count the total number of sentences in each sample (to nearest 1/10th).
2. Count the total number of syllables in each sample (to nearest 1/10th). Count 1 syllable for each symbol. Proper nouns, numerals, and initializations count as words.
3. Find the average number of syllables across the top of the graph. Find the average number of sentences on the left.
4. The reading grade level appears in the window opposite the sentence count.
5. Put more sample counts into the average if there is a lot of variability.
The CLOSE formula is different from those preceeding because it measures the degree of comprehension in the writing sample. This formula allows the visitors to determine the clarity and readability of the text (Murphy, 1979).

CLOSE:  1. Replace every 5th word with a standard size blank.
2. Ask visitors, over 12 years of age, to fill in the blanks with the words they feel should be there.
3. Mark the words correct only when they are exact matches to the text.
4. Score the percentage of correctly filled in words.

57-61% is about full comprehension
55% is a good level for viewers

The following are some methods to improving readability. They may be similar to methods to improving human interest as well (Murphy, 1979).

Know the reader, their interests and questions.
Know your purpose.
Raise personal word counts like "I" and "you".
Use narrative.
Shorten sentences and break up paragraphs.
Change abstract nouns into active verbs.
Eliminate nonessentials.
Design writing for outloud reading.
Never talk down to the reader.
Place the most important information last. It will be remembered longer.

Elements of Good Style
Good style makes an inscription easier to read.

Begin with visual, observable interpretations and facts about the objects (Serrell, 1983).
Use active verbs (Serrell, 1983; Grater, 1976).
Keep sentences short (15 to 19 words per sentence) (Serrell, 1983; Grater, 1976; Zehr, Gross, and Zimmerman;1990; Sharpe, 1982).
Select simple, easily understood words (Grater, 1976).
Don't use slang (Grater, 1976).
Keep it simple (Grater, 1976).
Avoid jargon (Grater, 1976; Young and Witter, 1988; Zehr, Gross, and Zimmerman, 1990).
Be concrete, use examples (Young and Witter, 1988).
Use personal language in a friendly tone (Grater, 1976; Zehr, Gross, and Zimmerman).
Write vividly (Grater, 1976; Zehr, Gross, and Zimmerman).
Use good punctuation (Grater, 1976).
Visual Design to Improve Comprehension

Decreasing the effort required for a visitor to read interpretive sign inscriptions involves visual design. Using appropriate choices in font (lettering) styles, font sizes, lettering spacing, leading, and paragraphing can improve the chances visitors will read interpretive signs.

Font Styles

A font is a complete set of characters for any type face (Dair, 1967). All font choices can be broken into two basic groups; serif and sans serif, differentiated by the presence or absence of a serif. A serif is the finishing stroke at the end of a main stroke of a letter (Turnbull, 1980). Other characteristics of font styles are thick and thin hairline strokes.

![Figure 2.14 - Basic typographical differences in font styles](image)

A wide variety of fonts are available to choose from. They came in all shapes and styles. Some have been used for centuries while others are constantly being developed. Each font possesses its own personality (Dair, 1967). Many suggest specific time periods, areas, or cultures.

![Figure 2.15 - A wide variety of font styles exists (Dair, 1967).](image)

All font styles can be broken into three main groups; text faces, roman faces, and gothic faces. The text faces are type designs resembling the calligraphy of German monks. They are very decorative making them appropriate for special occasion announcements of weddings, graduations, or for religious material, documents and diplomas. This font style is very difficult to read when composed in several lines (Turnbull, 1980). This makes them inappropriate for interpretive materials.
Roman faces are the font group most widely used. This group consists of the Old Style faces and the Modern Roman faces. Old style faces are less formal. Modern Roman faces are actually not "modern" at all. The first Modern Roman face was designed two centuries ago. These styles are more mechanical and less "arty" or hand-drawn looking. They have straight, thin serifs. Gothic faces are also known as sans serifs. They are also popular and the second most frequently used style of type. Their thin strokes and lack of contrast or extras give this type the appearance of functionalism (Turnbull, 1980).

Typeface Classifications

Text

\[
\text{ABCDEFGHIJKLMNOPQRSTUVWXYZ} \\
\text{abcdefghijklmnopqrstuvwxyz}
\]

Roman

Old Style

\[
\text{ABCDEFGHIJKLMNOPQRSTUVWXYZ} \\
\text{abcdefghijklmnopqrstuvwxyz}
\]

Modern Roman

\[
\text{ABCDEFGHIJKLMNOPQRSTUVWXYZ} \\
\text{abcdefghijklmnopqrstuvwxyz}
\]

Gothic

Square Serif

\[
\text{ABCDEFGHIJKLMNOPQRSTUVWXYZ} \\
\text{abcdefghijklmnopqrstuvwxyz}
\]

Script and Cursive

\[
\text{ABCDEFGHIJKLMNOPQRSTUVWXYZ} \\
\text{abcdefghijklmnopqrstuvwxyz}
\]

Decorative and Novelty

\[
\text{ABCDEFGHIJKLMNOPQRSTUVWXYZ} \\
\text{abcdefghijklmnopqrstuvwxyz}
\]

Figure 2.16 - Typeface classification (Turnbull, 1980).
Square serif faces are Gothic styles with serifs added. These are most often used for headings but not for lengthy reading materials (Turnbull, 1980).

Script and Cursive faces emulate handwriting. Cursive letters are not joined which make them impractical for use in text. They are popular styles for announcements, headings, and invitations (Turnbull, 1980).

Decorative and Novelty faces are sometimes termed "mood" faces since they give a feeling of time period, place, or mood. Generally, these faces are not good for long copy. They are difficult to read and may quickly go out of style (Turnbull, 1980).

Fonts for Interpretation

When choosing a font style ask yourself, "What is the story of the site?". Then try to match the font to the scene. Slanted fonts indicate action or motion. Times and Roman fonts blend in well in historic sites. Helvetica is known for its good readability and is frequently used in interpretation by the National Park Service (Pilley, 1990).

Improving Legibility with Fonts

The following are some suggestions for improving legibility based on font choices.

Select a readable font style. Some prefer sans serif and believe they are the most readable (Kemp and Dayton, 1985). Other prefer serif styles.

Avoid script letter styles because the letters are hard to distinguish from each other (Kemp and Dayton, 1985).

Stay away from fancy fonts or those that will soon be out of style.

Try not to mix font styles. Use the italics, bold, underline, and point size options for emphasis where it is needed. If it is necessary, use no more than three different styles (two is preferred) and select styles that harmonize with each other (Kemp and Dayton, 1985).

Use a combination of capitals and lower case letters. Here, word form is present and the reader's eye can easily move from the top of one letter to another. This shortens the time required to read the inscription. An inscription in all capitals would take 14% longer to read. Not only is this the most legible it is also the best way to conserve space. All capitals take up 40% more space than a combination of capitals and lower case letters (Murphy, 1979).
<table>
<thead>
<tr>
<th>Sans Serif Fonts</th>
<th>Serif Fonts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bookman</td>
<td>New Century Schoolbook</td>
</tr>
<tr>
<td><strong>Chicago</strong></td>
<td>New York</td>
</tr>
<tr>
<td>Courier</td>
<td>Palatino</td>
</tr>
<tr>
<td>Geneva</td>
<td>Times</td>
</tr>
<tr>
<td>Helvetica</td>
<td><strong>Venice</strong></td>
</tr>
<tr>
<td><em>Los Angeles</em></td>
<td>Zapf Chancery</td>
</tr>
<tr>
<td>Helvetica Narrow</td>
<td></td>
</tr>
</tbody>
</table>

Figure 2.17 - Common serif and sans serif font styles.
Font Sizes

Letter sizes are measured in points. A typographic point equals about 1/72 of an inch. Hence a letter in 72 point would be a 1 inch letter. The National Park Service has designated that all titles be in 60 - 72 point size, main text in 24 point as a minimum size, and captions in 18 point (Pilley, 1990). The figure below shows the most frequently used range of point sizes (Dair, 1967; Turnbull, 1980).

This is 9 point.
This is 10 point.
This is 12 point.
This is 14 point.
This is 16 point.
This is 18 point.
This is 20 point.
This is 22 point.
This is 24 point.
This is 60 point.
This is 72 point.

Figure 2.18 - The most commonly used lettering sizes, measured in point values (Dair, 1967).

Determining what point size to use depends on the context the sign will be viewed in. How will the audience be using the site? Will your audience be walking, driving, viewing the signs up close or far away (Dahn, 1990)? Always consider the distance your visitors will be viewing the signage from to determine minimum letter size (Minor and Frye, 1970).

<table>
<thead>
<tr>
<th>LETTER HEIGHT</th>
<th>MINIMUM LETTER SIZE FOR LARGE NON-PROJECTED VISUAL MEDIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>LETTER HEIGHT</td>
<td>MINIMUM LETTER SIZE FOR LARGE NON-PROJECTED VISUAL MEDIA</td>
</tr>
<tr>
<td>LETTER HEIGHT</td>
<td>MINIMUM LETTER SIZE FOR LARGE NON-PROJECTED VISUAL MEDIA</td>
</tr>
</tbody>
</table>

Figure 2.19 - Minimum letter size for signage (Minor and Frye, 1970).

<table>
<thead>
<tr>
<th>Recommended Type Sizes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size of Type</td>
</tr>
<tr>
<td>1/2&quot;</td>
</tr>
<tr>
<td>5/8&quot;</td>
</tr>
<tr>
<td>2 1/2&quot;</td>
</tr>
<tr>
<td>4&quot;</td>
</tr>
</tbody>
</table>

National Park Service Recommendations

Figure 2.20 - Minimum letter size for visually impaired visitors (Park, 1984).
Letter Spacing

Letters should be space optically instead of mathematically. Equal measured distances between all letters do not look the same. Spacing optically, you can adjust measurement as needed (Kemp and Dayton, 1985).

![TALLY TALLY](image)

Figure 2.21 - Optical spacing versus mathematical spacing (Kemp and Dayton, 1985).

Leading

Leading is the space between lines of type. Proper leading helps the eye to progress along a line without jumping to the line below. Generally, short lines of type, between 52 to 65 characters, do not need leading. The width of leading will vary with the font style (Dair, 1967). Experiment with different amounts of leading and ask staff and visitors for input.

The thicknesses of leads, from the top down:

Figure 2.22 - Thicknesses of lead options (Dair, 1967).

Typography today is the art of visual communication, an art which has for its materials ink, paper, and twenty-six abstract symbols. The methods of using these materials to gain the maximum of legibility constitute the science of typography.

Figure 2.23 - Leading effects readability (Dair, 1967).
Paragraphing

Information should be designed in tiers. This helps to break up long, ominous paragraphs that suggest a great deal of time and effort is required to read the sign. The National Park Service uses 175 words per 3 paragraphs as a standard (Pilley, 1990). Present the most important and general information first in the main titles and headings. Make successive paragraphs more detailed and specific. This way the sign satisfies both the casual observer who only wants quick, general information and the visitor wanting details (Murphy, 1979; Cook, 1990). Keep paragraphs short. Avoid using more than 50 words in the entire inscription (Veverka, 1990).

Many times paragraphs are justified. This means that spaces between words of a sentence are lengthened to achieve a perfectly aligned right margin. This gives paragraphs an organized, formal appearance and saves space. A ragged right margin has the advantage of looking more informal and conversational to the visitor and incorporating more open space (Veverka, 1990). Other alternative margins are given below.

Alternatives for Margins

Passages of text can be arranged on the page in a number of different formats. Some formats are easier to read than others.

- Fully justified text has flush or even margins on the left and right edges of the page. This is considered one of the best formats for sustained reading and is popular because of its neat, even appearance.
- Many electronic typewriters can justify text as can word processing programs and typesetters. Fully justified text will have varied spacing between words and often some hyphenation. In narrow columns, this variation in spacing between words can become quite noticeable.

Another common arrangement is flush left with ragged right margins (left justified). Hyphenation can help smooth some of the raggedness in the right margin by keeping line lengths fairly consistent. Left justified text is another good format choice for sustained reading.

- Sometimes other text arrangements are used such as right justified, centered, and asymmetrical. These less common arrangements are sometimes used for poetry, but are not recommended for long reading passages.

Figure 2.24 - Margin alternatives and their advantages and disadvantages (Zehr, Gross, Zimmerman, 1990).

Open Space

Open space around visual elements and words, makes concepts more recognizable, and gives visitors "Breathing room: to take in information. The more planned white space the better. However, the amount depends on the sign size, graphic, and design. The exact amount needed can not be defined by a % or formula (Wright, 1990; Veverka, 1990; Dahn, 1990; Hanna, 1990).

Use caution when designing open space into a sign face. When used around the outside edges of a sign face it creates unity. When used in the center, it splits up information and sends the visitor's eye in all different directions (Zehr, Gross, and Zimmerman, 1990).

Figure 2.25 - Arrangement of white space (Zehr, Gross, and Zimmerman, 1990).
Sign Face Materials

Selection Criteria

Today, interpreters have a choice in interpretive sign and wayside materials. They are faced with deciding which material best fits their site, purposes, and resources. While some materials have clear and important advantages, selection should never be based on only one or a few characteristics. Interpretive consultants who make material selection for interpretive sites all over the world have identified five important selection criteria. Select the most appropriate sign and wayside material for your site by asking yourself the following questions.

1. How much can I afford?
   Project the estimated costs for each material. Include maintenance and upkeep costs in your estimates. Then look at the most cost effective approach (Veverka, 1990). Keep in mind that cost includes preparation and production of camera ready art, fabrication, mounting, replacement, and repair (Peters, 1990).

2. What are my durability needs (Peters, 1990)?
   Consider any vandalism problems at your site. What kinds of abuse will your signs and waysides have to withstand? Estimate maintenance, repairs, replacement, or sign updating.

3. What are my color needs or desires (Peters, 1990)?
   Will color play a major role in your interpretive signage? How much color versatility will you need?

4. What physical limitations exist at my site (Pilley, 1990)?
   Will your signs be exposed to extreme heat, UV light, sea spray, or humidity?

5. What is my topic (Pilley, 1990)?
   Certain materials fit in with an area and topic better than others. Micro-metal imaging, an aluminum alloy material, is frequently used in historic sites. Their muted colors are less imposing than other materials. The professional appearance often seems to best "fit the site" (Pilley, 1990).

Following are descriptions of the most commonly used interpretive sign and wayside exhibit materials. Advantages and disadvantages are listed for each.

Wood Signs

Wood signs are popular in outdoor settings. Properly designed, they blend with most environments. Each sign can be unique and individual. Wood signs weather well, most becoming more beautiful with age when assembled and finished properly (Spielman, 1981).

This material is usually the only one that can be used to construct signs and waysides completely by site employees. This greatly reduces the initial cost of production by eliminating the need for a consultant. This is one reason why wood is still the most commonly used material for signs and waysides in small, private nature centers and natural areas operating on very limited budgets.

Wood signs can be 3-dimensional. Letters, numbers, and decorations can be cut into the surface of the sign with a router, raised from the back with sandblasting, or display a combination of these techniques (Spielman, 1981). The message can be handpainted, stenciled, silk screened, carved or
burned into the wood (Sharpe, 1982). Separate letters can be cut out and glued to the sign face to give the sign a stronger 3 dimensional quality (Spielman, 1981).

Wood signs have a variety of advantages and disadvantages.

**Advantages:**
1. They blend well with the environment (Spielman, 1981; Sharpe, 1982).
2. The initial cost is low.
3. They can be constructed by site employees with little experience.
4. Wood signs are weather resistant when properly sealed and maintained (Spielman, 1981).
5. Basic tools for layout and construction can be rented or borrowed (Spielman, 1981).

**Disadvantages:**
1. They are difficult to replace quickly, especially when designed with detailed artwork.
2. Detailed graphics are difficult to route or paint (Veverka, 1990).
3. Basic tools and "know how" to make wood signs are needed.
4. Wood signs can be expensive and labor intensive to maintain (Sharpe, 1982).
5. Wood can be susceptible to insect attack and weathering (Sharpe, 1982).

**Selecting the Wood**
Consider your desires and needs when selecting wood for your trail signs and wayside exhibits.

1. **Service** - Will these be indoor or outdoor signs? Will they be protected from the weather by a kiosk?
2. **Desired Appearance** - Does your theme and site require a smooth, slick, modern, rustic, or rough sign face?
3. **Workability** - What carving techniques will you use in preparing your sign. Which types of wood is best for the techniques you have selected?
4. **Freedom from Defects** - Is it essential that the sign face be free from cracks and knots?
5. **Cost** - What are your monetary limitations? How many signs will you need to make?
6. **Continued availability** - Is the same wood available for future signs?

Wood for exterior signs does not need to be kiln dried but should not be green. Redwood is the best choice in most cases. It is very resistant to decay and weathering. It's only disadvantage is that it is very expensive and some are ethically opposed to its use. Western red cedar, northern white cedar and cypress are less expensive and are also weather and decay resistant. The most common choices for wood signs are listed below with a brief description of their qualities for wood working (Spielman, 1981).

- **Basswood** - attractive grain, easily worked, does not weather well, must be carefully finished.

- **Cypress** - one of the most decay resistant, naturally termite resistant, moderately hard to carve.

- **Douglas Fir** - economical, difficult to route or carve smoothly, checks and distorts in hot and dry environments, must be well finished.

- **Pine** - clear, knot free pieces easily worked, little shrinkage or distortion, weathers well when properly finished and kept away from soil and excessive moisture.
Spruce - economical, readily available at most lumber yards, easily dried, light weight, easily worked, moderate shrinkage.

Cedar - among the best overall choice for outdoor signs, economical, highly decay resistance, easily worked, weather well, lightweight, moderately soft, easily dried.

Redwood - straight and uniform grain, little shrinkage or swelling, highly decay resistant, easiest of any wood to sandblast, naturally resistant to termites, high cost.

When selecting wood you will find that most boards are available in "rough sawn" form. These boards should be lightly sanded to remove slivers and fibers that can distort layout and routing. In some cases you can purchase smooth surfaced boards that have already been sanded. However, take into account that they will be finished to less than their name or "rough sawn" size when designing the layout.

2 x 4 actually measures 1 1/2 x 3 1/2
6 inch board actually measures 5 1/2 inches wide
8 inch board actually measures 7 1/4 inches wide

Also consider grain patterns when selecting wood for signs. Boards are cut with "vertical" or "flat" grained faces. Most species of wood that are cut with a flat grain will warp more easily than those cut with a vertical grain. Vertical grained boards also do not shrink or swell across their width as much as flat grained boards will. However, some species are more difficult to route or sandblast when cut on a vertical grain (Spielman, 1981).

Figure 2.26 - Vertical grain (Spielman, 1981).  Figure 2.27 - Flat grain (Spielman, 1981).
Preparing the Sign Face

You do not have to be an artist to design a sign face. Following a few helpful tips will allow you to successfully create attractive signs. Artwork and lettering can be enlarged to an appropriate size for your sign face with the help of an opaque projector. An enlarged image can be produced from any non-transparent object. The image can be projected onto white paper, the size of your sign face, then traced. Overhead projectors work in the same way. They are more convenient, portable, versatile, and generally less expensive. To use an overhead projector you must make a transparency of your artwork or lettering first. This can be done at many photocopy shops and universities. Then the transparency can be enlarged on the overhead projector in the same manner as with the opaque projector (Spielman, 1981).

Find artwork and illustrations for your sign face in magazines, photographs, and clip art books if you can not draw your own. Lettering in a variety of font styles can be found in lettering and clip art books. Stencils and press-on letters are also available. If you have a computer with a laser printer, print out your sign text in the font and size of your choice.

Once your layout is ready, trace all lettering and artwork onto the sign face with carbon paper. Then you are ready to begin carving, routing, sandblasting, painting, or wood burning your design into the sign face. Consult "Making Wood Signs" by Patrick Spielman for technical instructions on creating wood signs.

Fiberglass Embedment Signs

In this process an interpretive panel is produced with computer text and silkscreen graphics and printed on a special carrier sheet. This sheet is then placed between reinforced layers of tightly woven fiberglass cloth, resin saturated, baked, and cured. The result is a one piece panel that will not delaminate or fade. Photographs, treated not to absorb the resin, retain their clarity and color. The embedded fiberglass sign is mounted and slid into a frame.

Fiberglass embedment signs having grown in popularity with the National Park Service and many state governmental agencies. Their advantages usually outweigh their disadvantages. In large state parks, national wildlife refuges, and historical sites signs and waysides must give a professional appearance, be vandal resistant, and be easily repaired or replaced when vandalised, damaged, or outdated. Fiberglass has proven to meet the needs of these agencies well.

Most interpretive consultants send fiberglass embedment work to Pannier Graphics in Warminster, Pennsylvania. Here, signs can be sealed in one of three products: Modulite, Moducal, or Modulens.

Modulite - is a rigid material .040" to .250" thick. Signs the size of a postage stamp to 15' X 6' can be embedded in one piece. Larger signs can be embedded in sections. Modulite signs can be single or double faced (Pannier Graphics).

Moducal - is the same as Modulite except that it has an adhesive back. For this reason, they can be only single faced (Pannier Graphics).

Modulens - is a product that can control light to a very fine point. Modulens is most frequently used in pedestrian traffic control and architecture signage (Pannier Graphics).
Fiberglass Embedment signs have a variety of advantages and disadvantages.

**Advantages:**
1. They are resistant to: weather, moisture, dirt, shattering, breaking, graffiti, scratching, acid, and fire (Pannier Graphics).
2. Colors are resistant to fading and ultra violet light protection in the silk screen ink further reduces fading (Dahn, 1990).
3. Surfaces are non-glare (Wright, 1990).
4. A variety of colors are available through the silk screening process (Pannier Graphics).
5. They can be quickly and easily replaced when back up copies of the sign face are on file.
6. Additional prints are sequentially cheaper (Veverka, 1990).
7. Multiple copies can be sold as souvenirs or signed and presented to donors as a "thank you" (Veverka, 1990).
8. This material is very cost effective for directional or rules signs where many duplicates are needed because most of the expense is in the planning and design with little in actual sign production. (Peters, 1990).
9. They are artwork flexible (McHenry, 1990).

**Disadvantages:**
1. The cost for planning and design is initially high (McHenry, 1990).
2. A backing and framing material is needed (Peters, 1990).
3. Gun shot will ruin the sign. The graphic and text turn yellow where the bullet passed through the sign (Wright, 1990).

**Aluminum Alloy Signs**

Anodized aluminum sign faces are another option for interpretive signs and wayside exhibits. This technique produces very vandal and weather resistant signs that are professional looking and cost effective (Pilley, 1990). They are frequently used by the National Park Service at historic sites because they produce excellent line drawings in muted colors that mirror the importance of the site (Pilley, 1990).

Text and graphics are etched and photo processes anodized onto an aluminum sign face. There are many patented methods of producing these types of sign faces. One trade name is "Novalloy."

Novalloy is available in thicknesses up to 3/8". Permanent reproduction of highly detailed line art and photography is possible with this material. Available colors include any combination of brown, gold, silver, black, red, blue, and green. These colors are sunfast and guaranteed to retain their original quality indefinately (Interpretive Graphics).

This material, like Fiberglass Embedment, often requires that you work with an interpretive consultant for production. However, camera ready art can still be prepared on your site with the proper equipment.
There are a variety of advantages and disadvantages with metal micro imaging.

Advantages:
1. This material has indefinite durability (Peters, 1990).
2. It holds up well under ultra violet light and extreme temperatures (Kaye, 1990).
3. The sign face is not limited to squares and rectangles (Pilley, 1990).
4. It does not require a backing or frame (Peters).

Disadvantages:
1. The cost of duplicate signs is not reduced (Peters, 1990).
2. Scratches can be a problem. Covering the sign face with plexiglass can help protect it (Cook, 1990).
3. Colors are limited (Peters, 1990).

Porcelain Enamel Signs
Porcelain Enamel is a labor intensive and often more costly material for interpretive signs and waysides. They are made by covering a piece of sheet steel with a thin layer of powdered glass. When heated to 1500 degrees fahrenheit the enamel melts and fuses to the steel. The result is a smooth, hard, durable glass surface. When inks made of powdered glass are added to the surface, they fuse to the sign. All illustrations can be hand painted or airbrushed. Pen and ink drawings are usually applied by screen printing. Prints and photographs can be reproduced using a special photographic process. Porcelain enamel signs are considered a good choice where visitor contact is high for two reasons. They look very impressive to the visitor and foster a positive image of the managing agency. Where visitor contact is high the sign's vulnerability to vandalism is reduced (Hanna, 1990).

It is the susceptibility to vandalism that limits the use of this material. Porcelain enamel signs shatter when struck by a heavy object or bullet. Replacement and repair costs are high in most cases. Mounting in a podium position reduces their attractiveness to vandalism. Framing or covering with clear plexiglass reduces chipping. Placing them where visitor and personnel contact is high discourages vandalism (Dahn, 1990).

Porcelain Enamel also has a variety of advantages and disadvantages.

Advantages:
1. They are highly fade resistant (Cook, 1990).
2. They are considered the best material for color quality (Dahn, 1990).
3. They are very impressive to the visitor (Hanna, 1990).
4. They have an indefinite life span (Cook, 1990).
5. Scratch resistant (Berfield, 1990).

Disadvantages:
1. They are expensive because of hand illustration (Peters, 1990).
2. They are more susceptible to vandalism than other materials (Dahn, 1990).
3. They must be mounted and framed (Peters, 1990).
If you would like professional assistance in selecting and designing interpretive signage for your site, contact one of the following interpretive consultants. The following list is categorized by the material they most frequently use although many will select another material when necessary based on their clients needs and desires.

### Variety of Materials

<table>
<thead>
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<th>Company</th>
<th>Contact Name</th>
<th>Address</th>
<th>Phone</th>
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<tbody>
<tr>
<td>Wilderness Graphics</td>
<td>Marvin Cook</td>
<td>P.O. Box 1635</td>
<td>(904) 224-6414</td>
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<tr>
<td></td>
<td></td>
<td>Tallahassee, FL 32302</td>
<td></td>
</tr>
<tr>
<td>Inside/Outside</td>
<td>Tom Christiansen</td>
<td>2525 Wallingwood Suite 801</td>
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<td></td>
<td></td>
<td>Austin, TX 78746</td>
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<tr>
<td>Novalloy</td>
<td>Dr. John Hanna</td>
<td>1657 Rhoda Ave.</td>
<td>(614) 481-7662</td>
</tr>
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<td></td>
<td></td>
<td>Columbus, OH 43212</td>
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### Fiberglass Embedment

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<tr>
<td>Team Interpretation</td>
<td>Douglas Bruce McHenry</td>
<td>P.O. Box 429</td>
<td>(508) 428-8924</td>
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<tr>
<td></td>
<td></td>
<td>Marston Mills, MA 02648</td>
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<tr>
<td>Inside/Outside</td>
<td>GS Images</td>
<td>Doug Wright</td>
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<td></td>
<td></td>
<td>P.O.Box 1288</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Hagerstown, MD 21741-1288</td>
<td>(301) 791-6920</td>
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### Porcelain Enamel

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<th>Contact Name</th>
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<tbody>
<tr>
<td>John Veverka &amp; Associates</td>
<td>John Veverka</td>
<td>P.O. Box 26095</td>
<td>(517) 394-5355</td>
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<tr>
<td></td>
<td></td>
<td>Lansing, MI 48909</td>
<td></td>
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<tr>
<td>Porcelain Enamel</td>
<td>The Porcelain Co.</td>
<td>David Berfield</td>
<td>(206) 842-6210</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9461 Mandus Olson Rd.</td>
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<td>Bainbridge Island, WA 98110</td>
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Sign Supports and Placement

Sign Supports

Selection of support material depends on the site. Sign supports should be visually and structurally compatible with the sign face materials. The supports should look sturdy and the color should blend with the sign face and the site. In some cases designers have selected native site rock, shells, or wood and constructed bases to support the sign face. This is especially effective with entrance signs. Painted steel or aluminum posts are frequently used. Wood posts are also good sign supports when treated against rot and insect damage.

Sign Placement

There are many things to consider when selecting the right spot to place an interpretive sign. This is addressed in Chapter 3 "Designing Effective Interpretive Trails".
Chapter 3

Designing Effective Interpretive Trails
An Overview of Current Practices

Purposes of Nature Trails
Types of Interpretive Trails
Build it Right From the Start: Trail Planning
  Inventory the Site
  Layout the Route
  Construct the Trail
  Erosion Control and Prevention
  Interpret the Site
  Maintenance
Considerations for the Handicapped
"Everyone needs recreation, that is, something to do and to think that is not work, something different from the ordinary routine of existence; and everyone at times needs inspiration, something to make him or her see the world and their place in it in some broader way, to feel the presence of the larger forces of the universe."

Kimball Hubbard
Landscape Design, 1917

Purposes of Nature Trails

Trails have played a crucial role in our history. Game trails helped settlers find food and made travel easier. Water trails were the primary communication links between towns and served as highways to the frontier.

Trails promote first-hand experiences between people and the environment. Today the number of visitors using trails on public lands is rising. After holding 38 regional workshops in 31 states, reviewing 3,800 questionnaires to trail interest groups, and holding 30 meetings with these groups in 1986, the Heritage Conservation and Recreation Service of the Department of the Interior reported, that the nationwide supply of trail opportunities does not meet demand. New trails are needed in and near urban areas, especially in areas accessible to school outdoor and environmental education classes. More information is needed about existing trails, trail related activities, and interpretive services (U.S. Dept. of Interior, 1986).

Trails serve a variety of purposes.

Access - To provide visitors a safe, first-hand experience with minimal site impact (Proudman and Rajala, 1981; Cook, 1990).
Education - To provide stimulation and location for learning (Ashbaugh and Kordish, 1971; Cook, 1990).
Conservation - To provide first-hand examples of how we effect our environment by calling attention to both problems and solutions in managing natural resources (Ashbaugh and Kordish, 1971).
Interpretation - To bring the visitor and interpretive feature or site together (Ashbaugh and Kordish, 1971).
Research - To conduct systematic inquiry through observation and experiment (Ashbaugh and Kordish, 1971).
Direction - To introduce nature and environmental subjects in a logical sequence (Ashbaugh and Kordish, 1971).
Inspiration - To provide the visitor with first-hand experiences that motivate and enhance creative expression (Ashbaugh and Kordish, 1971).
Recreation - To exercise or pursue a hobby such as birdwatching, mushroom hunting, and jogging (Ashbaugh and Kordish, 1971).
Aesthetics - To enhance the user’s aesthetic enjoyment (Gustke and Hodgson, 1980).
Types of Trails

Trails can be formal teaching trails, self-guided interpretive trails, or hiking trails. Naturalists or teachers guide scheduled groups on formal teaching trails. Self-guided trails allow the visitor to explore on their own with the help of interpretive devices. Hiking trails are access corridors to wilderness, or trade routes with special aesthetic significance.

Other types of trails which may include interpretation are bicycle, underwater, canoe trails (Ashbaugh and Kordish, 1971), auto trails and scenic byways (Sharpe, 1981). The interpretive messages answer anticipated questions about the site (Ashbaugh and Kordish, 1971 and Sharpe, 1982).

Trails designed for interpretation should make the user feel comfortable in the natural setting, convey a feeling of being a part of the environment (Hultsman, 1983), create a desire to explore and discover, and bring about greater awareness and appreciation of the site (Ashbaugh and Kordish, 1971) without confusion or great physical challenges (Hultsman, 1983). Ultimately, a quality trail is a balance in design for beauty and function (Proudman and Rajala, 1981).

Interpretive trails should not be multipurpose where different activities interfere with each other (Hultsman, 1983 and Sharpe, 1982). For example, equestrian trails should be separated from other trails because horses may force hikers off trails, and create dusty or muddy conditions for hikers. Hikers may spook horses. Bicyclists can injure hikers (Ashbaugh and Kordish, 1971).

Interpretive trails have many values for the interpreter:

1. Seeing features in their natural setting provides a more realistic and memorable experience (USDA, 1964).
2. Visitors can walk self-guiding trails at their own pace and take in as much or as little of the interpretive message as their time permits (Sharpe, 1982 and USDA, 1964).
3. Children can look and question with their families at their own pace (Sharpe, 1982 and USDA, 1964).
4. Trails are open all day throughout the year (Sharpe, 1982).
5. Trails can be developed fairly rapidly and are relatively economical to construct (Sharpe, 1982 and USDA, 1964).
6. Self-guiding trails can serve a large number of people without the presence and expense of an interpreter (Sharpe, 1982 and USDA, 1964).
7. The self-guided trail can provide interpretation in areas impractical to station personnel. (Sharpe, 1982)
8. Trails allow entry into sensitive areas with minimum damage or alteration to the site (Sharpe, 1982).
Disadvantages can be minimized if considered during planning. Keep in mind that with interpretive trails:

1. Communication is one way. There is no chance to clarify interpretive messages.
2. Interpretation geared to an average audience may be too elementary for some and too sophisticated for others.
3. Grabbing and holding the visitor’s interest may be difficult.
4. Vandalism that goes unnoticed can annoy or inconvenience the visitor.
5. Natural phenomena changes can make once relevant stories obsolete.
6. Features must be interpreted as they appear along the trail rather than in an orderly, logical way.

(Sharpe, 1981)

**Build it Right from the Start: Trail Planning**

The total trail environment is made up of several components. Each component must be considered in trail design and construction if the trail is to be effective. The components are:

- **Trail treadway or tread** which is the surface the visitor walks on.
- **Trail right-of-way**, the area around the treadway that is cleared for safety.
- **Trail corridor**, the combination of the treadway, right-of-way, and all the land the visitor sees along the trail and that influences their perception of the trail.
- **Buffer or protection zone**, the land that insulates the hiker from activities adjacent to the trail that might be detrimental to the hiking experience including home development, mining, or logging. This zone can also serve to protect fragile areas from visitor damage.

**Interpretation** which included signs, brochures keyed to markers or landmarks, and wayside exhibits.

![Figure 3.1 Anatomy of a Trail (Proudman and Rajala, 1981).](image-url)
Interpretive trails are usually located near places of visitor concentration such as campgrounds, lodges, visitor centers, and outdoor education centers (Sharpe, 1981). To design an effective interpretive trail, the planner must consider these elements in the trail design. Trails are seldom designed in a vacuum. Interpretive trails should always be a mix with other site interpretation, buildings, landscapes, features, and attractions (Christiansen, 1990).

Consider the user's experience and desires as well as the managing agency's objectives and needs (Hultsman, 1983; McHenry, 1990). Money spent later correcting problems can often be avoided with detailed planning (Sternloff and Warren). Assess the cultural or natural interpretive possibilities of the site (Ashbaugh and Kordish, 1971; Hultsman, 1983). Some questions you should ask before planning an interpretive trail are:

1. For whom are you designing the trail (Herman, 1978)?
2. What does your audience want to see and learn (Herman, 1978)?
3. Who will use the trail (Herman, 1978)?
4. What will the trail be used for (Veverka, 1977)?
5. Does the trail purpose coincide with existing programs (Grater, 1976)?
6. What is your budget (Veverka, 1977)?
7. What constraints must you consider in planning (Veverka, 1977)?
8. How much choice do you want to offer the visitor (Veverka, 1977)?

The length, number of interpretive stops and their placement, trail design, gradient, trail shape, and surface material are all affected by the answers to these questions (Herman, 1978). Include considerations on safety, accessibility, parking potential, and features of special interest (Grater, 1976; USDA, 1964; Sharpe, 1981). A basic plan should consist of "one step at a time" development of a coordinated trail system (Ashbaugh and Kordish, 1971) that attempts to pull the visitor outside to experience the site through trails (McHenry, 1990).

There are six steps in effective interpretive trail planning (Fazio, and Purdue University Cooperative Extension). They are:

1. Inventory the Site
2. Layout the Route
3. Construct the Trail
4. Soil Erosion Control and Prevention
5. Interpret the Site
6. Maintenance

Inventory the Site

Begin with a detailed analysis of the resources present (Ashbaugh and Kordish, 1971). It is helpful to get professional assistance from civil engineers, soil scientists, and
foresters (Proudman and Rajala, 1981). Survey the site for special features, vegetative cover, drainage, topography, soil condition and type, natural, and cultural resources (Cook, 1990). Look for perceptually exciting nodes (PENs) or areas such as vistas, blooms, sounds, or a combination of these (Veverka, 1990). A sketch map showing approximate locations of these elements is useful as a general overview record (Purdue University Cooperative Extension). Some good sources of information about your site are:

**Topographic Maps** - (put out by the U.S. Geologic Survey, Washington D.C. 20242) Look for existing corridors you might use. i.e. - old railroad beds, logging roads, utility trails (Herman, 1978). Topographic variations such as hills, knolls, and views are stimulating in trail design. Also look for subtle turns and changes in grade to keep visitor interest and satisfaction high. These maps will also show ownership boundaries (Proudman and Rajala, 1981).

**Soil Surveys** - (available through the Soil Conservation Service or your county office) Know your area's soil type. This will help you select surface materials and erosion control methods (Herman, 1978). More information on soil considerations for trail layout is presented in the next section of this chapter.

**Aerial Photographs** - What special features would interest the visitor? What habitats are on your property? Keep notes directly on a copy or on overlays for reference when laying out the trail (Ashbaugh and Kordish, 1971; Proudman and Rajala, 1981). A series of overlays can show various natural, cultural, historic, and development features of the site (Proudman and Rajala, 1981).

**Long-time residents or former owners** - People can tell you a lot about the history of the site. Did any historic events take place on the site (Herman, 1978; Proudman and Rajala, 1981)?

**Your Own Investigation** - Investigate the area on foot. Envision the area at different times of the day and in different seasons (Herman, 1978). Check the library and the local historical society for books and other information about the area (Herman, 1978; Proudman and Rajala, 1981).

**Original Land Survey Notes** - These can provide information on the site's original vegetation.

**Regional and Local History Books** - Check with local historical societies for more information about the stories of the past. Pictures might also be available.
Lay Out the Route

There are many decisions to make when laying out the route of an interpretive trail. How will visitors gain access to the trail? What soil types are found in the area and how will they impact the trail site? What is the most aesthetically pleasing path the trail can follow? What configuration will best fit interpretation and visitor needs?

Answering these questions before beginning trail construction can eliminate costly and time-consuming mistakes. The following ideas are from Proudman and Rajala (1981).

Trail Access Considerations

Consider the volume of public access desired and acceptable to your site. For example, a trail proposed on a major recreational highway will probably be frequently visited. More planning for visitor and site safety will be necessary in the trail design. If, on the other hand, you locate the trail off an infrequently used rural road, visitor use and site impact will be reduced.

The location and size of the parking lot allows the planner a degree of user control. If you want to reduce the number of visitors to a trail or reduce the time they spend there, limit parking. A large parking lot will attract more visitors. However, do not plan for what you don't need. If the trail requires only a 10 minute walk to a feature, the parking lot does not need to be as large as one where the visitor will want to spend several hours hiking.

Try to coordinate parking with other recreational uses such as picnic areas and snowmobile trails. For safety, plan parking locations with the appropriate representatives of the State Highway Department or the Department of Transportation.

Supply the area with litter receptacles, signs, and information boards. Buffer the visitor from the sight and noise of manmade features when possible. Crossing roads or railroads at the shortest right angles may be the safest. However, the trail entrance appears abruptly to the motorist who should be made aware of a trail crossing.

Figure 3.2 Safe Road Crossing (Proudman and Rajala, 1981).
Soils

Trail treadway problems, such as erosion and compaction, can be reduced by detecting and avoiding trouble areas during planning. Compaction occurs when the surface layers of soil are continually walked on until they become like cement and no longer absorb surface water. Water that puddles on the surface of the trail can flow downhill carrying soil particles along with it. Water will flow 15 times faster on compacted soil than on naturally porous soil increasing the severity of the soil erosion.

While erosion is a natural process where soils are worn away by wind or water compacted soils aggravate the condition. Flowing water can eventually carry the entire trail tread away.

![Figure 3.3 The Effects of Water Movement on Trail Erosion (Proudman and Rajala, 1981).](image)

Erosion can also cause damage beyond the trail treadway. Soil particles deposited on the forest floor can suffocate plants. In stream and ponds, eroded soil can kill fish and increase the rate of eutrophication. Soil washed from around tree bases can expose roots to disease and weaken the tree's anchoring function, increasing the chances of blowdown.

When areas with compacted soils can not be avoided, use special surface materials and soil stabilization techniques to reduce trail damage. Start laying out the trail on soils capable of withstanding the amount of anticipated use without eroding or becoming wet and muddy. To select a good trail surface look at: soil wetness, texture, structure, and depth.

**Soil Wetness**

Avoid areas with a high or seasonably high water table. Here the trail soil can be saturated much of the year. Avoid areas with poor drainage such as bogs, depressions, and areas of frequent flooding along lakes and streams unless you are considering special trail surfacing techniques. You can determine the soil wetness by visiting the site during periods of high water run off, long periods of rainfall, and spring snow melt.

If you do not find surface water, dig a shallow hole along the trail site and watch if it fills with water. If it does, or if water placed in the hole doesn't percolate down and out then the site either has poor drainage or a high water table and may be unsuitable for a trail unless it is covered with coduroy or a boardwalk. Some surface soil color characteristics can also tell you if the site has drainage problems. Color characteristics are only generalizations and
should be used in conjunction with other determining factors. If the color of the subsurface soil is:

- reddish brown it is well drained
- uniform it is well drained
- red or yellow mottles it has short periods of poor drainage
- gray/bluish or gray mottles it has perenially poor drainage
- thick dark brown or black surfaces are peats or mucks with poor drainage

Soil Texture

Soil texture is the relative proportions of various sized soil particles. Soil types can be identified in the field through touch and a hand lens. There are many variations to those listed below. Check with your local office of the Soil Conservation Service for more specific details about the soils in your area.

1. Loam soils are a mixture of sands, clay, and silt. They are the best for trails because they resist compaction and erosion. The silt and clay add cohesion and the sand and gravel add water absorption capabilities. Look for a mix of sand, silt, and clay that is very gritty but still smooth and plastic (Proudman and Rajala, 1981).

2. Pure sand easily blows away, supports little vegetation, and can lead to a shifting treadway. Avoid soils with loose, single grains readily seen and felt (Proudman and Rajala, 1981).

3. Clay will be muddy and wet in the spring and cracked, dusty, and highly erodible in the summer. Clay soils with imbedded gravel or rocks can add stability and reduce erosion. These soils are fine textured, plastic, sticky wet, and break into hard clumps when dry (Proudman and Rajala, 1981).

Soil Structure

Many soils have hard, compacted layers called hardpans, that are impervious to downward water movement. Avoid these areas. Water will move across the trail or puddle (Proudman and Rajala, 1981).

Soil Depth

Shallow soils over bedrock or hardpans are heavy and frequently saturated with water. They easily erode when walked on. Avoid these areas. In alpine zones where these soils can't be avoided, mark trails with rocks to reduce damage from off trail hikers. Avoid abrupt turns that might encourage cutting (Proudman and Rajala, 1981).

Aesthetics

Aesthetic considerations are an important part of planning the trail route. They can add mystery to the visitor's experience and entice the visitor to travel further along the trail. Complexity in trail environments can capture and hold the visitor's attention. Aesthetic research measures our visual preferences for scenes in the environment so that we can learn how to better design the visitor's environmental experience.
Aesthetics, "that branch of science which deals with beauty," comes from the Greek meaning "things apprehended through the senses" (USEPA, 1973). Human perception is 87% based on sight (Hammitt, 1978). Therefore, for an interpretive trail to be effective it must be a visually appealing path.

The Japanese have known this since before the 7th century. They have traditionally designed their gardens with aesthetic considerations in mind (Elivioson, 1973). Today, researchers in the field of landscape design are determining our visual preferences to improve on our landscape design abilities.

A model was developed to measure visual preferences. Photographs of natural areas were divided into immediate, intermediate, and distant viewing zones. By changing the amount and composition of landscape features, preference scores were determined. With this model, landscape architects can determine the most preferred viewing points or choose where removal of additional forest cover can open aesthetically pleasing views. This model was a key in understanding what is aesthetically pleasing to the public (Brush and Shafer, 1975).

From the study of aesthetics, Japanese garden design, and landscape architects, three key elements have been identified as aesthetically pleasing. They are diversity, complexity, and mystery (Hammitt, 1980).

Our survival once depended on acquiring new information about our environment. (Hammitt, 1980; S. Kaplan, 1975). The informationally oriented characteristics of diversity, complexity, and mystery became strong predictors of visual preference because of our innate desire to learn in order to survive (Hammitt, 1980).

**Diversity** is the amount of new and different information available in our surroundings. An area with several habitat types, varying terrain, and canopy changes would contain diversity.

Visitor's attention is captured along edge habitats where diversity is high. Researchers found that people who viewed photographs and paintings focused their attention along edges of different patterns. (Brush and Shaffer, 1975). It was also found that aesthetic pleasure is triggered principally where there is environmental discontinuity, for example, where the trail leaves a meadow and enters a woods (Gustke and Hodgson, 1980).

**Complexity** is where there are many interrelated or interconnected parts that make the environment challenging to understand. Complexity captures and holds our attention, and promotes exploratory and curiosity behavior (Vitz, 1966). Visitors would be interested in the complexity of a meadow or the many species of insects found there if it were brought to their attention.
We all have a preferred amount of visual complexity. Too much results in chaos, a very unpleasant situation for most visitors. However our preferred amount can increase with continued exposure (Vitz, 1966).

**Mystery**, a consistently strong and common predictor of preference in natural environments, is created when visual information, that could be seen by entering deeper into the area, is hidden from the viewer (Hammitt, 1980). Forest scenes containing a curved segment of trail were consistently preferred over scenes containing a straight segment of trail (Hammitt, 1980). “The fact that it is vaguely seen makes it more elusive, distant, and intriguing” (Hammitt, 1980; Eliovson, 1971). Depth, hidden visual information, and potential involvement are all elements of “mystery” (Hammitt, 1980). Space that allows for entry, exploration, and discovery of additional information is preferred. Landscape design research has found that depth, a major factor in scenic preference, is created by textural gradients and overlapping landforms (Brush and Shafer, 1975). Hidden information stimulates the visitor to discover new information by entering the scene. Potential involvement provides the visitor opportunities to become active in the scene (Hammitt, 1980).

These discoveries in the field of aesthetics can be applied to trail layout:

**Take visitors through a variety of habitats** (Herman, 1978; Sharpe, 1982; Gustke and Hodgson, 1980). You can increase trail scene complexity by providing visitors entrance into edge areas (Brush and Shafer, 1975).

**Take advantage of scenic views.** If necessary, clear a section of trees or brush to expose a view. Integrate rock outcrops, streamsides, and other special features into the trail design (Proudman and Rajala, 1981). This adds variety and enriches the visitors' experience (Fazio, 1973; USDA, 1964; Herman, 1978; Eliovson, 1971).

1. Frame the view with partially obscuring leafy branches or a group of slim trees to increase appeal and a feeling of distance (Eliovson, 1971; Brush and Shafer, 1975).
2. Add diversity with pockets of dense understory, low hanging branches and topographic formations (Hammitt, 1980).
3. Create an interesting mood with changes in terrain, climate, and light levels (Brush, 1988; Proudman and Rajala, 1981).

**Don’t give the visitor a view of the parking lot at the end of the trail.** This will prevent them from taking short cuts (Hultsman, 1983). Trails originating from parking lots should turn soon after the trail head to lure visitors on the trail (Hammitt, 1980).

**Avoid straight trails!** Curves increase interest, feelings of seclusion, surprise and remoteness (Fazio, 1973; Grater, 1976; Ashbaugh and Kordish, 1971; Sharpe, 1982).
1. A path that winds into shrubbery and emerges a little later gives the illusion that it is longer and farther away then it really is (Elivioson, 1971).

2. A curved boardwalk lures the visitor into the scene because of a sense of mystery but also because of a promise of additional information around the bend (Hammitt, 1980). Give them a rewarding view or special trail feature once they get there (Hammitt, 1980).

3. Design the trail to turn at a point where dense vegetation, a landform, or an object exists that will obscure the view of where the trail leads (Hammitt, 1980).

4. Where straight stretches are necessary they should not exceed 100 feet (Ashbaugh and Kordish, 1971).

Watch for reminders of city life - telephone poles, roads, etc. Plan to blot them from view with plantings or avoid those areas altogether (Elivioson, 1971; Proudman and Rajala, 1981; Cook, 1990).

Consider Comfort! Avoid placing signs, benches, or opening a view in a typically windy, hot, or sunny spot where the visitor will be uncomfortable (McHenry, 1990).

Trail Configurations

There are a variety of trail shapes to choose from. Where you begin and end the trail is very important to other facilities on your site and to your visitor. If most of your visitors come to your site by private vehicle, remember they must return to their car. Select a trail shape that will accommodate them. Perhaps you want them to come back through the visitor center or gift shop? Pick one that fits your needs (Christiansen, 1990).

When your interpretive trails begin near or at the nature center, consider incorporating an outdoor exhibit plaza. Interpretation immediately outside a building or kiosk is a transition zone for the visitor. It functions like a porch, drawing them outside by offering the safety of the indoors with the appeal of the outdoors. In most cases, outdoor exhibit plazas help to lead the reluctant visitor to the interpretive trail (Christiansen, 1990).

Whatever the trail shape, a head sign or marker, interpretive structure like a kiosk, or even a park entrance sign should identify the trail entrance and entice the visitor to walk the trail (Elivoson, 1971; Ashbaugh and Kordish, 1971). Trail head signs should include the trail objective and length (Ashbaugh and Kordish, 1971). More details about trail head signing is found in Chapter 2.

Figure 3.4 The Line Configuration (Veverka, 1977; Proudman and Rajala, 1981).
Linear

Linear trails, usually for long distance hiking, or to connect campgrounds to other park facilities, have a definite origin and destination which are usually a special feature (Veverka, 1977; Proudman and Rajala, 1981). Linear trails may also be augmented with side trails or alternate routes and connectors forming a more complex trail system (Proudman and Rajala, 1981).

Linear trails are harder to interpret. Visitors tend to select stations that catch their eye as they travel back and forth along the trail instead of reading them in order. For this reason, each interpretive sign along a linear trail must stand on its own as well as be a part of a broader sequenced theme (McHenry, 1990).

Horseshoe

This configuration is popular where public transportation is available. The horseshoe configuration is also used as an auto route to a wayside exhibit or scenic spot (Proudman and Rajala, 1981).

Loop

Interpretive trails commonly use loop configurations. They have a well defined start and end near or at the same point (Grater, 1976).
Loop trails are advantageous for interpretation in many ways.

1. Loop trails eliminate backtracking that bores the visitor (Hultsman, 1983; Veverka, 1977; Sharpe, 1982).
2. They reduce trail wear (Hultsman, 1983).
3. Their simplicity easily directs hikers (Hultsman, 1983).
4. Confusion is reduced with only one entry point (Hultsman, 1983).
5. Maintenance is reduced having one trail head/end (Hultsman, 1983).
6. Inexperienced hikers are less disorientated (Hultsman, 1983).
7. They are convenient for visitors with time constraints or not able or interested in a longer hike (Sternloff and Warren).
8. People are better dispersed along the length of the trail without coming in contact with those who are returning (Sharpe, 1982).

There is some disagreement about the best length for single loop interpretive trails. Ashbaugh and Kordish suggest 1/4 to 1/2 mile to reduce fatigue and sustain interest (Ashbaugh and Kordish, 1971). Fazio suggests 1 mile as an appropriate length (Fazio, 1973). The USDA suggests 1/2 mile (USDA, 1964). Generally, 1 mile or shorter is best (Sharpe, 1982). Perhaps more important than length is walking time. Translate trail length into walking time for your visitors. A 45 minute walk is usually comfortable and meets visitor time constraints (Veverka, 1990). Determine the proper length of your trail by considering your topography and your visitor's goals (USDA, 1964).

Loop trails also present problems. Visitors can lose their feeling of privacy on a short, single loop trail. Decrease contact with other visitors by varying the terrain. Enhance the feeling of wilderness with vegetative screening (Hultsman, 1983; Proudman and Rajala, 1981). Creating a physical distance between parallel points assures that visitors at the beginning of the trail don't view others near the end. (Hultsman, 1983). Bringing visitors back near their starting point instead of back to the same exact spot also reduces contact with other visitors (Cook, 1990).

**Multiple Loops**

**Figure 8**

Multiple loops increase visitor flexibility. Visitors with more time can extend their hike (Sternloff and Warren; USDA, 1964). Special subject spur loops also give them a choice of interpretive themes (Ashbaugh and Kordish, 1971).
Stacked Loop or Satellite Loop

This trail design significantly increases the visitor’s scenic and hiking options. Additional loops may provide the visitor with access to different ecological zones or scenic viewpoints (Veverka, 1977).

Figure 3.8 The Stacked Loop Configuration (Ashbaugh and Kordish, 1971; Veverka, 1977).

Spoked Wheel

This design connects a central point with several outlying points. This design is good in teaching situations where groups originating from the same point, such as a nature or environmental center, can split up and take different routes (Veverka, 1977).

Figure 3.9 The Spoked Wheel Configuration (Veverka, 1977).
Maze
A complex network of trails expands teaching opportunity, variety, interest by interconnecting with nearby trails (Ashbaugh and Kordish, 1971; Herman, 1978; Veverka, 1977). This system is often confusing for the visitor to follow. Color code them for easy orientation (Veverka, 1977).

![Maze Diagram](image)

Figure 3.10 The Maze Configuration (Veverka, 1977).

No matter what configuration you choose, a trail system should use different formats to satisfy a diversity of recreational needs, interpretive themes, and access choices. In this way trails can be provided for different users with different expectations reducing the need to combine interpretive with non-interpretive trails (Proudman and Rajala, 1981).

![Trail System Diagram](image)

Figure 3.11 Trail System (Ashbaugh and Kordish, 1971).
A trail system can also be designed to form "layers" that can be developed as funding becomes available. Tom Christiansen of the interpretive consulting firm Inside/Outside suggests layering trail interpretation in the following manner:

**Layer 1: "Warm Up Trail"** - This section of the trail is actually the trail access. While this section of the trail may not present an interpretive message per se, it should pose a question to lure the visitor further along the trail (Christiansen, 1990).

**Layer 2: "After Hours Trail"** - This section of the trail, usually located near a visitor or nature center, offers the visitor an optional interpretive trail experience when the visitor center or nature center is closed. This section of the trail should be identified with a trail head or kiosk (Christiansen, 1990).

**Layer 3: "Universal Trail"** - This segment of the trail, about 1/2 mile with cut backs available for those with physical or time limitations, is more heavily interpreted. This section of trail should be clearly marked for distance, topography, and accessibility (Christiansen, 1990).

**Layer 4: "Extended Trail"** - This portion of trail is for visitors wanting extended physical activity as well as interpretation (Christiansen, 1990).
Construct the Trail

Consider the function of the trail and the user’s desires when selecting construction standards (Sternloff and Warren, 1977). Select width, grade, surface material, and trail structures appropriate to your site.

Marking the Route

Use flagging to mark the trail path for your clearing crew. Blaze marks are permanent, disfiguring, expose trees to insects and disease and invite vandalism. Tie bright colored cloth strips, tissue paper, or engineer's flagging tape to bushes and shrubs (Sharpe, 1982; Fazio; Ashbaugh and Kordish, 1971; Proudman and Rajala, 1981). Twine strung along each side of the trail works well (Ashbaugh and Kordish, 1971). Spring and Fall, when leaves are off the trees and the ground is clear of ice and snow, are the best times to mark the route. Do the work in pairs, one standing at a checkpoint and calling to the other reading from the layout map (Proudman and Rajala, 1981).

Width and Height

Most trails should be cleared 10ft. above the path. Extend this height to above average snow cover in snow country. Allow for drooping branches wet with rain or snow (Ashbaugh and Kordish, 1971; Herman, 1978). The trail should be wide enough to accommodate motorized maintenance vehicles such as a jeep, electric cart, or truck. Leave some spots of rough terrain. Most hikers enjoy occasional steep climbs or descents (Sternloff and Warren, 1977).

Teaching trails should be 4-6ft. wide in wooded areas in order to comfortably gather groups. For hiking, 3ft is adequate (Ashbaugh and Kordish, 1971). To construct a trail on a hillside, take the excavated material from the slope and build up the outside of the trail with packed material (Purdue University Cooperative Extension) Prune back the vegetation 1 arms length from the trail to avoid any potential injury (Fazio, 1973). A wide trail encourages ferns, clovers, grasses, and flowering plants along the edges (Ashbaugh and Kordish, 1971). However, narrow paths are more visually appealing than wide bare ones (Elivioson, 1971).

Figure 3.12 Width and Height Requirements for Trail Construction.

3-18
Grade

Build trails to follow the contour of the land (Herman, 1978; Ashbaugh and Kordish, 1971). A 0-5% grade is the most desirable for comfortable walking according to the Wisconsin Department of Natural Resources. Inclines should not exceed 10% grade for more than 100 ft. Extended grade should not exceed 8.3% for handicapped visitors (Park, Ross and Ellis, 1984). Trails that climb long, steep gradients will be subject to gully erosion (Proudman and Rajala, 1981). Where extremely rough terrain cannot be avoided consider other locations for an interpretive trail (Hultsman, 1983). If this is not possible consider some of the following trail techniques to use on steep grades.

Sidehill

A sidehill trail allows running water to cross the trail but not run down the treadway at high speeds. Sidehill trails may break up steep climbs with short, level sidehill stretches (Proudman and Rajala, 1981).

Steps

Steps make it easier for the visitor to ascend or descend steep parts of the trail. They are also used to prevent erosion. If possible, steps should be constructed of locally available materials (Veverka, 1977). Use firm, safe, rustic but unobtrusive materials (Fazio, 1973). Native stones, flat stones, old railroad ties, and hewn logs treated with water repellent and preservative are possibilities (Ashbaugh and Kordish, 1971; Veverka, 1977). The following are diagrams of some popular step designs. More information on using steps for erosion control and prevention is given in the section Erosion Control and Prevention.
Figure 3.14 Ramped Steps (Veverka, 1977).

Figure 3.15 Steps on Stingers (Veverka, 1977).

Figure 3.16 Timber Steps (Veverka, 1977).

Figure 3.17 Log Steps (Veverka, 1977).

Figure 3.18 Step Edge Details (Veverka, 1977).

Figure 3.19 Boulder Steps (Veverka, 1977).

Figure 3.20 Rock Steps with Backfill and Overlapping Rock Steps (Proudman and Rajala, 1981).
Switchbacks

Switchbacks are a series of sidehill trails that turn back and forth across a grade several times to lead hikers to a destination. Switchbacks should be level with a 4' minimum turning radius. Others suggest 10% a maximum grade for comfortable walking with a 15% maximum for inclines (Ashbaugh and Kordish, 1971). Switchbacks should not be built too close together. Closely spaced, they invite shortcuts, especially on the descent. Making wide turns reduces shortcutting. Design switchbacks over a large area so vegetative screening can be used between switchback legs, also reducing shortcutting (Proudman and Rajala, 1981).

![Figure 3.21 Proper Switchback Placement (Proudman and Rajala, 1981).](image)

Clearing

Clearing can be done by machine or by hand. Machine clearing is more disruptive but quicker and less costly. Hand clearing takes much longer, is more costly but less disruptive. Whichever method you choose, the trail planner should supervise clearing to avoid misunderstandings (Ashbaugh and Kordish, 1971; Sharpe, 1982). The planner should decide where to fell large trees that are impractical to go around, where brush and logs can be stacked for wildlife shelter, or where to leave stumps and rocks for interpretive or aesthetic purposes (Ashbaugh and Kordish, 1971). Otherwise, clear the trail of exposed roots, protruding rocks, stumps, and dead overhanging limbs (Fazio, 1973). Paint the exposed cut on the remaining roots with tar or pitch to prevent disease from entering the tree (Purdue University Cooperative Extension).

Trail Surface

Trail surfaces reduce trail erosion, compaction, widening, cutting, serve as a comfortable walking medium, and offer the visitor access into fragile or wet areas (Sternloff and Warren; Hultsman, 1983; Proudman and Rajala, 1983; McHenry, 1990). In ideal situations the trail may need little, if any improvement. If you could select the perfect outdoor trail surface it would:

- sustain multiple use
- be dustless and stainless
- be durable despite its use
- be reasonably priced
- be easily maintained
- need little maintenance
- look nice
- be nonabrasive
be resilient
be available year around
not be slippery
not create excessive amounts of noise when walked on (Hultsman, 1983).
be locally available (Veverka, 1977).

The type of activity, soil, vegetation, design, and intensity of use are major factors which determine the best surface to apply (Veverka, 1977; Sternloff and Warren, 1977; Herman, 1978). If your trail shows signs of trampled vegetation, soil compaction, erosion, or standing water, consider applying a surface material (Veverka, 1977). Also consider your accessibility needs, environmental requirements, and aesthetic desires (Cook, 1990). Your local parks and recreation department, U.S. Forest Service office, or regional planner can advise you. Keep in mind that loose materials should not be used on portions of trails where grade exceeds 9% (Sternloff and Warren, 1977).

Surface material options are:

**Woodchips** - Woodchips are one of the most frequently used materials (Sternloff and Warren, 1977; Hultsman, 1983; Veverka, 1977). They are probably the cheapest, most easily applied, durable surface materials with a natural appearance (Veverka, 1977; Ashbaugh and Kordish, 1971). There are different types of woodchips to choose from. Hardwood chips from pruning and thinning operations or telephone and power companies are best. Shredded bark is similar to woodchips but is not as available. You can find shredded bark at sawmills and pulpmills (Ashbaugh and Kordish, 1971). Good drainage is required with woodchips or surface material will be lost or get soggy after a heavy rain (Veverka, 1977; Sternloff and Warren, 1977).

**Grass** - Grass is aesthetically pleasing and comfortable as cover in open areas. It requires a recovery and fertilization period in the Spring and Fall. For this reason grass is used where alternative trails are available (Ashbaugh and Kordish, 1971).

**Fine Shale** - This material is especially good for wet areas with heavy use (Ashbaugh and Kordish, 1971).

**Bank Sand and Small Gravel** - This is preferred over fine shale when it is available on site (Ashbaugh and Kordish, 1971).

**Blacktop and Concrete** - This material is for heavy use and handicapped accessible areas (Hultsman, 1978; Veverka, 1977). Contractors are the best sources of information on the type, thickness, and costs for your area. It can be coated with a tough vinyl plastic to increase the life of the trail. A sand and clay mixture is very similar to blacktop and concrete however it is more visually appealing (McHenry, 1990).

**Soil Cement** - Similar to concrete, soil cement is typically used in high use urban areas. A hard, durable surface is produced by mixing several inches of parent material (usually gravel) with cement and water (Veverka, 1977). Sandy soil from the site can replace the gravel and
reduce the cost (Ashbaugh and Kordish, 1971). To apply, a dug-out tread is filled with 4-5" of this mixture. A slight crown aids drainage (Veverka, 1977; Ashbaugh and Kordish, 1971).

Concrete Blocks - Large blocks are laid in a prepared bed of sand 6-8' wide. This is appropriate on heavily used trails where the ground does not freeze (Ashbaugh and Kordish, 1971).

Gravel - Gravel, if found locally, is relatively inexpensive, compacts well, is durable, and smooth. However, it becomes very dusty and is noisy when walked on. Chemicals such as calcium chloride can remedy this situation but also kill trailside vegetation (Veverka, 1977). The application of gravel starts by clearing surface vegetation. Then, 3-4" of gravel is applied and compacted. This is covered with 2-3" of crushed and compacted gravel (Veverka, 1977).

Crushed Limestone or Granite - This material is similar to gravel and is applied in the same way. It is relatively cheap, attractive, holds shape well, has good drainage, and does not float away with rain or in seasonally wet areas (Christiansen, 1990). It must be graded regularly to retain an even tread (Veverka, 1977).

Trail Furniture

Many visitors will appreciate the opportunity to sit and rest somewhere along the trail. There is also evidence that information given at rest stops is better retained (Sharpe, 1982). If you have a point to emphasize make it at a station where a bench is provided (Sharpe, 1982). The following are trail furniture options.

Figure 3.22 Viewing Platforms (Veverka, 1977).
Figure 3.23 Log Benches (Grist).

Figure 3.24 Wildlife Blinds (Grist, Nov. 1959).

The observation tower is a useful trailside device for promoting panoramic views.

Lookout with a simple overhead shelter. This structure can double as a fire tower.

An observatory with a telescope is always a popular feature at a nature center.

Lookout with a spiral staircase. Small building can be a restroom.

Figure 3.25 Observation Towers (Grist, Dec. 1965; Grist, May 1961; Ashbaugh and Kordish, 1971).
Wet and Fragile Areas

Lay out trails around sensitive plant life, lake shores, springs, and other fragile areas with buffers for protection from trampling (Proudman and Rajala, 1981).

Figure 3.26 Trail Layout Around Sensitive Areas (Proudman and Rajala, 1981).

Special structures can invite visitors into these areas with a minimum of site damage (Proudman and Rajala, 1981). Boardwalks, half logs, rocks, and stretches of corduroy are options for muddy or seasonally wet areas (Fazio, 1973; Veverka, 1977; Proudman and Rajala, 1981).

Figure 3.27 Boardwalks (Veverka, 1977)
Some areas of the trail can be raised above the wet area. Where feasible and safe to the site, water can be diverted away from the trail. Railroad ties with drainage pipes underneath serve this purpose. Tread can be built above the pipes with extra dirt and fill. However, this must be done where the trail is on an incline so ditches don't act as collecting areas for groundwater (Purdue University Extension).

Figure 3.28 Step Stones and Rock Treadway (Proudman and Rajala, 1981).

Figure 3.29 Trail Built-up Over a Wet Area (Ashbaugh and Kordish, 1971).

Figure 3.30 Elevated Tread Bordered by Logs (Veverka, 1977).
Figure 3.31 Culverts for Stream Crossing (New Mexico Parks and Recreation Committee, 1974).

Figure 3.32 Bridges are another option (Grist, June 1972; Grist, Oct. 1974).
Erosion Control and Prevention

The two main erosion control methods, considered at the beginning of a trail's life, can also act as erosion prevention. Waterbars, set at angles across a trail directly water off the trail treadway. Steps, also used to help the visitor traverse a steep section of trail, set perpendicular to the trail help slow water down and retain soil by creating little terraces. Steps and waterbars complement each other well and are usually used together. Steps prevent the waterbars from being clogged with loose soil by holding soil in place. Waterbars remove water from the trail that could eventually wash out steps (Proudman and Rajala, 1981).

Waterbars
Types
Wood logs are the most frequently used because they are easy to obtain. Use a rot resistant wood such as hemlock, fir, spruce, and cedar. The logs should be peeled to inhibit rot and reduce insect damage. The length of the log depends on the width of the trail but they should be at least 6-8 inches in diameter at the smallest end.

Rocks are also used. They are placed in the same way as wood logs. If you use smaller rocks, they must be butted end to end tightly or be overlapped so water will not move in between and loosen them. Rock waterbars can provide longer lasting and more aesthetic erosion control, however, they can be harder to obtain and place.

Placement
If water is channeled from the trail with the flow significantly reduced the water will deposit sediment and eventually clog the waterbar. Natural turns in the trail are excellent waterbar locations because they are self cleaning.

Figure 3.33 Self Cleaning Waterbar (Proudman and Rajala, 1981).
To find a suitable site for a waterbar, walk up the trail to the area where water enters the trail. Identify where it can be channeled away before reaching the trail. If numerous small rivulets cross the trail, try to channel the water into one flow with ditches.

![Figure 3.34 Proper Waterbar Placement (Proudman and Rajala, 1981).](image)

Installation

Dig a trench at a 30-40 degree angle to the treadway the same diameter as the waterbar. Extend the trench 1-3 feet beyond the end of the waterbar to ensure the water will be well directed off the trail, if the natural topography will not accomplish this. To slow water and reduce trailside damage place log and rock impediments in the path of the diverted water (Proudman and Rajala, 1981).

![Figure 3.35 Reducing Waterbar Trailside Damage (Proudman and Rajala, 1981).](image)

Stake log waterbars securely in place with one stake at the lower end and one or two on each side. Drive them in at an angle to form an inverted "V" over the log. This trough fit holds the logs tightly and reduces drag.

![Figure 3.36 Staking Waterbars (Proudman and Rajala, 1981).](image)
Make sure the stakes are flush with the waterbar and out of the main traffic area so after wear and tear and soil settling they will not stick up and present a hazard to hikers. Use large rocks where the soil is too thin for stakes.

![CROSS SECTION OF SOIL AROUND WATERBAR](image)

Figure 3.37 Cross-Section of a Waterbar (Proudman and Rajala, 1981).

If necessary, a drainage ditch can be used to collect water above the waterbar. Use a backslope on the ditch to prevent collapse and clogging with debris (Proudman and Rajala, 1981).

![DRAINAGE DITCH AND BAR](image)

Figure 3.38 Drainage Ditch with Waterbar (Proudman and Rajala, 1981).

Once the waterbar is secure, pack it with a 8-12 inch width of soil up against the downhill side and slightly higher than the waterbar. The soil will pack flush with traffic. Pack the uphill side with soil underneath the log to prevent water from moving through.

Lastly, create a rough surface for good footing by topping the log surface with an axe. The waterbar will become slippery when wet, especially if it was not peeled.

Steps

Rock steps are the most desirable because they last longer and are more aesthetically pleasing. Over time they may look as if they were placed naturally. Wood steps are also frequently constructed using the same techniques and materials as wood waterbars.

Placement

Any shape rock can be used. Large rocks with a flat surface work best. Begin placing rock steps from the bottom and work your way up the incline. Where possible, take stones from the site. Determine which face will provide the best step and the direction it should be turned for the most stability.

Larger logs give a more vertical rise on steeper slopes. Again, length depends on the trail width and they should be extended into the banks of the incline. Dig a trench for the log
about 1/3 its diameter. Secure with stakes in the same manner as securing waterbars. Once secured, the uphill side should be backfilled with the soil removed when digging the trench. The bottom of the upper log should be higher than the top of the lower log with soil in between, slightly sloped to prevent water puddling on the steps. Flatten the top of the log for secure footing.

Interpret the Site

Interpretive messages along a trail increase visitor’s preference for a scene because they add meaning (cognitive structure) to their experience (Hammitt, 1978). A balance should exist between overwhelming the visitor, answering too few questions and stimulating none (Ashbaugh and Kordish, 1971). Effective trail interpretation is coordinated with other media in telling the story of the site (Grater, 1976). Trail interpretation should be a planned and well written story where stops along the trail illustrate the story but are not the story themselves (Veverka, 1990).

Interpret any special feature found on the site. Visitors are usually curious about temporary or seasonal features. Interpret features with hidden significance the visitor may otherwise miss (USDA, 1964). Philosophical and ethical messages are most effective at overlooks, rest stops, areas of exceptional beauty, and at the trail end (Fazio, 1973). Add interest and variety with an interpretive device or exhibit not part of the scene (i.e. a cord of wood, observation tower, observation blinds, and overlooks, etc.) They increase visitor participation in the scene (USDA, 1964; Ashbaugh and Kordish, 1971). Also point out good photographic opportunities along the trail (Grater, 1976). Consider the distance of the trail, and your objectives when selecting interpretive sites and methods (USDA, 1964).

Traditionally, there are two types of interpretive trails. One type is designed for interpretive hikes led by a naturalist or teacher. The other, self-guided interpretive trails, display various devices that interpret area features, objects, structures, or concepts in sequence along the trail (Grater, 1976). A well chosen name is an asset. It gives the visitor a clue to the theme and features along the route (Grater, 1976). A new hybrid of guided and self-guided tours combine the advantages of both methods. Disadvantages like one way communication on self-guided trails can be remedied. Interpretive talks can be scheduled along the self-guided tours. Interested visitors can stop or proceed without it. It has been shown that this technique increases visitor questions and participation at the visitor desk. Since the chief aim of interpretation is provocation, then questions may indicate a stimulation to learn and discover more (Lipman and Hodgson, 1978).

An attractive entrance sign that entices the visitor to experience the site is essential. Visible from the parking lot, it should show a map indicating trail length, trail purpose, title, and the organization responsible for design and construction. It should also display location of special features and pictures of what is found along the trail (Fazio, 1973; Ashbaugh and Kordish, 1971).
Themes

Trail interpretation can reflect a specialized theme or story through stations along the trail (USDA, 1964; Grater, 1971; Ashbaugh and Kordish, 1971). Theme unity can increase understanding and retention of the interpretive message (USDA, 1964; Veverka, 1990).

A miscellaneous trail interpretes a variety of features but does not attempt to show any relationship between stations. These trails usually interprete the obvious features. General information common to many sites is presented. For this reason it may be disappointing to visitors. Miscellaneous trails should be avoided unless no other interpretive possibilities exist (USDA, 1964).

A nature trail theme identifies rather than interprets features along the trail. Its purpose is to provide opportunity for nature study (USDA, 1964).

A “Great Truths” theme covers a broad concept, a wholeness of nature (Grater, 1976).

An orientation trail is designed to acquaint visitors with geographic features and places. It gives information rather than interprets (Grater, 1976).

These themes can be applied to any interpretive method you select. These include stakes with interpretive labels, interpretive signs, wayside exhibits, stakes with recorded messages, and markers with leaflet (Grater, 1976).

Interpretive Methods

Deciding which interpretive method to use on a self-guiding trail is not an easy task. Many interpreters have differences of opinion on the best method to use. Selections should depend on your site needs, limitations, and visitor desires. Consider disadvantages and advantages in relation to your own particular situation.

Stake with Interpretive Label

The stake is usually of wood, metal, or concrete. It should be tall enough that visitors do not have to stoop to read but short enough so as not to intrude upon the site (Grater, 1976). Labels, smaller than signs, are descriptive text providing names, characteristics, historical background, or economic importance. Labels must be accurate, interesting enough to capture and hold attention, easy to read, understandable, and brief (Ashbaugh and Kordish, 1971). Labels are often used to interpret seasonal features (Sharpe, 1982 and Ashbaugh and Kordish, 1971). However, do not leave labels when the feature is gone. This confuses the visitor, clutters the trail and often wastes money and maintenance efforts (Ashbaugh and Kordish, 1971).

Place stakes with interpretive labels close enough to the object that there is no chance for mistaken identification. Be careful not to detract from the site or photographic opportunities (Grater, 1976).
Interpretive Signs

Interpretive signs are enlargements of the interpretive label. They are larger, have a longer text, and are designed to tell a more complete story (Grater, 1976). They are usually impressive and have a high quality appearance (Sharpe, 1982).

Signs have many functions along a trail. They may offer direction. Directional signs, posted at trail intersections and at 1/4, 1/2, and 3/4 marks, help guide the visitor (USDA, 1964). Trail signs may designate a particular purpose (Ashbaugh and Kordish, 1971). For example, trail entrance signs are the “cover of the book” identifying the theme, length, and organization responsible for its construction. Trail signs may also post rules or caution the visitor of hazardous conditions. Most frequently however, trail signs carry a detailed interpretive message (Ashbaugh and Kordish, 1971).

Interpretive signs should be simple. Complicated relationships or fully developed themes should be left for larger wayside exhibits or booklets. Exceptions can be made for special features or strategic areas (Ashbaugh and Kordish, 1971). They should all be made of the same material, shape, and size. This creates unity and coherence while also reducing cost (Sharpe, 1982).

One criticism of interpretive signs is that they are not multi-language. This can be corrected by reducing the camera ready art, typesetting the inscriptions in the languages required, printing, and distributing a free booklet corresponding to the signs as they appear along the trail (Pilley, 1988).

It is believed that interpretive signs are more expensive than other methods of trailside interpretation (Sharpe, 1982). Often however, costs are comparable to the marker keyed to brochure method when considering costs involved with printing, reprinting, and revisions of high quality publications. Also, interpretive signs give a high quality of appearance that markers usually cannot match (Pilley, 1988).

Interpretive sign placement is an important consideration in their effective use. Signs should never be placed on trees (USDA, 1964). Instead they should be fastened to sign supports and secured in the ground (see the chapters "Vandalism Control Methods" and "Sign and Wayside Exhibits" for more details). Using two posts instead of one reduces twisting and theft (Cook, 1990). Face signs north to orient visitors (Herman, 1978). Place the first interpretive sign within sight of the trail starting point. Space the rest close enough together to keep the visitor's interest. Avoid crowding them so close that visitors intrude on each other (Grater, 1976). Generally, they should be placed within view of each other (McHenry, 1990). Be careful not to place them so close together that the visitor feels they are not progressing down the trail (Kaye, 1990). The USDA suggests placing 15-18 interpretive stations on a 1/2 mile trail. Sharpe suggests 20 to 25 at approximately 100 feet apart (Sharpe, 1982). Veverka suggests 7 to 10, their placement along the trail to be determined by the site features (Veverka, 1990).
Some interpreters recommend that you place more interpretive stops at the start of the trail where visitor interest is high. Visitor interest decreases as they tire (USDA, 1964; Herman, 1978). However, some believe that visitors slow down as they progress along the trail and are more likely to read interpretive signs at that point (Cook, 1990). Messages placed at points where aesthetic pleasure peaks, such as where the meadow enters a woods, are more easily learned and better retained than messages received elsewhere along the trail (Gustke and Hodgson, 1980). Look for areas where visitors naturally stop or congregate (Christiansen, 1990).

Signs are subject to weathering and vandalism so must be inspected regularly. There may also be some environmental impact to the site where groups stop to read the signs (Sharpe, 1982).

Interpretive Wayside Exhibits

Waysides are outside exhibits that usually stand alone and are more detailed than interpretive signs and may display objects as well as graphics and text (Sharpe, 1982). Three or four large kiosks may carry the interpretive messages instead of a series or smaller signs (Cook, 1990).

Wayside exhibits are usually located near the feature being interpreted. They are susceptible to environmental factors including light and moisture. Photographs will fade quickly. Reflection on glass or plastic can be a problem for the viewer. An exhibit shelter or kiosk can decrease these problems. Wayside exhibits are typically more expensive than individual signs but can be more economical than a series of interpretive signs.

Sign or Wayside Exhibit Placement

Consider the following questions before placing your signs. How will the audience be using the site? Will they be walking, driving, viewing signs from a distance or up close? What do you want to interpret? Do you want to encourage them to come down the trail or hide the trail head from immediate view to reduce the possibility of vandalism? What are the impacts to the site? What is the accessibility to the feature (Dahn, 1990)? While the answers to these questions are very site specific, some rules of thumb are appropriate to most sites.

1. **Face signs north to orient visitors or orient them to site features** (Herman, 1978).
2. **Place the first interpretive sign within sight of the trail starting point.** Space the rest close enough together to keep the visitor’s interest.
3. **Avoid crowding them so close that visitors intrude on each other** (Grater, 1976). Generally, they should be placed within view of each other (McHenry, 1990). Be careful not to place them so close together that the visitor feels they are not progressing down the trail (Kaye, 1990). The USDA suggests placing 15-18 interpretive stations on a 1/2 mile trail. Sharpe suggests 20 to 25 at approximately 100 feet apart (Sharpe, 1982). Veverka suggests 7 to 10, their placement along the trail to be determined by the site features (Veverka, 1990). Some interpret-
ers recommend that you place more interpretive stops at the start of the trail where visitor interest is high. Visitor interest decreases as they tire (USDA, 1964; Herman, 1978). However, some believe that visitors slow down as they progress along the trail and are more likely to read interpretive signs at that point (Cook, 1990).

4. Messages placed at points where aesthetic pleasure peaks, such as where the meadow enters a woods, are more easily learned and better retained than messages received elsewhere along the trail (Gustke and Hodgson, 1980).

5. Look for areas where visitors naturally stop or congregate (Christiansen, 1990).

6. Avoid southern exposures to reduce sign fading, peeling, and chipping (Cook, 1990).

7. Look for adequate and even lighting (Cook, 1990).

8. Place signs at an appropriate height for children and handicapped visitors (Cook, 1990). The bottom surface of a horizontal exhibit or sign must be a minimum of 30 inches from the ground to allow wheelchairs a frontal approach (Park, 1984).

9. Slope the sign face to drain water that might collect on the sign face and to reduce glare (McHenry, 1990).

10. Place signs in the proper perspective so the visitor does not have to turn around to see the thing interpreted (McHenry, 1990).


12. Position the sign face at a 45 degree angle to improve reading ease for children and adults (Murphy, 1979; Hanna, 1990). A reading height of 65 inches maximum and 54 inches minimum allow both standing and sitting people easy reading (Price, 1984).

Brochure Keyed to Markers or Features

This method is most commonly used because it is considered one of the most useful devices in terms of cost, effectiveness, and simplicity (Grater, 1976 and Sharpe, 1982). This alternative to descriptive signs or labels keys trail markers or features to leaflet text (Ashbaugh and Kordish, 1971). The marker, generally a treated wood post standing approximately 2 feet out of the ground, has a routed or painted letter or number on a sloped face (Sharpe, 1982). It is often used where trailside signs and labels would detract from the site (USDA, 1964 and Sharpe, 1982). However, some individuals feel they are less desirable than interpretive signs (Pilley, 1988).

In Favor of Brochures Keyed to Markers or Features

Vandalism is less of a problem. Vandals do not destroy site markers as often as signs because they are less visually appealing and represent less value (Grater, 1976 and Sharpe, 1982).
Markers are more unobtrusive than signs and do not conflict much with guided interpretive walks (Sharpe, 1982 and Grater, 1976). At the same time they give the visitor a sense of security and safety. They protect the site by lowering the tendency to wander off the trail and short cut (Grater, 1976).

Generally, more information can be given in a leaflet than on an interpretive sign (Fazio, 1973). The text can be designed for “out loud” reading by family groups. Parents can explain the message to their children in simpler terms (Grater, 1976).

Several leaflets, made for the same trail, can be designed to reach different age groups (USDA, 1964). Seasonal leaflets can interpret the trail at different times of the year. A leader’s guide can be prepared for teachers and group leaders (Ashbaugh and Kordish, 1971).

Souvenir value is another advantage to this method (Fazio, 1973; Sharpe, 1982). Leaflet printing expenses can be offset by asking the visitor to deposit a small fee or return it when finished (Herman, 1978). This discourages littering because what the visitor pays for they believe is worth keeping (Grater, 1976). Leaflets can be picked up at the trail head or at the visitor center (Ashbaugh and Kordish, 1971).

Against Brochures Keyed to Markers or Features

Directs attention to markers and leaflets but not on the site (Pilley, 1988). Reprinting costs are high when editing and revisions are necessary (Pilley, 1988). Brochure boxes must be maintained and kept full (Pilley, 1988). Most are too site specific to truly be used off site (Pilley, 1988). Printing costs for a high quality publication are high. The costs are not usually offset by visitor donations (Pilley, 1988).

There is some question whether an inquisitive question approach or a traditional declarative approach is more instructionally effective for the visitor. Earlier studies with museum exhibits demonstrated that the inquisitive approach was superior in motivating, directing attention, and promoting visitor interaction and learning. However, one study showed no difference between the two approaches (Korn, 1988).

Tips on Producing Effective Interpretive Trail Brochures

Self-guiding interpretive trail brochures are an effective substitute for the interpreter when they are well written and attractive. Keep the following tips in mind when planning an producing written materials for your self-guiding interpretive trail.

Use short sentences and paragraphs (17 to 19 words/sentence) (Grater, 1976).
Write in a friendly tone (Grater, 1976).
Use personal language (Zehr, Gross, and Zimmerman, 1990).
Write vividly. Use concrete nouns and active verbs (Zehr, Gross, and Zimmerman, 1990; Grater, 1976).
Use active rather than passive verbs (Grater, 1976).
Use good punctuation (Grater, 1976).
Present one idea per sentence (Grater, 1976).
Relate to your reader (Zehr, Gross, and Zimmerman, 1990).
Use graphics to break up long sections of text, to eliminate extra words, and to clearly explain complex information (Zehr, Gross, and Zimmerman, 1990).
Use white space around the outside edges to create an inviting, readable, uncluttered appearance (Zehr, Gross, and Zimmerman, 1990).
Arrange information into "Chunks" along with headings and graphics (Young and Witter, 1988).
Make your writing concrete with the use of examples (Young and Witter, 1988).

For more information on brochure design and layout refer to "Creating Environmental Publications" by Jeffrey Zehr, Michael Gross, and Ron Zimmerman. For more information on effective interpretative writing see Chapter 2 "Designing Effective Interpretive Signs and Wayside Exhibits."

Recorded Interpretive Trail Messages (Audio Trails)
These are trail and road tours where the visitor uses a portable play-back device with a cassette taped message in lieu of a leaflet or booklet (Grater, 1976). A fixed listening station equipped with an audio visual device which can be activated by pushing a button or inserting a rented key, is another option (Sharpe, 1982). The location of each interpretive site is indicated by a numbered marker or by visual description narrated on the tape (Grater, 1976).

There are many advantages to this method. It requires no reading. More information can be given than with signs, wayside exhibits, or in a leaflet. The narrator’s voice can emphasize important information and add special voices, music, and sound effects (Sharpe, 1982). This can create a mood and involve the listener. This is a cost effective method for blind visitors. It is also very effective in historical settings (Sharpe, 1982). If needed, the message can be more easily changed than with other interpretive methods. However, the equipment needed is very expensive and can be difficult, costly, and time consuming to maintain. On-site repeaters, activated by a push button located within a permanent structure are very susceptible to weather and vandalism (Grater, 1976).

Production Tips for Effective Recorded Interpretive Messages

Keep it short. Three minutes is the right length in most situations (Sharpe, 1982).
Chat with your visitors. Don’t sound like you are reading from a script. Use the first
texture and structure of the soil. Apply fertilizer high in nitrogen to increase growth and natural recovery (Ashbaugh and Kordish, 1971).

**Tread Repair** - Remove minor slides or sluff that has slipped downhill on the trail. You may need to reconstruct the trail to its original shape, outslope, grade, or tread material. Repair or replace waterbars where necessary. Carefully inspect bridges and steps for damage.

**Fire Protection** - Keep fire lanes free of vegetation and periodically inspect fire tool boxes spotted around the area (Asbaugh and Kordish, 1971).

**Trail Transect** - Measure soil loss and changes in width and vegetation to tell you if the trail needs periods of recovery (Leonard and Whitney, 1977). Establish a transect trail monitoring system by:

1. Setting up ground control
2. Choosing sites
3. Setting up transects
4. Collecting information
5. Evaluating the data

**Setting up ground control** - A series of marks on permanent objects, benchmarks, are necessary to relocate transect points year after year. To do this, place a permanent marker on one tree at the trailhead. This is usually a lag bolt screwed into the tree at 41/2 feet breast height (bh). Record the species, diameter breast height (dbh) and location in relation to the trail head. Run a cyclometer, a highway distance measuring wheel, up the center of the trail. Nail aluminum tags to the trailside base of trees every 100 meters. Again, record the dbh, species and distance from the trail center for each taged tree. Also, take elevation measurements at each of these points using a hand-held altimeter (Leonard and Whitney, 1977).

**Choosing sites** - Select sites that cover a range of physical trail characteristics (slope, elevation, erosion potential, erosion problems etc.). Be careful not to select sites that will be difficult to remeasure next year such as the brink of a trench or a steep ledge. Do not select an unreasonably large number of transect points. Select instead points that represent critical trail conditions and changes (Leonard and Whitney, 1977).

**Setting up transects** - You will need the following equipment to establish trail transects:
- 2 sets of numbered aluminum tags
- 2 lag bolts
- highway distance-measuring wheel (cyclometer)
- notebook
- simple altimeter
- carpet string
- 2 metric tape measures
- plumb bob
- hammer
Select two trees, one on each side of the trail. Place a numbered tag on the left tree at 4 1/2 bh. Record the distance from the tree to the nearest ground control tag. Drive a nail about waist high, attach a string to it and extend it across the trail to the second tree. Adjust the string so that it is parallel to the trail and attach it to a nail on the second tree. Record the species and dbh of both trees. Note elevation and distance from these trees to manmade structures such as waterbars or steps. Diagram 3.39 illustrates the set procedure.

Collecting information - Extend one tape measure between the two trees to serve as a horizontal measure. The second tape measure, with a plumb bob suspended from the end, is used as a vertical measure. To ensure future readings are comparable even if different tapes are used, measure the distance between the "0" point and the end of the plumb bob. Set up the horizontal tape from the tree on the left to the tree on the right. Slip the hook of the measuring tape over the left nail, wrap the tape around the tree, pass it under the nail, and bring it across to the other tree. Follow the same procedure on the right tree and tie it off. Record the points where the tape passes under the nails so that the tape can be realigned in future measurements. A loop of carpet string drawn taught over the nails will prevent the measuring tape from sagging. Take all vertical measurements from the top of the string.

Figure 3.39 Trail Transect Set-up (Leonard and Whitney, 1977)

Figure 3.40 Calibrating the Vertical Tape
The first measurements you will want to take will be the trail boundaries. Suspend the plumb bob over the left trail treadway edge and record the position on the horizontal measuring tape. Then move the plumb bob to the right trail treadway edge and record the same information. Next, begin taking trail profile measurements. Take vertical measurements from the ground surface to the string every 5 to 10 cm along the horizontal tape. This will provide you with a profile or cross section of the trail. At each measurement point also record the vegetation and surface soil characteristics. Also record the forest stand surrounding each transect site. Figure 3.41 shows an example of trail transect fieldbook notes and the information that should be recorded for each transect site.

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<th>SAMPLING NO. 1</th>
<th>MONTH 6</th>
<th>YEAR 1976</th>
<th>TRANSECT NO.</th>
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<td>TRANSSCRIBER</td>
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<td>DESCRIPTION</td>
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<td>LEFT TREE:</td>
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<td>NAIL READING:</td>
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<td>NAIL READING:</td>
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<td>50 cm</td>
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Figure 3.41 Trail Transect Fieldbook Notes (Leonard and Whitney, 1977).
Evaluating the data: Change in trail width is shown by the horizontal readings. The vertical measurements monitor soil loss. Insert your readings in the following equation to calculate the area (A) from the string to the ground surface for each transect point.

\[ A = \frac{V_1 + V_2}{2} + \frac{V_2 + V_3}{2} + \frac{V_n + V_{n+1}}{2} \times D \]

Where:
- \( A \) = area in square centimeters
- \( V_n \) = vertical distance measurements (cm)
- \( D \) = interval on horizontal axis (5 or 10 cm)

An increase in area from one year to the next at an individual site indicates soil loss. Figure 3.42 shows how soil loss on trails can be graphed.

![Graph showing soil loss on trails](image)

Figure 3.42 Calculating and Graphing Soil Loss on Trails (Leonard and Whitney, 1977).

Change in vegetation at a transect can be determined by the presence or absence of plants or species from one sample to the next. This information can also help you monitor trail widening, shifting, or cutting.

Today, photographs and video recorders are also used effectively to monitor trail changes. It is important, when using these methods, to be consistent with angle, site location, and time of day so a true comparison can be made from year to year.
Considerations for the Handicapped

Resource managers have learned from the handicapped that they do not want special facilities that make them feel segregated from the rest of the public (Beechel, 1975). Segregation offends some and embarasses others (Sharpe, 1982). Also, the needs of the handicapped vary greatly and may conflict. Instead of establishing a variety of special use trails, find out which handicapped visitors will want access to your trails (Sharpe, 1982).

Many trail use barriers to the physically and emotionally handicapped can be reduced or eliminated without the construction of separate facilities. What is needed is an understanding of these barriers and advanced planning to reduce them. Some of the barriers that have been identified are (New Mexico Park and Recreation Commission, 1974):

**Trail Location and Access**

The trail is not adjacent to large metropolitan areas where most handicapped individuals live. It is not accessible by public transportation or normal auto traffic. It is difficult to reach from the parking lot because of curbs and steps. There is no access to shelters, benches, toilets, water fountains, and other amenities needed by the disabled or aged.

**Trail Form and Terrain**

The trail grade is too steep, the surface too dangerous, the path is broken by steps, is too narrow for wheel chairs, is too long or physically tiring, or has too many safety hazards such as overgrown vegetation, cliffs etc.

**Trail Interpretation, Directional Signage, and Furniture**

Signs aren't readable to the blind, sight-impaired, or mentally retarded. Signs, railings, and camera rests are out of the reach of wheel chair users and persons with crutches. Benches, gates and railings are too hard to negotiate by persons with affected coordination and muscle strength.

**Human Considerations**

Trails do not allow for privacy for those who are irritated by presence of others. Trail design may be too secluded for those who need to feel secure. Trail uses can not usually be scheduled for use solely by handicapped groups.

Recently, the National Park Service and U.S. Forest Service have made an effort to accommodate the handicapped on 24 interpretive trails across the country. The following are accommodations found to be successful for specific handicaps (Beechel, 1975).

**Communication**

**Blind** - Trails with cassette players that are carried by the visitor using a belt clip or shoulder strap, where the location of each stop is indicated on the message concluding with the mention of the number of feet to the next stop where successful. Trails that rely on conducted walks or blind visitor accompanied by a sighted person.
Mentally Retarded - Trails custom tailored with personal guides were the most successful at meeting the comprehension level and needs of each particular group.

Ambulatory Limited - Signs mounted at a height where a person in a wheelchair can read them was very important.

Location of the Trail
The most successful and used trails were those located near urban centers that were serviced by public transportation.

Trail Design
Blind - Trails left as natural as possible that gave a safe yet challenging experience were enjoyed the most. Guardrails and ropes were not needed.

Ambulatory Limited - Trails surfaced with a hard, smooth material with little or no crown, a gradient less than 5%, at least 4 feet wide, and without steps were the most accessible. Appropriately designed and conveniently located drinking fountains and restrooms near accessible parking also contributed to trail use and enjoyment.

To plan a trail that can also be used by handicapped visitors.

1. Make the pathway at least 5 feet wide to accommodate wheel chairs (Veverka, 1977).
3. Travel through areas of level topography (Ashbaugh and Kordish, 1971).
4. Do not exceed 8.3 degrees (1 ft. rise/12 foot run) extended grade or 10 degrees shorter grades (Park, Ross and Ellis, 1984).
5. Do not incorporate steps in the trail (Beechel, 1975).
6. Keep it short, approximately 1/8th mile (Ashbaugh and Kordish, 1971) and provide shorter cut-off loops on long trails (Park, Ross and Ellis, 1984).
8. Make brochure boxes easy to reach and barriers and walls short enough to view over (Park, Ross and Ellis, 1984).
9. Only 5-10% of the blind population reads Braille. Information is best presented by sound (Beechel, 1975).
10. On longer trails, include sheltered rest areas including benches with back and arm rests, accessible restrooms and water facilities (Park, Ross and Ellis, 1984).
11. Inform visitors of trail length, travel time, degree of difficulty, facilities provided, and special precautions needed (Park, Ross and Ellis, 1984).
12. Place signs appropriately for readability from a wheelchair (Park, Ross and Ellis, 1984).
13. Learn sign language to help communicate with your visitors (Beechel, 1975).
14. Encourage personal involvement, make interactions oriented to touch (Beechel, 1975).
Chapter 4

Vandalism Control Measures for
Signs, Trails, and Wayside Exhibits

Vandalism Costs!
Who and Why?
Vandalism Control Management (VCM)
Lessons in Litter Control
During the fourth and fifth centuries, the Vandals, an East Germanic tribe, viciously invaded Western Europe ransacking everything in their path. The Roman civilization was the hardest hit. Art and literature were enthusiastically destroyed without thought or remorse. Today the term vandal describes anyone who recklessly destroys property (Madison, 1970 and Cohen, 1968).

Vandalism has been a growing problem. These willful acts lower the aesthetic or economic value of an object (Madison, 1970). Today however, after interviewing eleven interpretive consultants producing interpretive signs, trails, and wayside exhibits, the consensus of opinion is that vandalism in not the problem it once was. Perhaps this is due to an improvement in durable, attractive materials. Our improvement in understanding the motivations of vandals may help us ward off some types of vandalistic behavior.

Unfortunately vandalism is not obsolete. An example is where the managing agency’s public image is very bad. Public hostility and resentment is released through vandalism. Other forms of unintentional vandalism associated with typical visitor use are still a problem.

**Vandalism Costs!**

Overuse and related vandalism problems were identified as the most prevalent threat facing the entire park system in the 1980 “State of the Parks” address (Main, 1987). What is vandalism actually costing us? This is often unclear.

Monitarily, the figure rises. The total cost of vandalism in the United States is estimated at over $1 billion per year (Sternloff, 1977). The U.S. Parks and Recreation Departments together estimated that 30% of their maintenance budgets were spent on vandalism cleanup and repair (Howley, 1981) totalling about $500 million per year (Christiansen). In 1974 the Forest Service spent $3 million to combat the vandalism problem (Lustig, 1985). These figures are alarming, however, they don’t give us the whole picture. Dollar figures don’t include:

1. The loss of irreplaceable cultural or historical artifacts (Sternloff, 1977 and Lustig, 1985).
2. The manpower or time lost from other projects (U.S. Dept. of Trans., 1986).
3. The psychological price visitors pay when offended by racial or sexual graffiti (Lustig, 1985).
4. Aggravation and inconvenience to visitors resulting in a loss of park revenue through entrance or camping fees (Lustig, 1985).
5. Hazardous conditions when warning signs are removed or destroyed (U.S. Dept. of Trans., 1986).
6. The threat of liability when hazardous conditions are not quickly noticed and corrected by park personnel (U.S. Dept. of Trans., 1986).
7. The detrimental effects of a defeatist attitude that results in the facility becoming so damaged that it has to be shut down (Ward, 1973).

Vandalism costs us much more than the figures show. An important first step in combating vandalism is to identify the type of vandals present and attempt to understand the psychology behind their actions (Christiansen, 1982).

**Who and Why?**

Most vandals are between the ages of 6 and 25, 12 to 15 being the most typical. They are both boys and girls, rich and poor, and represent all ethnic backgrounds (Howley, 1981). What many of these young people do have in common are their feelings toward society and the public property they commonly attack.

Vandalism often begins as play. Children under 12 destroy or damage property in games of skill (Sykes, 1979). Parents and park personnel often see these actions as acceptable since no malicious intent was involved. As children grow up, some may have an excessive thirst for adventure (Cohen, 1968). This, allied with negative peer pressure, can generate serious results. In their late teens, revenge, frustration, and anger may set in (Sykes, 1979).

Years ago children were considered adults at a much younger age. They were needed on the farm or in the factory. Meaningful jobs offered them financial independence and a sense of self worth. Generally, they were a part of a smaller, close knit community. Neighbors, friends, and extended family offered emotional support and a watchful eye (Main, 1987). For many teens today the scenario is very different. There is a lack of challenging job opportunities. Teens are forced to remain dependent on parents longer. City and suburban life is often impersonal. Today teenage years are periods of limbo and frustration (Madison, 1970). Vandalism is the release, the attempt for teens to gain control of their lives (Sykes, 1979).

With the motivation to regain control over their own behavior vandals rebel against societies' norms. The more teachers, parents, clergymen, and police officers attempt to regulate behavior, the more the would-be vandal rebels. Depending on the magnitude of control a facility or individual attempts to impose, the young would-be vandal responds contrary to the demanded behavior. This theory of reactance is highly evident (Reiter, 1980). Over one-third of all sign vandalism happens near colleges, schools, recreation centers, and camps (U.S. Dept. of Trans., 1986).

Damage to a facility is more often done by unthinking or uneducated visitors (Campbell, 1968). The National Forest Service estimates that only 5% of the vandalism they respond to is considered to be malicious (Huber, 1963).
Other vandals can be categorized as rule violators. Some simply lack understanding of a rule. Others selectively disregard rules standing between them and what they desire. Then there are those with an inadvertent disrespect for public property (Campbell, 1968).

Other reasons people engage in vandalism are anger, social retaliation, boredom, poor parent/child relationships or teacher/child relationships, peer pressure, psychological problems, and drugs and alcohol abuse (Howley, 1981).

Vandalism Control Management

To effectively decrease sign, trail, and exhibit vandalism a cost effective approach must be implemented. There is no single universal solution to the problem of vandalism. Vandalism in itself is varied and complex. It is important to maintain a balance between park uses, aesthetics, and vandalism control and prevention. It is the job of every person involved at a site from interpreter, designer, director, and public official, to agree on and develop a method of prevention, control, and maintenance (Christiansen, 1982).

There are six principal steps in vandalism control (Christiansen, 1982; Sternloff, 1977):

- Assess the Problem
- Determine the Behavior
- Establish Quantifiable Objectives
- Select your Strategy
- Implement and Collect Data
- Evaluate and Follow Up

A VCM program has many benefits. Common targets can be identified. Frequency type, and extent of the damage can be determined. A VCM program can help you provide data for evaluating strategies and measuring achievement toward your objectives (Christiansen). It can also help to document your need for financial or staff assistance (Main, 1987). You will have the information necessary to prioritize tasks based on safety, disruption of services, and social, moral or aesthetic factors (Christiansen, 1982).

Assess the Problem

Problems will differ during the season, within areas of the park, and within different communities. Attempt to understand the problem by analyzing each situation individually (Sykes, 1979). Identify the type of vandal and the act. While we may not see the cause behind a particular vandalistic act, it is seldom that the deviant doesn’t feel one. Labels such as wanton, aimless, pointless, senseless, malicious, meaningless, and obscure tend to discredit what may be the real explanations. Certain types of vandalism should not be overlooked just because they occur with regularity and are trivial (Cohen, 1968). The inability to analyze the
motivational causes of vandalism and do something constructive about them is the problem (Sternlof, 1977). The following types of vandalism were described by Christiansen, 1982 and Sternlof, 1977. Others authors are sited for specific contributions.

**Inexplicable Vandalism** - Unprovoked actions for the personal pleasure of destruction.
- Wanton: For the joy of destruction (Cohen, 1968).
- Psychotic: Resulting from mental disorder.
- Inebriate: During intoxication.

**Deliberate Vandalism** - Premeditated acts the vandal feels are justified.
- Vindictive: A desire to express antagonism and hatred toward a particular individual or group as revenge for a real or imagined grievance. These are the easiest acts to identify but the most difficult to control.
- Tactical: Intentional acts to deliberately cause damage or to advance some end or cause.
- Expedient: Damage to gain entry into a public facility.
- Acquisitive: Destructive acts to acquire souvenirs.
- Malicious: Especially shocking, offensive, or abhorrent acts for malicious satisfaction.
- Instrumental: Vandalism for profit by looting or theft where all or part of the materials are sold for recyclable scrap.

**Incidental “Erosive” Vandalism** - Small, avoidable and preventable destructive acts the vandal does not perceive as “wrong” and management has accepted as inevitable. Individually they aren’t very damaging, costly, or shocking, but when accumulated they cause considerable, costly damage. After continued abuse, a facility can become an accepted target for other types of vandalism.

- Destructive Play: Families today often don’t feel a responsibility toward natural areas or understand what is appropriate behavior there. When children are alone, motivations for play vandalism include competition, skill, and practical jokes. Children take things apart, climb trees, throw stones, and scribble on walls (Campbell, 1968).
- Imitative: Youths copy actions of adults, especially those they admire.
- Boredom: Very common, sometimes seen as inevitable, this type of vandalism generally results in graffiti or property defacement.
- Inquisitive: Curious vandals ask “What would happen if...?”
- Negligent: These acts are due to thoughtlessness or indifference. Examples are picking park flowers and littering. Negligent vandalism is difficult to clean up, therefore, it is difficult to assess the monetary damage.

**Institutionalized Vandalism** - Vandalism that becomes tolerated or accepted.
- Ritual: On occasions like halloween, senior prank day, club initiations, homecoming, and graduations, vandalism is expected, tolerated, and even condoned.
- Sanctioned: Individuals, typically employees are sometimes authorized to post signs on trees or collect plants which done without permission would be considered vandalism.
Determine the Behavior

What is the damage? At the site carefully record the vandals’ damage. Determine the type and severity of the damage. Most vandalism falls into one or more of the following categories (Christiansen, 1982 and U.S. Dept. of Trans., 1986).

- Breakage
- Surface Graffiti or Marking
- Mutilation
- Theft
- Disfigurement
- Disassembly and Removal
- Burns
- Blockage
- Vegetative Damage or Loss

Knowing what types of damage are prevalent will help you pinpoint your objectives and select the best strategy(s) to achieve them.

Establish Quantifiable Objectives

The ultimate goal of your vandalism control management program should be to decrease unnecessary money spent to repair, clean-up, or replace vandalized items. This should be stated as a positive change from a known status on baseline conditions. Document your present circumstances. It will be necessary to refer back to this when evaluating your selected strategy (Christiansen, 1982).

Select your Strategy

Select your strategy based on the type of vandal, vandalism, motives, and severity of the problem. The most effective solution is usually a combination of approaches. Generally it is more successful to use a pleasant, positive approach than a forceful one. Inform staff members as necessary. These are the people most likely to affect the success or failure of the objectives (Christiansen, 1982).

There are direct and indirect methods of vandalism. Hard sell direct methods aim at forceful, immediate action. These strategies target a specific problem, situation, or vandalistic attack. Direct strategies are used most frequently when vandalism is extremely severe, predictable, or especially shocking.

Hindrance

Altering structure design can decrease susceptibility and appeal to vandals. Advance design planning can prevent up to 75% of vandalism (Howley, 1981). Federal, state, and
local agencies have identified signs, markers, picnic tables, benches, and garbage containers as the most common targets for vandalism (Christiansen, 1982). Hindrance, sometimes called “vandal proofing,” is a very effective method of control in instances where specific items such as these are under attack (Howley, 1981). There is the possibility that the vandal will see the installation of more durable hardware as a greater challenge and admittance of inevitability of the vandalism. Excessive use of the hindrance strategy can result in a fortress-like facility instead of a pleasing and functional one.

Hindrance techniques fall into three main categories. Routine hindrance includes litter pickup and cleaning to maintain and promote a positive image. Preventive hindrance involves regular inspection and simple repairs to prevent more serious and costly damage. Adaptive hindrance measures include repairing or altering equipment to prevent recurring damage (Howley, 1981).

The following suggestions can benefit any facility (Howley, 1981).

1. **Quickly repair or remove vandalized items.** It has been shown that parks in poor condition are more vandalized than those well maintained (Howley, 1981). Well-kept facilities also give the public reason to be protective and proud of the facility. Early morning crews that promptly respond to vandalism deny the vandals the pleasure of viewing their handiwork (Hancock, 1981; Christiansen, 1982; Main, 1987; Sternloff, 1977; Allen, 1978).

2. **Present a professional appearance.** All interpretive materials and structures should be well designed, built, and maintained. A professional, well-kept appearance reduces vandalism (Cook, 1990).

3. **Secure the entire park after closing both daily and seasonally.** Most vandalism occurs after normal operating hours and in the off seasons. By restricting access to signs, trails, and wayside exhibits during these times, it is possible to deflect vandals from your area (Christiansen, 1982).

4. **Increase the chance of detecting vandals.** Use guards, patrols, caretakers, and volunteers to spot trouble and to deter vandals (Christiansen, 1982; Main, 1987; Lustig, 1985; Ward, 1973).

5. **Provide signs that denote proper behavior.** Vandalism may occur simply out of ignorance of the rules. State your message in a tone appropriate to the situation you are addressing (Main, 1987; Lustig, 1985; Ward, 1973).

6. **Promote facility use.** The most important anti-vandalism ingredient is people in and around the area (Christiansen, 1982; Sternloff, 1977).

7. **Provide children with constructive forms of play.** Erosive vandalism that results from boredom is one of the most prevalent problems today. Eliminating
as much of this as possible will save considerable amounts of time and repair costs (Main, 1987).

8. **Increase presence and visibility of park personnel and patrols** (Christiansen, 1982; Ward, 1973).

9. **Provide graffiti boards to deflect writing.** These should be placed in shower/restroom areas and near existing problem sites. These allow the vandal the moment of recognition that they are looking for (Christiansen, 1982; Ward, 1973).

10. **Establish a carving tree, bench, or totem pole to deflect carving.** This satisfies the visitor who wants to be immortalized and reduces damage to the facility (Christiansen, 1982; Ward, 1973).

11. **Provide registration stations.** Registers at trailheads give the potential vandal an acceptable way of recording their presence (Christiansen, 1982).

12. **Keep things natural and appealing.** Make structures fit into the environment as much as possible. Vandalism is often triggered because the object didn’t seem to “fit” or was considered unattractive (Allen, 1978).

13. **Place trail heads near activity centers** (McHenry, 1990). Here, vandals are easily detected. Place the first marker or sign just around the bend. Generally vandals will not want to search for a target (Christiansen, 1990). Place interpretive signs far enough from the trail so vandals can not reach them without leaving the trail (Hultsman, 1983).

Signs, trails, and wayside exhibits often are targets of very specific types of vandalism. Here are some of the most common problems with suggested solutions (Christiansen, 1982; U.S. Dept. of Trans., 1986; Hancock, 1981; Howley, 1981).

4-8
Protecting Signs and Wayside Exhibits

**Problem: Breakage**
Use wood. It is stronger and generally attracts less attention. Green and purple heartwood is the strongest. Use natural color stains instead of paint. Avoid artificial colors that contrast with surrounding colors. Pretreat wood with a petrifying agent. If it is necessary use metals, use bronze, brass, or iron. Use durable structural supports (Cook, 1990).

**Problem: Graffiti/Scratching**
Use protective pre-incident coatings. Seal the sign face with a thick coating of petroleum jelly. (This also waterproofs it.) Seal concrete to keep markings from being absorbed. Remove adhesives with commercial solvents and steel wool. Remove lipstick, crayon, tar, and oil with mild solvents like mineral spirits followed by soap and water. Use scratch resistant materials (Cook, 1990). Routinely polish plastic surfaces and glaze with plastic polish. Select affordable materials that can be duplicated and replaced when necessary (Cook, 1990). Epoxy and car polish will reduce the severity of scratches in fiberglass (Kaye, 1990; Dahn, 1990). Cover signs with plexiglass that can be easily and inexpensively replaced if damaged (Cook, 1990).

**Problem: Disassembly/Theft**
Protecting Trails

Problem: Breakage
Benches: Use poured in place concrete benches instead of wood.
Trail Lights: Mount pathlights next to walks one foot high with sturdy grills of 5/8" reinforcing rods welded together.
Remove lamps from all unused luminaries.
Signs: Stencil messages right into boardwalks when possible.

Problem: Graffiti
Provide register at trailhead to provide an acceptable way of recording presence.
Preplanned impressions in concrete eliminate the “clean slate” vandals are looking for (wood grain textures, brick/stone patterns, leaf imprints, animal footprints, notable signatures, sprinkled with pea gravel).

Problem: Fragile Vegetation
Plant large trees, they have a better chance of surviving abuse.
Stake seedlings to prevent them from being pulled over.
To reduce the loss of new plantings, secure each ball in a heavy duty chicken wire basket secured with hog rings and tie each to a rod driven below ground. Link the baskets of group plantings together.
Protect fragile vegetation with barriers or breaks in grade.
Make evergreens unacceptable as Christmas trees by spraying with water soluble poster paints or sulfur dioxide in December. These compounds will weather and wash off by spring and not damage the trees.
Provide appropriate trail surfaces to reduce trail cutting around seasonally wet areas or where erosion is a problem.
Use alternate trails when a heavily used trail needs time to recover (Ashbaugh and Kordish, 1971).

Problem: Controlling Access
Use baffle entrances instead of fence gates to control bike and motorcycle access.
Do concrete work when the public isn’t in the park and reschedule staff hours to cover the curing period.
Contractors should provide security until it has set.
Mark the trail well to reduce cutting and wandering (Veverka, 1990).
Select an appropriate trail configuration to suit visitor’s desires and needs (Veverka, 1990).
Block shortcuts with anything available. Reroute the trail if necessary so natural barriers force users to follow the trail (USDA, 1980).
Law Enforcement

Law enforcement is another hard sell strategy. Here management clamps down hard on vandalism through better detection and stiffer sentences (Ward, 1973).

The number of vandals typically apprehended is small. Chances are better, however, to deter vandalism through the threat of monetary restitution and work programs (Christiansen, 1982). It is often possible to even target the suspected vandals by hiring or encouraging them to help in the clean up operation of the very facility that they vandalized (Lustig, 1985).

The first step is to adopt realistic, enforceable rules and regulations (Christiansen, 1982). It is extremely important in law enforcement that the public understands the agency's policy toward vandalism. It is possible to confuse and anger the public when inappropriate acts are ignored in one case but acted upon in another (Lustig, 1985).

The law enforcement strategy usually involves one or more of the following techniques of control (Lustig, 1985; "Repairing and Preventing Vandalism Damage," 1981; Christiansen, 1982).

1. Prosecution
2. Fines to cover costs and/or repairs
3. Police escorts home to notify the parents of young vandals
4. Rewards for reports of vandals

Publicity

Public knowledge of vandalism generally creates a feeling of outrage and scorn. It can also rally support for the victimized department. It has the potential of reaching a large number of people quickly and efficiently. Each agency must establish a clear policy regarding publicity of vandalism. How much information will be disclosed? Under what conditions will a reward for information leading to an arrest be given? When will the police be notified? Will public education campaigns be a part of the publicity strategy? Will law enforcement be incorporated (Christiansen, 1982)?

The surrounding community is a good source of support in this control measure. Brief radio, TV, or newspaper public announcements may be sponsored by banks, local industry, or other community establishments (Schnelle, 1980; Anderson, 1980; Christiansen, 1982). Cooperative publicity programs can benefit your agency as well as a service or community group with public support and mutual feelings of being able to help (Christiansen, 1982).

Financial incentives and rewards have been effective in publicity campaigns in several ways. Money saved through the community's help in vandalism control have been returned to them for use on projects they would like to see finished. Standing rewards are sometimes offered when an agency is determined to apprehend vandals (Christiansen, 1982). The costs involved can often be recovered from the convicted criminal. One city, wanting to bring attention to the situation, stimulated public concern and ultimately decreased
vandalism. They posted $1,000 reward posters throughout the city for information leading to the arrest and conviction of vandals. The posters were printed in a local high school printer shop where the word spread fast among teens (Anderson, 1980).

Soft sell techniques are probably the most commonly used vandalism control techniques today where vandalism isn’t particularly extreme or malicious. Local public education campaigns, community cooperation, and everyday interpretation involve local residents in the solution to the problem (Lustig, 1985). These techniques are very effective for a number of reasons.

Data shows that over 50% of all apprehended vandals live within 35 miles of the park and recreation areas they vandalize. “The vandals are local, the problem is local, the solution is local.” Increasing their participation in the area vandalized promotes stewardship and support for the area. Soft sell techniques also serve as excellent public relations tools. A good community-park relationship also decreases the threat of vandalism (Christiansen, 1982).

Soft sell strategies are appealing because they gently persuade the public for support instead of demanding it. Appeals to our inherent sense of “right and wrong” allow the freedom of choice in participation. This is often what many vandals are trying to regain through vandalism. Soft sell techniques have even persuaded suspected offenders to help prevent future vandalism.

**Interpretation**

The goal of any interpretive program is to create visitor appreciation, a feeling of responsibility toward, and pride in their park resource. Interpretive programs can and do work in vandalism control (Lustig, 1985).

A park ranger or naturalist can utilize their instant “hero” status to suggest and enforce proper behavior with visitors, especially young children. Interpreters are an important information and idea resource center (Lustig, 1985). State naturalists share and borrow ideas. However, the success or failure of a park’s vandalism control plan should not rest solely on their shoulders.

All staff should be trained in positive public contact and relations. They should be available, in a non-threatening manner, for public visibility and casual conversation. A campground host or caretaker living on site can deliver positive visitor contact during hours other staff aren’t available (Christiansen, 1982).

All staff should also be trained in effective vandalism control. Do they know the goals and objectives for your park? Brainstorm together possible methods for achieving these (Christiansen, 1982) Some techniques to follow for effective vandalism control through interpretation are:

1. **Pass out vandalism messages** as a part of the entrance brochure package and/or
permit applications (Christiansen, 1982).

2. **Explain the problem.** Develop a vandalism orientation display or presentation at the visitor center (Lustig, 1985, Christiansen, 1982).

3. **Explain why.** Post park policy explanations in clear, simple, positive language (Christiansen, 1982).

4. **Be friendly.** Promote personal contact between park staff and visitors (Christiansen, 1982).

5. **Be a model.** Carry a litter bag during nature hikes and use it (Lustig, 1985; Geller, 1982).

6. **Make them aware.** Post interpretive explanations at the sites of unrepaird vandalism (Christiansen, 1982).

7. **Be personal!** Post a tally board that lists recent vandalism incidents, their costs, and cumulative totals. Translate these amounts into services that could have been provided. (lost opportunity, time, inconvenience of specific instances upon each park visitor) (Christiansen, 1982).

8. **Use eye-catching posters and clever anti-vandalism slogans.** Post them in high use areas (Christiansen, 1982).

9. **Show anti-vandalism movies and cartoon** (Geller, 1982).

10. **Give rewards.** Promote organization activity in the park’s anti-vandalism struggle and then recognize them (Christiansen, 1982).

11. **Be mobile.** Promote community pride in your park through mobile interpretive centers and programs (Christiansen, 1982).

12. **Reach them at home.** Mail anti-vandalism appeals or condition updates to park patrons (Christiansen, 1982).

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**Public Education Campaigns**

The basic philosophy behind public education campaigns is that if people were more aware of the seriousness of the problem, its financial cost to the community, the potential physical dangers, and its threats to cherished values, they would do something about it (Ward, 1973). These campaigns should be targeted to specific audiences (Christiansen, 1982). This technique can reduce incidental vandalism. However, the pessimistic view that this provides vandals with additional thrills of fame and glory. It may encourage others to do likewise. Some believe that truly malicious vandalism can’t be changed in this manner. Others feel that with with education, strong public opinion can be aroused and in this way malicious vandalism can be stopped.

A 1985 study proved that destructive behavior can be reduced. Vandalism was reduced by 50% with a brochure and 80% when personal contact was added. Most agree that this strategy can reduce careless and ignorant vandalism (Main, 1987).

Public education campaigns are usually multi-faceted large scale productions. They can involve presentations, brochures, ads, commercials, handbooks, and training (Howley, 1981). It is often a conglomerate of many strategies and media. The broad scope that can
interest many different people is in part what makes it effective.
Examples of public education campaigns include:

Essay competition among school children - "How to Prevent Vandalism."
"Tally Box" of recent incidents and costs printed weekly in a local paper.
Course materials for teachers.

Implementation and Data Collection

Make comparisons between current and previous conditions for later evaluation.
Conduct periodic inspections (Christiansen, 1982).

Evaluation and Follow Up

What solutions worked and which ones did not? Develop a new or modified plan if necessary based on your experiences (Christiansen, 1982).
Lessons in Litter Control

Litter is misplaced solid waste (Horsley, 1988; Geller, 1982) that costs taxpayers over $500 million per year to clean up (Schnelle, 1980). The Forest Service alone spent $22 million in 1971 (Goodrick, 1980). Often the actual cost of litter cleanup is hidden as part of employee’s everyday duties (Goodrich, 1980). Other costs include safety, fire, and health hazards. Litter also represents a waste of energy when items can otherwise be recycled (Geller, 1982). Litter can also destroy the appearance of the park the visitor comes to enjoy (Goodrich, 1980).

The characteristic "Litter Bug" is male, between 21 and 35, and from a small community. However, anyone is a potential litterer in certain situations (Geller, 1982). First, visitors who are too lazy or indifferent to carry trash, especially if receptacles are not readily available, will drop it anywhere (Burgess, 1971; Horsley, 1988). Often, litter is a problem where an area is highly visited, where the public norm is non-involvement, where urban growth has reduced an appreciation of nature, or where general disrespect for the law exists (Campbell, 1968).

With the right litter control techniques littering can be reduced at your site. Reducing littering is a two part problem: Encouraging people not to throw their litter on the ground and motivating them to pick up litter that is already on the ground (Hart and Bailey, 1975). If you have a problem try one of the suggestions below. Their effectiveness will depend on your visitors and the intensity of the problem. No one technique will control littering completely. Use a combination of strategies where necessary (Lustig, 1985).

2. Develop an advertising campaign. This will alert your visitors to the problem (Burgess, 1971).
3. Hand out trash bags and information about the problem (So far, this has not been successful for the National Park Service and the Forest Service.) (Burgess, 1971).
4. Increase the number of trash containers near problem areas (Clark, 1972; Burgess, 1971).
5. Post signs that inform the public and request their assistance (Clark, 1972; Burgess, 1971). Messages making commands generate more littering in some cases than those making an appeal. Ask people to "pitch in" (Reiter, 1980; Reich, 1979).
6. Use anti-litter animated 16mm films and cartoons (Lustig, 1985).
7. Educate with puppetry and contests (Goodrich, 1980).
8. Clean up. Most litter occurs in the evening. If workers pick it up early in the day, visitors see a clean park. This reduces the chance that they will litter (Hancock, 1981; Goodrich, 1980; Reiter, 1980).
9. Use the newspapers to report problems and successes. This is often provided by the paper as a public service (Schnelle, 1980).
10. **Be a role model.** Pick up trash as you find it.

11. **Promote personal responsibility.** Increase employee/visitor contact to improve involvement and interest in the site (Campbell, 1968).

12. **Use an "Adopt a Highway" program.** In some states, service clubs and youth groups are responsible for patrolling sections of highway. This is posted prominently on signs, resulting in positive publicity and more local responsibility.
Chapter 5

Future Research Questions in Interpretive Signs, Trails, and Wayside Exhibits

Introduction
Survey Results
Discussion
Recommendations

This is a paper presented at the National Association for Interpretation Conference Charleston, South Carolina November 1990.
SIGNs, TRAILS, AND WAYSIDE EXHIBITS
FUTURE RESEARCH NEEDS

ABSTRACT — Twelve interpretive experts were selected to review and prioritize questions in the area of interpretive signs, trails, and wayside exhibits, developed through literature review and telephone interviews with interpretive professionals. The Delphi method was employed. Panelists responded to four rounds of surveys in order to reach a consensus of opinion of research categories and questions needing immediate research. As a result, 97 questions and seventeen categories were identified and prioritized on a Likert scale.

The top three categories identified for immediate research need were Self-Guiding Interpretive Trails - Expectations, Preferences, and Benefits, Visitor Motivations for Interpretive Sign, Trail, and Wayside Exhibit Use, and Visitor Learning in Outdoor Recreational Settings. From the results several recommendations were made.

First, the AIN Research Bibliography must be updated to be useful to interpreters and researchers. A NAI library system should be developed to make available unpublished materials. Second, we must overcome the fear that some research topics will produce too site specific results. Site, visitor, and interpretive characteristics should be identified so that the results of research studies can be paralleled to other sites with similar characteristics.

KEYWORDS — sign, trail, wayside exhibit, future research.

INTRODUCTION

Interpretation is the communication link between the visitor and the natural, cultural, or historical resources of a site (Sharpe, 1982). Interpretation enhances the visitor's experience at a
site. It can benefit the site by fostering responsible visitor behavior and the managing agency by increasing visitation revenue and improving public image. With interpretation, the resource manager can improve public understanding of park policies and regulations (Vander Stoep, 1987). Interpretation can help people understand the dynamics of natural environments and the consequences of their actions, possibly fostering an environmentally responsible citizenry (Wagar, 1973). Signs, trails, and wayside exhibits are increasingly popular methods of interpretation.

To effectively design signs, trails, and wayside exhibits, the interpreter or resource manager needs the talents of a writer, artist, graphic designer, historian, and researcher. Few individuals are expert in such diverse areas. Effective design and maintenance of signs, trails, and wayside exhibits often depends on resource managers and interpretive professionals who are able to apply standards, principles and guidelines, much of which is poorly documented through research.

Agencies have shown a limited ability to understand and then practically apply and implement recommendations from research (Dick, McKee, and Wagar, 1974). Practitioners report that research related to signs, trails, and wayside exhibits is undirected. Studies frequently do not build upon one another, address questions pertinent to the practicing professional, or offer practical applications to their discoveries (Moore, 1989).

The purpose of this study was to establish a panel of interpretive experts who, through the Delphi survey technique, could determine important and pressing future research questions in the area of signs, trails, and wayside exhibits. This research is needed to help practitioners improve the effectiveness of these media.

METHODS

SELECTING THE DELPHI PANEL

The Delphi method was employed to identify future research questions related to signs, trails, and wayside exhibits important to the interpretive profession. This research method is a systematic survey technique where a group of experts independently respond to several rounds of surveys. Typically the Delphi panel deals with broadly defined problems. The objective of a Delphi
survey is to derive a consensus of opinion regarding future events (Leitch, 1984).

Critics of the Delphi technique suggest that the nature of experts and the selection process of Delphi panelists must be identified (Leitch, 1984). In this research study, individuals expert in one or more of the areas of signs, trails, and wayside exhibits, were selected based on their contributions to the literature and from recommendations by interpretive professionals. Panel members were selected who had:

1) knowledge of research in signs, trails, and/or wayside exhibits
2) experience conducting or participating in research
3) experience as a practitioner in the field of interpretation
4) motivation to participate in this study.

Delphi panel members were initially contacted by phone to explain the project and request their participation. The twelve member panel included university professors, interpretive consultants, and government professionals. The following is a list of delphi panelists:

Dr. Gary Mullins - Ohio State University
Dr. William E. Hammitt - Clemson University
Dr. Gail Vander Stoep - University of Massachusetts
Dr. Thomas Hudspeth - University of Vermont
John Veverka - John Veverka and Associates
Dr. John Hanna - Vice President Inside/Outside
Pamela Wright - PhD candidate Ohio State University
Dr. Joe Roggenbuck - Virginia Polytechnical Institute
Dr. Don Field - University of Wisconsin, Madison
Dr. C.G. Screven - University of Wisconsin, Milwaukee
Ed Tanner Pilley - National Park Service
Dr. Alan Wagar - University of Washington

DEVELOPING THE SURVEY

The first step in the Delphi process is to determine the events, or in this case, the research
questions to be rated (Sprovil, 1980). An initial list of possible future research questions for signs, trails, and wayside exhibits was developed through a literature review. Many studies include recommendations for further research.

To obtain more current information and opinions, nine interpretive consultants and three National Park Service professionals designing and producing signs, trail, and wayside exhibits were interviewed to determine their perceptions of research needs. The interviewees were first contacted by letter explaining the project and requesting their assistance. The telephone interview questions were included in the letter. They were interviewed by phone seven days later.

Based on the literature review and telephone interviews, an initial list of 62 research questions was developed.

CONDUCTING THE SURVEY

The Delphi survey was structured into four rounds (Leitch and Leistritz, 1984; Griffith, 1973). In round one, panel members were asked to respond to the list of 62 research questions organized into eight categories. They were asked if it was a valid research question, if it was properly stated, and what other pressing research questions fall under this category. Options were given to reword, add to the list in appropriate categories, or delete the questions.

The second round consisted of a revised set of research questions based on the initial responses from the Delphi panel. The panel was asked to rate each question on a Likert scale as to importance for immediate research.

One of the assumptions of the Delphi method is that opinions will be improved if respondents are allowed to modify their responses after comparing them to responses from other panel members (Sprovil, 1980). Round three consisted of showing each panel member how they ranked each question and the mean score each question received from the panel. They were asked to reconsider their second round responses in light of this additional information. If they disagreed, 1.5 to 2 points from the mean score, they were asked to state their reason.

The resulting mean scores and a summary of the minority opinions were presented to the Delphi panel for final consideration in round four of the survey. They were asked to assign each question a final score in light of this additional information.
RESULTS

Round 1

Ten of the twelve respondents returned completed surveys within the time alloted. Of the 62 original questions only 6 were eliminated after 40% or more of the panel responded that they were not valid research questions. An additional 36 questions were added to the list based on the survey responses. Tables 1 and 2 show the changes in question categories. Question categories were expanded to 16. Most of the original questions were also edited by respondents to be more specific and to eliminate research that would produce only yes and no answers.

<table>
<thead>
<tr>
<th>Original Question Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>(prior to Round 1)</td>
</tr>
<tr>
<td>General Questions Related to Interpretive Signs, Trails, and Wayside Exhibits</td>
</tr>
<tr>
<td>The Visitor</td>
</tr>
<tr>
<td>Interpretive Signs and Waysides - General Questions</td>
</tr>
<tr>
<td>Interpretive Signs and Waysides - Interpretive Methods</td>
</tr>
<tr>
<td>Interpretive Signs and Waysides - Design</td>
</tr>
<tr>
<td>Interpretive Signs and Waysides - Placement</td>
</tr>
<tr>
<td>Trails - General Questions</td>
</tr>
<tr>
<td>Trail Interpretation</td>
</tr>
<tr>
<td>Trail Layout, Construction, and Maintenance</td>
</tr>
<tr>
<td>Vandalism</td>
</tr>
</tbody>
</table>

Table 1. Original Question Categories Prior to Round One Responses

<table>
<thead>
<tr>
<th>Revised Question Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>(after Round 1)</td>
</tr>
<tr>
<td>Funding Interpretive Signs, Trails, and Wayside Exhibits</td>
</tr>
<tr>
<td>Interpretive Signs, Trails, and Wayside Exhibits in Other Countries</td>
</tr>
<tr>
<td>Visitor Motivations for Interpretive Sign, Trail, and Wayside Exhibit Use</td>
</tr>
<tr>
<td>Visitor Learning in Outdoor Recreational Settings</td>
</tr>
<tr>
<td>Self-Guiding Interpretive Trails - Expectations, Preferences, and Benefits</td>
</tr>
<tr>
<td>Interpretive Trails - Interpretive Methods</td>
</tr>
<tr>
<td>Interpretive Trails - Interpretive Sign Placement and Numbers</td>
</tr>
<tr>
<td>Interpretive Trails - Interpretive Self-Guiding Brochures</td>
</tr>
<tr>
<td>Interpretive Trails - Audio Devices</td>
</tr>
<tr>
<td>Interpretive Trails - Other Interpretive Devices</td>
</tr>
<tr>
<td>Interpretive Trails - Layout, Construction, and Maintenance</td>
</tr>
<tr>
<td>Interpretive Signs and Wayside Exhibits - Objectives</td>
</tr>
<tr>
<td>Interpretive Signs and Wayside Exhibits - Writing Interpretive Text</td>
</tr>
<tr>
<td>Interpretive Sign and Wayside Exhibits - Design Elements</td>
</tr>
<tr>
<td>Interpretive Sign and Wayside Exhibits - Design</td>
</tr>
<tr>
<td>Interpretive Sign and Wayside Exhibits - Materials</td>
</tr>
<tr>
<td>Interpretive Sign, Trail, and Wayside Exhibit Vandalism</td>
</tr>
</tbody>
</table>

Table 2. Revised Question Categories after Round One Responses.
Round 2

Again, ten of the twelve panel members returned completed surveys in the allotted time. In this round, panelists reviewed and ranked the revised questions on a Likert scale based on priority for immediate research. A score of 0 meant that no immediate need for research existed. A score of 5 indicated a highest need for immediate research. A variety of scores fell in between.

Round 3

Eleven of twelve survey respondents returned completed surveys in the time allotted. In this round, to help respondents reach a consensus of opinions, they were given the average group score for each question along with their score from the previous round.

This additional information did influence responses. Question scores moved 15.52% toward the group average. Table 3 shows how all categories ranked after Round 3.

<table>
<thead>
<tr>
<th>Category Priorities</th>
<th>(computed after Round 3 results)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Self-guiding Interpretive Trails - Expectations, Preferences, and Benefits</td>
<td>4.00</td>
</tr>
<tr>
<td>2. Visitor Motivations for Interpretive Sign, Trail, and Wayside Exhibit Use</td>
<td>3.95</td>
</tr>
<tr>
<td>3. Visitor Learning in Outdoor Recreational Settings</td>
<td>3.69</td>
</tr>
<tr>
<td>4. Interpretive Signs and Wayside Exhibits - Writing Interpretive Text</td>
<td>3.50</td>
</tr>
<tr>
<td>5. Interpretive Trails - Interpretive Methods</td>
<td>3.30</td>
</tr>
<tr>
<td>6. Interpretive Sign, Trail, and Wayside Exhibits - Objectives</td>
<td>3.25</td>
</tr>
<tr>
<td>7. Interpretive Sign, Trail, and Wayside Exhibit Vandalism</td>
<td>3.16</td>
</tr>
<tr>
<td>8. Interpretive Trails - Other Interpretive Devices</td>
<td>3.12</td>
</tr>
<tr>
<td>9. Interpretive Trails - Layout, Construction, and Maintenance</td>
<td>3.07</td>
</tr>
<tr>
<td>10. Interpretive Trails - Interpretive Self-guiding Brochures</td>
<td>2.96</td>
</tr>
<tr>
<td>11. Interpretive Signs and Wayside Exhibits - Design Elements</td>
<td>2.94</td>
</tr>
<tr>
<td>12. Interpretive Trails - Interpretive Sign Placement and Numbers</td>
<td>2.85</td>
</tr>
<tr>
<td>13. Interpretive Signs, Trails, and Wayside Exhibits in other Countries</td>
<td>2.85</td>
</tr>
<tr>
<td>14. Interpretive Sign and Wayside Design</td>
<td>2.79</td>
</tr>
<tr>
<td>15. Interpretive Trails - Interpretive Audio Devices</td>
<td>2.77</td>
</tr>
<tr>
<td>16. Interpretive Sign and Wayside Materials</td>
<td>2.09</td>
</tr>
<tr>
<td>17. Funding Interpretive Signs, Trails, and Wayside Exhibits</td>
<td>1.40</td>
</tr>
</tbody>
</table>

Table 3. Research Question Categories - Round 3 - Ranked In Order of Need for Immediate Research.
Round 4

Again, eleven of twelve completed surveys were returned in the time allotted. In this round, the comments made in Round 3 were included as additional information to assist panelists in the final ranking of the research questions. This additional information did influence panelists. A shift in scores toward the group average resulted. This also shifted category priorities for research. The most substantial changes were an Interpretive Signs, Trails, and Wayside Exhibits moving from thirteenth priority to eighth and Interpretive Trails-Interpretive Methods moving from fifth place down to seventh. The top three categories remained the same as in Round 3. Table 4 shows final category prioritization by the Delphi panel. A list of the final prioritized categories with related research questions is found in the Appendix.

<table>
<thead>
<tr>
<th>Category Priorities</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-guiding Interpretive Trails - Expectations, Preferences, and Benefits</td>
<td>4.00</td>
</tr>
<tr>
<td>Visitor Motivations for Interpretive Sign, Trail, and Wayside Exhibit Use</td>
<td>3.94</td>
</tr>
<tr>
<td>Visitor Learning in Outdoor Recreational Settings</td>
<td>3.68</td>
</tr>
<tr>
<td>Interpretive Signs and Wayside Exhibits - Writing Interpretive Text</td>
<td>3.40</td>
</tr>
<tr>
<td>Interpretive Sign, Trail, and Wayside Exhibits - Objectives</td>
<td>3.38</td>
</tr>
<tr>
<td>Interpretive Sign, Trail, and Wayside Exhibit Vandalism</td>
<td>3.14</td>
</tr>
<tr>
<td>Interpretive Trails - Interpretive Methods</td>
<td>3.04</td>
</tr>
<tr>
<td>Interpretive Signs, Trails, and Wayside Exhibits in other Countries</td>
<td>3.03</td>
</tr>
<tr>
<td>Interpretive Trails - Other Interpretive Devices</td>
<td>2.91</td>
</tr>
<tr>
<td>Interpretive Trails - Layout, Construction, and Maintenance</td>
<td>2.87</td>
</tr>
<tr>
<td>Interpretive Trails - Interpretive Self-guiding Brochures</td>
<td>2.86</td>
</tr>
<tr>
<td>Interpretive Signs and Wayside Exhibits - Design Elements</td>
<td>2.79</td>
</tr>
<tr>
<td>Interpretive Sign and Wayside Design</td>
<td>2.76</td>
</tr>
<tr>
<td>Interpretive Trails - Interpretive Sign Placement and Numbers</td>
<td>2.72</td>
</tr>
<tr>
<td>Interpretive Trails - Interpretive Audio Devices</td>
<td>2.43</td>
</tr>
<tr>
<td>Interpretive Sign and Wayside Materials</td>
<td>1.96</td>
</tr>
<tr>
<td>Funding Interpretive Signs, Trails, and Wayside Exhibits</td>
<td>1.24</td>
</tr>
</tbody>
</table>

Table 4. Research Question Categories - Round 4 - Ranked In Order of Need for Immediate Research.
DISCUSSION

Although the Delphi panel reviewed and prioritized 97 research questions and 17 categories and reached a consensus of opinions in most cases, some opposing views existed. In general, problems arose from differences in agreement on how much research had already been done within a category or on a specific question. Others disagreed on whether results would be useful. There was some concern that research questions were too site specific. It is important to identify these differences in opinion for each category so that researchers and practitioners can reevaluate priorities themselves.

While *Self-Guiding Interpretive Trails - Expectations, Preferences, and Benefits* received the highest ranking, several respondents felt the answers to research here would frequently be unique to each setting. It was suggested that expectation research generally has proven ineffective. Others felt that a greater focus on needs and preferences was essential in improving the visitor's site experience. If research in this category were undertaken, the focus should be on why visitors feel as they do instead of what influences them.

There were also differences in opinion on the need for research in the area of *Visitor Motivations for Interpretive Sign, Trail, and Wayside Exhibit Use*. The comment that managers need early warning about shifting motives in order to provide interesting and motivating interpretation exemplifies the high priority score of this category. Despite the score, one respondent felt that we are here to motivate visitors, not satisfy their motivations. The question, *What interpretive themes interest visitors most today?*, elicited the response that we are here to tell visitors what they need to know, not what they think they want to know. Others expressed that while understanding visitor motivations may be helpful, other more pressing research needs exist.

The only disagreement with questions in the category of *Visitor Learning in Outdoor Recreational Settings*, was how much research has already been conducted in this area and whether learning would be different in an outdoor versus indoor setting.

Many respondents assigned a lower priority score to questions researched by other fields. It
was suggested that interpreters pull this information in and make it more accessible to professionals in the interpretive field. In the category *Interpretive Signs, Trails, and Wayside Exhibits - Writing Interpretive Text*, work has been done in the journalism field. In the category of *Interpretive Trails - Interpretive Self-guiding Brochures*, work in advertising and communications can be applied to interpretive writing. Using research from other fields reduces duplication of research efforts.

Again, several respondents felt, *Interpretive Trails - Interpretive Methods* has been sufficiently researched. One comment in favor of a higher average score noted that involvement and identification with the site is a key to effective interpretation. Non-personal services are provided for a large audience, however, the messages are often weak or impersonal.

Only one respondent criticized the questions in the category *Interpretive Signs, Trails, and Wayside Exhibits - Objectives*. The respondent felt style of objective (emotional, behavioral, or cognitive) is not linked to visitor comprehension.

While the category *Interpretive Trails - Layout, Construction, and Maintenance* did not receive a high priority ranking from the Delphi panel, several responses should be noted. First, administrators and budget people all too often make the decision of trail layout, surfacing, length, and other characteristics based on beliefs rather than data. Characteristics of effective trail layout are the basis for many other trail considerations including signage material and interpretive possibilities.

Questions on *Interpretive Signs and Wayside Exhibit Design and Design Elements* provoked comments that in most cases research would not produce generalizable results. However, when considering design elements for different cultures, several respondents noted an increasing importance to produce cross cultural interpretive signage.

An interest in interpretive efforts in other countries received a low priority ranking overall.
However, concern was expressed for assisting other countries interpret global environmental issues as part of a world society.

Research on *Funding Interpretive Signs, Trails, and Wayside Exhibits* received the lowest priority rating. Respondents felt that generally, funding is not a research topic. Since research funds are limited, priority should be placed on interpretive effectiveness and design variables. Information on funding would be generic and not useful to a variety of agencies and organizations. However, it is important that field personal understand funding sources in general, especially to improve chances of being funded. Research on funding should already be available within the study of organizational behavior.

Most respondents felt that enough research on *Interpretive Trail - Sign Numbers and Placement* warranted a low priority ranking. However, it was emphasized that signs are read or not read in the context of the environment. This makes the environmental acceptability of the sign and setting a prerequisite to higher level educational attainment.

**RECOMMENDATIONS**

There was considerable disagreement on how much research had already been done within a category or on a specific question. This suggests that a substantial amount of fugitive literature exists within the interpretive field. Small site studies are frequently not published in popular interpretive journals. One respondent noted that in fact very few interpretive research findings are ever reported at all! Hence, a few researchers or interpreters involved in these studies seem to be the only ones familiar with the results. One respondent summed up his, and I believe other's frustration, with a rebuttal to a survey comment that "We know all this". He asked, "Who knows? It is obvious from the discrepancy in signing programs that this is not general knowledge. If it is known (by some
few) it is certainly not generally shared!" Another respondent agreed that we are not aware of all the interpretive research that has been and is currently going on. This suggests a need for more than just additional interpretive research.

The old AIN Research Bibliography must be updated to be useful to interpreters and researchers. After conducting a literature review for the 4th book in the Interpreter's Handbook Series, "Interpretive Signs, Trails, and Wayside Exhibits", we agree that there is considerable difficulty locating much of the research in this area. Many universities do not loan out Masters and PhD documents. In some cases these documents are not available for purchase. In effect, the research findings are locked away from the professionals who need them. Updating the AIN Research Bibliography is a partial solution. NAI should go a step further and obtain copies of key literature and develop a library loan system to assist interpreters in acquiring this information.

The problem of disseminating research findings to interpreters is compounded when research is done in related fields. For example, respondents commented that in the area of interpretive writing, trail design, graphics, and layout, considerable research has been done in the fields of communications, advertising, and landscape architecture pertaining to interpretation. These fields of study and their associated journals must also be examined. It is infrequent that interpreters look outside their own field for information. Moore, in a 1989 study, determined that interpreters have difficulty interpreting the results of research. This problem is compounded when attempting to review research studies containing foreign jargon. This problem could be reduced in the NAI library loan system by summarizing and drawing conclusions for interpreters.

Another problem within the field of interpretive research became apparent through this study. The categories of Interpretive Signs and Wayside Exhibits - Design, Design Elements and Interpretive Trails - Layout, Construction and Maintenance received low priority scores because questions...
were perceived as being too site specific or situation dependent. There was concern that research results would not be generalizable. This suggest a need to develop site, audience, and interpretive method characteristics, defined within research studies, to enable interpreters and researchers to draw generalizable conclusions applicable to many sites possessing similar characteristics. This is greatly needed by many interpreters attempting to produce effective interpretive signs, trails, and wayside exhibits with only their intuition. Without guidelines, interpreters may produce non-personal materials that reflect their own prejudices and preferences, that may or may not satisfy visitor needs and desires. Guidelines would also improve consistency within the interpretive profession.
LITERATURE CITED


Prioritized Research Categories with Related Research Questions in the area of Interpretive Signs, Trails, and Wayside Exhibits

Self-Guiding Interpretive Trails
Expectations, Preferences, and Benefits

How are visitor's expectations for self-guided interpretive trails similar to or different from the expectations of interpretive planners and managers? (4.18)

What are the visitor benefits and rewards of self-guiding interpretive trails? (4.04)

What influences visitor preference toward indoor interpretive exhibits or outdoor interpretive trails? (4.03)

What are visitor's expectations when using self-guiding interpretive trails? (3.90)

To what extent are visitor's expectations of self-guiding interpretive trails being met? (3.83)

Visitor Motivations for Interpretive
Sign, Trail, and Wayside Exhibit Use

How can visitor motives be used to increase the number of visitors who read interpretive signs and wayside exhibits? (4.40)

What motivates visitors to use interpretive trails? (4.32)

What motivates visitors to read interpretive signs and wayside exhibits? (4.27)

How are visitor motivations different for museum learning than for outdoor recreational learning? (4.09)

How are motives for using urban, rural, and wilderness interpretive trails changing? (3.97)

How are motives for urban interpretive trail use different than motives for rural interpretive, wilderness, or other interpretive trails? (3.84)

What interpretive themes interest visitors today? (3.42)

How are urban resident's motives for using interpretive trails different from the rural or suburban resident? (3.21)

Visitor Learning in Outdoor
Recreational Setting

What special characteristics of the outdoor environment enhance or detract from the interpretive learning experience? (3.86)

Which research findings on indoor exhibits are transferable to outdoor interpretive exhibits such as signs and waysides? (3.73)

How do people learn in outdoor recreational settings as compared to museum settings? (3.44)
Interpretive Signs and Wayside Exhibits

Writing Interpretive Text

How does organization of interpretive information into message levels (primary, secondary, and tertiary paragraphs) affect message retention by the visitor? (3.72)

What interpretive approaches to rule presentation increase visitor compliance with site rules? (3.72)

How does the organization of interpretive text into message levels (primary, secondary, tertiary paragraphs) influence the visitor to read interpretive signs and waysides? (3.58)

How does the tone of an interpretive rules message (authoritative rule statement, explanatory rule presentation) affect visitor compliance with site rules? (3.49)

What determines the amount of text a visitor is willing to read in an interpretive sign or wayside exhibit? (3.44)

How does interpretive sign and wayside text style (first person, third person, and straight declarative style) affect comprehension? (2.98)

How does interpretive sign and wayside message style (first person, third person, and straight declarative style) affect information retention? (2.86)

Interpretive Signs and Wayside Exhibits

Objectives

How can behavioral, emotional, and cognitive objectives be used by interpretive sign and wayside planners, to increase visitor message comprehension of the interpretive sign or wayside exhibit? (3.54)

How can cognitive objectives be used by interpretive sign and wayside planners to increase visitor message comprehension of the sign or wayside exhibit? (3.39)

How can behavioral objectives be used by interpretive sign and wayside planners to increase visitor message comprehension of the sign or wayside exhibit? (3.36)

How can emotional objectives be used by interpretive sign and wayside planners to increase visitor message comprehension of the sign or wayside exhibit? (3.22)

Interpretive Sign, Trail, and Wayside Exhibit Vandalism

What are today's trends in interpretive sign and wayside vandalism? (3.47)

Under what conditions will educational methods and techniques (interpretation, public education campaigns, publicity campaigns) reduce incidental interpretive site vandalism? (3.32)

Under what conditions will management practices (patrol, regulation, maintenance) reduce intentional interpretive site vandalism? (3.22)

How can interpretive sign, trail, and wayside exhibit production be improved for greater protection from vandalism? (3.22)

What are the characteristics (age, socio-economic background, motive) of today's intentional interpretive sign and wayside vandals? (3.20)
Under what conditions will educational methods and techniques (interpretation, public education campaigns, publicity campaigns) reduce intentional interpretive site vandalism? (3.11)

What are the characteristics (age, socio-economic background, motive) of today's unintentional interpretive sign and wayside vandals? (3.09)

Which types of vandalistic acts (intentional, incidental) can be eliminated or reduced using a vandalism oriented display at the visitor or nature center, explaining site problems and their monetary costs and lost opportunities? (3.01)

Under what conditions will management practices (patrol, regulation, maintenance) reduce incidental interpretive site vandalism. (2.99)

What are today's trends in interpretive trail vandalism? (2.98)

What current vandalism problems are associated with interpretive signs, trails, and wayside exhibits? (2.92)

**Interpretive Trails**

**Interpretive Methods**

How can trail design increase visitor involvement in the site? (3.35)

How can the effects of disadvantages (e.g., one-way communication) in self-guiding interpretive trails be reduced? (3.19)

Under what conditions do visitors prefer, the sign in place; brochure keyed to markers; brochure keyed to landmarks; or audio tapes for self-guided trail interpretation? (2.58)

**Interpretive Signs, Trails, and Wayside Exhibits in Other Countries**

What are the message needs, literacy level, and cultural considerations for designing interpretive signs, trails, or wayside exhibits in other countries? (3.97)

What interpretive methods are appropriate for the development of interpretive signs, trails, and wayside exhibits in countries having limited money and materials? (2.65)

What material and skill options are available to countries with limited money and materials who wish to develop interpretive signs, trails, or wayside exhibits? (2.47)

**Interpretive Trails**

**Other Interpretive Devices**

How can interpretive devices (viewing towers, blinds, spotting scopes, and tunnels) enhance the visitor's trail experience? (3.35)

How can interpretive trail devices (viewing towers, blinds, spotting scopes, tunnels) minimize impacts on the site? (3.03)

How does visitor response to trail species identification labels vary according to personal visitor characteristics (experience level, motives, knowledge, age)? (2.76)

How do visitors respond to species identification labels along interpretive trails? (2.49)
Interpretive Trails
Trail Layout, Construction, and Maintenance

What interpretive structures allow visitors to enter fragile environments with minimal site damage, taking into account site variables (visitor traffic, soil types)? (3.81)

How can aesthetic components (complexity, diversity, view scapes, view corridors, and physical changes) enhance the visitor's trail experience? (3.61)

How do interpretive structures that allow visitors to enter fragile environments attract visitor use? (3.43)

How effective are vegetative management practices designed to reduce site impact (planting barriers to reduce trail cutting, planting "unfriendly plants," replacing trampled vegetation, giving trails a rest period)? (3.18)

What vegetative management practices (creating openings, controlled burns, creating views, selective cutting) enhance the interpretive trail experience? (3.11)

What trail surfaces best balance cost, maintenance, and physical and aesthetic resource impacts? (2.82)

How is the optimal length for self-guiding interpretive trails affected by site variables (visitor age and group size, trail subject, and main destination feature)? (2.81)

What trail surfaces are most effective at reducing soil erosion and compaction? (2.76)

How is the optimal length for self-guiding interpretive trails affected by interpretive methods (sign in place, waysides, audio tapes, brochures keyed to landmarks, brochures keyed to numbered posts)? (2.45)

What trail surfaces do visitors prefer? (2.40)

How much manipulation of vegetation is appropriate along an interpretive trail? (2.18)

Interpretive Trails
Interpretive Self-Guiding Brochures

What graphic design elements (layout, graphics, color, writing styles, length, complexity ) improve information retention in self-guiding trail brochures? (3.71)

What graphic design elements (layout, graphics, color, writing styles, length, complexity) increase the number of visitors who read self-guiding trail brochures? (3.55)

How are visitors influenced to use self-guiding trails when several different themed brochures are offered to them? (3.13)

What influences visitors to use self-guiding brochures after the on-site experience? (2.87)

When visitors use self-guiding trail brochures after the on-site experience, how are they used? (2.64)

What influences the amount visitors are willing to pay for self-guiding brochures? (2.49)

Under what circumstances is a brochure more frequently used if a requested donation is attached to it? (2.24)

Under what circumstances is a brochure more frequently used if a charge is attached to it? (2.24)
Interpretive Sign and Wayside Exhibit

Design Elements

How can graphics (photography, line drawings, illustrations) be used to improve message comprehension? (3.45)

What criteria for interpretive sign and wayside exhibit design elements (color, layout, font choice) communicate effectively for the sight impaired? (3.42)

How does the effectiveness of various interpretive sign elements (color, layout, graphics, font choice) change with different cultures? (3.37)

How can graphics (photographs, line drawings, illustrations) be used to increase the number of visitors that read interpretive signs and waysides? (3.05)

What interpretive sign and wayside design elements (color, layout, font choice) improve communication of the interpretive message to non-English speaking visitors? (3.02)

How do variations in color, graphics, layout, white space, and font choice increase the number of visitor's that read interpretive signs or wayside exhibits? (2.93)

How do variations in color, graphics, layout, white space, and font choice increase the visitor's preference for an interpretive sign or wayside exhibit? (2.84)

What design elements (size, color, shape, supports, font choice, graphics) influence the level of signage visitors find offensive in natural, cultural, historical, archeological, and wilderness sites? (2.66)

How do variations in color, graphics, layout, white space, and font choice improve message comprehension by the visitor? (2.55)

What are the minimal and optimal font sizes for titles, body, copy and captions for reading ease? (2.34)

When is color an asset or detriment in interpretive signs and waysides? (1.96)

How does effectiveness of interpretive sign elements (color, layout, fontchoice) change in underwater and canoe trails? (1.92)

Interpretive Sign and Wayside Exhibit

Design

What is the best spacial balance of text and illustrative material to increase the number of visitors willing to read an interpretive sign or wayside exhibit? (2.78)

What is the best spacial balance of text and illustrative material to improve visitor message comprehension? (2.73)
Interpretive Trails
Interpretive Sign Placement and Numbers

What controllable aesthetic and comfort factors (shade, benches, seclusion, habitat variety, mystery) considered in placement of interpretive signs and waysides affect whether interpretation will be read? (3.53)

How do interpretive sign and wayside physical placement variables (angle, height, proximity to other signs) affect readability? (2.85)

How does the level of signage visitors find offensive change in natural, cultural, historical, archeological, and wilderness sites? (2.32)

What determines the number of signs specific visitors will read under specific circumstances? (2.18)

Interpretive Trails
Interpretive Audio Devices

How does the availability of interpretive audio messages increase visitor motivation for using self-guiding interpretive trails? (2.92)

How do interpretive audio messages improve message comprehension? (2.91)

How can damage (weather, intentional vandalism, incidental vandalism) to audio interpretive devices along self-guided interpretive trails be reduced? (1.46)

Interpretive Sign and Wayside Exhibit Materials

How do signage materials compare in terms of cost, maintenance, longevity, and visitor preference? (2.36)

What sign and wayside exhibit materials are most durable for underwater and canoe trails? (1.55)

Funding Interpretive Signs, Trails, and Wayside Exhibits

What characteristics promote successful funding for interpretive trails from these sources? (1.48)

What funding sources are available for interpretive trails? (1.47)

What sources of funding are available for interpretive signs and waysides? (1.42)

What characteristics promote successful funding for interpretive signs and waysides from these sources? (1.23)

How are interpretive signs, trails, and wayside exhibits funded? (1.16)

What funding amounts are available for interpretive trails? (1.07)

What funding amounts are available for interpretive signs and waysides from these sources? (0.82)
Chapter 6

Summary of this Study

Project Overview
Results
Recommendations
Project Overview

Interpretive signs, trails, and wayside exhibits are becoming increasingly popular with resource managers and interpreters. They are available to visitors at all times, are relatively inexpensive to produce and maintain, and are self-pacing. Their use can free interpretive personnel for other duties. However, a considerable amount of knowledge is needed to effectively design these non-personal forms of interpretation. A background in graphic design, art, research, and writing helps insure the interpretation will be effective. A comprehensive guide to designing interpretive signs, trails, and waysides would be a valuable resource to those who do not possess the background in these various areas. While some research has been conducted and literature is available it is scattered throughout a variety of disciplines. Most interpreters lack the time or resources to locate them. In addition little research has been done to document the best techniques for this medium.

There were two goals to this project. First, to review the most current literature available on interpretive signs, trails, and wayside exhibits and a summary and bibliography of these resources was prepared. Second, to develop research questions related to interpretive signs, trails, and wayside exhibits important to the interpretive profession and suggest priorities for future research.

Problem 1: Literature Review for a Comprehensive Guide

A literature review was conducted to determine the most current methods used in developing interpretive signs, trails, and wayside exhibits. A computer search located pertinent journal articles, books, research bibliographies, and agency manuals. Interviews with nine interpretive consultants and three agency personnel designing interpretive signs, trails, and wayside exhibits were conducted by phone.

Problem 2: Future Research Questions Delphi Survey

The second part of this project involved identifying and prioritizing research questions within the area of interpretive signs, trails, and wayside exhibits. An initial list of 62 questions was identified through the literature review. These questions were compiled and the Delphi survey technique was employed. The delphi panel consisted of a twelve member group of University professors, interpretive consultants, and government professionals identified as having both interpretive field and research experience. Four rounds of surveys were conducted. The first round was to edit and supplement the original research question list. Round two began the prioritization process. Respondents ranked each question on a Likert scale from 1, minimal importance for immediate research, up to 5 for highest priority. In round three respondents were given the option of rescoring questions after reviewing the average score given by the entire delphi panel. They were asked to state their reasons for deviating substantially from the mean score. In the final round respondents were given the opportunity to again revise their prioritized scores for each question based on the comments from other participants. From this survey a prioritized list of 98 research questions was obtained.
Results

Problem 1: Literature Review for a Comprehensive Guide

Current design methods for interpretive signs, trails, and wayside exhibits were compiled into three chapters: designing effective interpretive signs and wayside exhibits, designing effective interpretive trails, and vandalism control measures for signs, trails, and waysides. Selected bibliographies for each chapter were also compiled and included in the final appendix of this document.

Areas lacking interpretive research became clear through the literature review. Possible research questions were developed as the literature review progressed. From this, as well as a brainstorming session of project committee members, the initial research question list was developed.

Problem 2: Future Research Questions Delphi Survey

The result of four rounds of survey produced 97 research questions within 17 categories in the area of interpretive signs, trails, and wayside exhibits. In most cases the panel reached a consensus of opinions. Some opposing views existed. There was considerable disagreement on how much research had been done within a category or on a specific question. There was some concern that research questions were too site specific and that results would not be universally useful. Below is the final ranking of categories in order of importance for immediate research. The individual questions within each category as well as a detailed discussion of these results is found in Chapter 5 of this document.

<table>
<thead>
<tr>
<th>Category Priorities</th>
<th>Priorities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(computed after Round 4 results)</td>
</tr>
<tr>
<td>1. Self-guiding Interpretive Trails - Expectations, Preferences, and Benefits</td>
<td>4.00</td>
</tr>
<tr>
<td>2. Visitor Motivations for Interpretive Sign, Trail, and Wayside Exhibit Use</td>
<td>3.94</td>
</tr>
<tr>
<td>3. Visitor Learning in Outdoor Recreational Settings</td>
<td>3.68</td>
</tr>
<tr>
<td>4. Interpretive Signs and Wayside Exhibits - Writing Interpretive Text</td>
<td>3.40</td>
</tr>
<tr>
<td>5. Interpretive Sign, Trail, and Wayside Exhibits - Objectives</td>
<td>3.38</td>
</tr>
<tr>
<td>6. Interpretive Sign, Trail, and Wayside Exhibit Vandalism</td>
<td>3.14</td>
</tr>
<tr>
<td>7. Interpretive Trails - Interpretive Methods</td>
<td>3.04</td>
</tr>
<tr>
<td>8. Interpretive Signs, Trails, and Wayside Exhibits in other Countries</td>
<td>3.03</td>
</tr>
<tr>
<td>9. Interpretive Trails - Other Interpretive Devices</td>
<td>2.91</td>
</tr>
<tr>
<td>10. Interpretive Trails - Layout, Construction, and Maintenance</td>
<td>2.87</td>
</tr>
<tr>
<td>11. Interpretive Trails - Interpretive Self-guiding Brochures</td>
<td>2.86</td>
</tr>
<tr>
<td>12. Interpretive Signs and Wayside Exhibits - Design Elements</td>
<td>2.79</td>
</tr>
<tr>
<td>13. Interpretive Sign and Wayside Design</td>
<td>2.76</td>
</tr>
<tr>
<td>14. Interpretive Trails - Interpretive Sign Placement and Numbers</td>
<td>2.72</td>
</tr>
<tr>
<td>15. Interpretive Trails - Interpretive Audio Devices</td>
<td>2.43</td>
</tr>
<tr>
<td>16. Interpretive Sign and Wayside Materials</td>
<td>1.96</td>
</tr>
<tr>
<td>17. Funding Interpretive Signs, Trails, and Wayside Exhibits</td>
<td>1.24</td>
</tr>
</tbody>
</table>
Four problems were found to exist with regard to research related to signs, trails, and wayside exhibits:

1. Through the literature review and delphi panel survey it was apparent that a substantial amount of fugitive literature exists within the interpretive field and specifically in the area of interpretive signs, trails, and wayside exhibits.

2. Many studies have not been published or the documents are not available through interlibrary loan or for purchase.

3. Much of the research that is available has been done in related fields filled with technical jargon foreign to interpreters and resource managers and published in unfamiliar journals not readily available.

4. Several categories determined as needing additional research received low priority ranking because questions were perceived as being too site specific or situation dependent. There was concern that research results would not be generalizable.

**Recommendations**

At the conclusion of this study it was apparent that interpretive research is hard to locate, often not published, or very limited. Most of the interpretive consultants and delphi panel members were in considerable disagreement about what had been sufficiently researched and what had not. The result is a lack of guidelines for the development of effective interpretive signs, trails, and wayside exhibits. Without these guidelines very little consistency can be expected within the interpretive profession.

We recommend the following:

1. **Update the old Association of Interpretive Naturalists (AIN) Research Bibliography.** After conducting an extensive literature review and then surveying the Delphi panel it was apparent that it is extremely difficult to locate much of the research available in this area. The AIN Research Bibliography, a 32 page document prepared at Ohio State University as a function of the AIN Research Committee 1976, has not been updated since it's development. In addition to updating it should include pertinent research in related fields with a brief summary of each study.

2. **The National Association of Interpretation (NAI) should obtain copies of key literature and develop a library loan system to disseminate research not readily available to interpreters.** Many research documents are difficult to find, can not be loaned out, and are unavailable for purchase. Compounding this problem is that much research pertaining to interpretive signs, trails, and waysides is conducted in other fields. This essentially keeps valuable information from the interpreter's that need it. By developing a library loan system, interpreter's could easily access research, conducted in many areas, selected by NAI as useful.
3. Summarize and draw conclusions from relevant research conducted in other fields to include in the proposed NAI library loan system. It is infrequent that interpreters look outside their own field for information. It was found that they also have difficulty interpreting the results of research (Moore, 1989). This is compounded when reviewing studies containing foreign jargon. This problem could be reduced by NAI summarizing and drawing conclusions for interpreters.

4. Develop site, audience, and interpretive method characteristics, defined within research studies, that enable interpreters and researchers draw generalizable conclusions applicable to many sites possessing similar characteristics. Many research categories prioritized during the delphi survey received low priority ranking because they were perceived as being too site specific or situation dependent. This was due to a concern that research results would not be generalizable. Developing site, audience, and interpretive method characteristics, clearly defined within the research study, would allow interpreter's to review studies that possess characteristics similar to their site. This would begin establishment of guidelines that reflect the results of research not personal preferences and prejudices.

5. Focus research on expectations, preferences, and benefits of self-guiding interpretive trails; visitor motivations for interpretive sign, trail, and wayside exhibit use; and visitor learning in outdoor recreational settings. These were the top three categories identified as needing immediate research through the delphi study conducted as part of this project. Fourteen other categories were also identified as needing research but received a lower priority ranking. They are listed on page 6-3.
Appendix 1

The Literature Review Materials

List of Key Descriptors in Computer Search
Computer Data Base Assistance
Journals
Interpretive Research Bibliographies
Coorespondence with Interview Participants
Telephone Interview Participants List
Telephone Interview Questions
List of Key Descriptors for Computer Search

signs - heuristics, inscriptions, graphic art, graphic design, interpretation, signs, labels
trails - trail, interpretive trail, nature trail, trail design, trail maintenance, landscape design
wayside exhibits - exhibit, exhibit evaluations, wayside exhibit, interpretive exhibit, and all signs descriptors
vandalism - vandalism, park maintenance

Computer Data Base Assistance

A computer search with the help of a UW-SP research librarian was conducted in the following data base systems:

Reader’s Guide to Periodical Literature
ERIC
CABA CAB - Comprehensive File of Agricultural and Biological Abstracts
CAIN AGRICOLA
NTIS - National Technical Information Service

Interpretive Research Bibliographies and Manuals

Bibliographies
Institute for Leisure and Visitor Studies Bibliography and Abstracts
Second edition
May, 1988
The International Laboratory for Visitor Studies
Milwaukee, Wisconsin

An Interpretive Research Bibliography 1978-1984
Doug Moore and Michael Gross
College of Natural Resources
University of Wisconsin
Steven Point, Wisconsin

An Interpretive Research Bibliography
Ohio State University, 1976
AIN Research Committee

A Bibliography on Historical Organization Practices Interpretation
Frederick L. Rath, Jr. and Merrilyn Rogers O’Connell
American Association for State and Local History
Nashville, Tennessee, 1978

Appendix 1-2
Manuals
Interpretive Trails Manual
John A. Veverka
Interpretive Consultant

Sign Handbook
U.S. Department of Agriculture
Forest Service
Escanaba, Michigan 49829.

Interpretive Handbook
State of Wisconsin Department of Natural Resources
Wisconsin 1985.

Sign Handbook
State of Wisconsin Department of Natural Resources
Wisconsin 1980.

New Mexico State Trails Handbook
New Mexico Park and Recreation Commission
Santa Fe, New Mexico, 1974.

Trail Deterioration and Maintenance
U.S. Department of Agriculture
Forest Service
Equipment Development Center
Missoula, Montana, August 1980.

Developing the Self-Guiding Trail in the National Forests
U.S. Department of Agriculture
Forest Service
Miscellaneous Publication 968, Sept. 1964.
Journals

Useful materials were scattered throughout many sources. Literature on signs, trails, and wayside exhibits were found in the following journals:

**Trails**
- Journal of Personality and Social Psychology
- Environment and Behavior
- Journal of Interpretation
- Environmental Design Research
- Journal of Environmental Education
- Journal of Leisure Research

**Vandalism Control Measures**
- Crime and Delinquency
- Park Maintenance
- Journal of Applied Behavior Analysis
- The Annals of the American Academy of Political and Social Science
- Journal of Environmental Education
- Parks and Recreation
- American Forests
- Journal of Interpretation
- Journal of Applied Social Psychology
- Grounds Maintenance
- Environment and Behavior
- National Parks Magazine
- Park and Recreation Management

**Signs and Wayside Exhibits**
- Curator
- Museum News
- The Museologist
- Journal of Environmental Education
Interpretive Trails

What is your basic philosophy behind trail design?

Trail Planning
What is your first step in designing an interpretive trail?
What traffic flow shape do you most commonly use?
What are the most important aesthetic considerations involved in trail planning?

Trail Construction
What trail surface do you most commonly recommend?

Trail Design
How long are the typical interpretive trails you design?
What traffic flow shape do you most commonly use?
What are the most important aesthetic considerations involved in trail planning?

Trail Interpretation
Which interpretive method do you most frequently use on trails? (Sign in place; brochure keyed to markers, other.) Why?

When using interpretive signs, is there a typical number you use on a trail?
Is there a maximum or minimum interval for placing signs along a trail?

Vandalism
What do you feel are the most common vandalism problems associated with trails?
What solutions have you found to these problems?
Signs and Wayside Exhibits

What is your basic philosophy behind sign and wayside exhibit design?

**Design**
What color combinations are the most popular with outdoor signage?

What fonts do you believe are the most readable?

What % of the sign should be white space?

**Construction**
What materials are your signs and waysides typically made of?

What are the advantages and disadvantages of this material? (please include cost)

What types of supports do you use?

**Placement**
How do you attach the sign face to the supports?

How do you anchor the supports in the ground?

What considerations are involved in sign and wayside exhibit placement?

**Vandalism**
Which materials do you find the most vandal resistant?

Do you apply special sealants to signs and waysides to reduce graffiti damage?

How do you decrease the possibility of theft?

**Future Research**
What are the future research questions in the area of signs, trail, and wayside exhibits that you would like to see answered?
Telephone Interview Participants

Interpretive Businesses

Wilderness Graphics
Marvin Cook
P.O. Box 1635
Tallahassee, FL 32302
(904) 224-6414

John Veverka & Associates
John Veverka
P.O. Box 26095
Lansing, Michigan 48909
(517) 394-5355

Team Interpretation
Douglas Bruce McHenry
P.O. Box 429
Marston Mills, MA 02648
(508) 428-8924

Pannier Graphics
John Fitch Industrial Park
Warminster, PA 18974
(215) 672-3600

GS Images
Doug Wright
P.O. Box 1288
Hagerstown, MD 21741-1288
(301) 791-6920

DahnDesign
Richard Dahn
1824 NE Ravenna Blvd.
Seattle, WA. 98105
(206) 525-9325

Inside/Outside
Tom Christiansen, President
2525 Wallingwood Suite 801
Austin, TX 78746
(512) 327-3438
Dr. John Hanna, Vice President
1657 Rhoda Ave.
Columbus, OH 43212
(614) 481-7662

Governmental Agencies

National Park Service
Glen Kaye, Chief of Interp. SW Region
Box 728
Santa Fe, New Mexico 87504-0728
(505) 988-6839

National Park Service
Ed Tanner Pilley
Southern Arizona Group
3693 S. Old Spanish Trail
Tucson, AZ 85730-5699
(602) 670-6581

Harper's Ferry
Ray Price, Chief of Wayside Division
Harper's Ferry, WV 25425
(304) 535-6046

Interpretive Graphic Signs & Systems
Jim Peters
2469 E. 7000 S.
Salt Lake City, UT 84121

Appendix 1-7
Research is underway on *Interpretive Signs, Trails, and Wayside Exhibits*, the fourth book in the Interpreter's Handbook Series, published by the University of Wisconsin Press. This book addresses effective planning, design, material selection, construction, evaluation, and the prevention of vandalism to signs, trails, and wayside exhibits. It will serve as a resource for interpretive and recreational professionals, professors, and other educators in planning their own projects or identifying and communicating with interpretive consultants. A flyer introducing this series is included. The first two printings have sold out and are being reprinted for the third time.

As a service to our audience, we would like to include information from major interpretive businesses. We are looking for:

1. your participation in a phone interview, answering questions important in our research. A list of these questions has been included for your reference. Your responses will be included in the book with full credit.
2. slides or photographs of signs, trails, or wayside exhibits to appear with full credit underneath.
3. a 50 word paragraph explaining your design philosophy to be included in a special section.

Space is available for formal advertising at a nominal fee. Price quotes will be given on request.

I will contact you on April 18th to answer any questions and if interested, set up an appointment for the phone interview.

Thank you for your time,

Suzanne Trapp, Graduate Student

Ron Zimmerman
College of Natural Resources
UW - Stevens Point, 54481

Dr. Michael Gross
College of Natural Resources
UW - Stevens Point, 54481
Appendix 2

Telephone Interview Data

Summary of Results: What the Experts Say

Individual Interview Results

Wilderness Graphics
John Ververka & Associates
Team Interpretation
GS Images
DahnDesign
Inside/Outside
Interpretive Graphic Signs & Systems
National Park Service SouthWest Region
National Park Service Southern Arizona Group
National Park Service Harper's Ferry
Summary of Results: What the Experts Say

Eleven interpretive media specialists who design and produce interpretive signs, trails, and wayside exhibits were asked to share their views in the spring of 1990. In a telephone interview, these experts responded to questions concerning design philosophy, planning, construction, and vandalism control. Their ideas are summarized here. These concepts are included and expanded on in Chapters 2, 3, and 4.

Interview Participants
Wilderness Graphics
Marvin Cook
P.O. Box 1635
Tallahassee, FL 32302

John Veverka & Associates
John Veverka
P.O. Box 26095
Lansing, MI 48909

Team Interpretation
Douglas Bruce McHenry
P.O. Box 429
Marston Mills, MA 02648

GS Images
Doug Wright
P.O. Box 1288
Hagerstown, MD 21741-1288

DahnDesign
Richard Dahn
1824 NE Ravenna Blvd.
Seattle, WA 98105

Interpretive Graphic Signs & Systems
Jim Peters
2469 E. 7000 S.
Salt Lake City, UT 84121

Inside/Outside
Tom Christiansen, President
2525 Wallingwood Suite 801
Austin, TX 78746

Inside/Outside
Dr. John Hanna, Vice President
1657 Rhoda Ave.
Columbus, OH 43212

National Park Service
Glen Kaye, Chief of Interp. SW Region
Box 728
Santa Fe, New Mexico 87504-0728

National Park Service
Ed Tanner Pilley, Southern Arizona Group
3693 S. Old Spanish Trail
Tucson, AZ 85730-5699

Harper's Ferry
Ray Price, Chief of Wayside Division
Harper's Ferry, WV 25425
Interpretive Trails

Design Philosophy

Interpretive trails should provide an enjoyable, safe learning experience out on the site. All interpretive trails should have a theme that reflects the special qualities of the site and fulfills visitors needs and interests. Interpretive stops along the trail should reveal a well planned and well written theme that complements other interpretive media without simply repeating it.

Trail design should be subtle and integrated with the environment or historic site including buildings, landscape, features, and attractions. Take the visitor through the most attractive and interesting areas of the site. Plan the trail to reveal new views and information all along the route.

Planning

Begin with a site inventory. Include cultural and seasonal resources, PENs (perceptually exciting nodes or areas) such as vistas, ephemeral blooms, sounds or a combination of these. Use a topographic map to mark these areas as you layout the trail route. Learn all you can about the site visitors. What are their interests? What are their constraints when visiting the site? Gather all available interpretive materials site managers already have. These include photographs, artifacts, or an existing interpretive master plan. What is the project budget? Will it be necessary to implement the plan in phases? If so, how and when will money be available?

Next, determine your theme. Ask yourself "What is the obvious story?" Look for a process or event that may be overlooked by the visitor or things that don't lend themselves well to Nature Center interpretation.

Ask yourself "What do you want the visitor to remember, learn, or feel." Also determine the managing agency's objectives for the site. Write behavioral, cognitive, and emotional objectives to help you evaluate your effectiveness later. When planning trail layout consider visitor safety, traffic flow, pull offs, and site constraints that will affect trail use.

Length and Shape

Trail length varies depending on site geography and objectives. Generally however, loops under 1 mile accommodate the elderly, handicapped, and visitors with time constraints. Measured in time, an easy 45 minute walk is best. Clockwise loops eliminate the need for cross traffic, confusion, and backtracking. They also make interpreting ideas in sequence easier.

Sometimes a multi trail layering system is used to meet a variety of visitor needs, interests, and time constraints. An "Outdoor Exhibit Plaza" added to the start of the interpretive trail can draw the Nature Center or Museum visitor outside much as a porch does on a house. A "Warm Up Trail" lures the visitor to a longer trail experience with a question or provocative thought. Next, a "Universal Trail", about 1/2 mile long carries most of the interpretive message. The "Extended Trail" follows for visitors wanting extended physical activity and interpretation. An "After Hours Trail" beginning at the Nature Center or museum offers an interpretive trail experience when other interpretive facilities are closed.

Appendix 2-3
Aesthetics

Create excitement and surprise for the destination by including curves, edge habitat, interesting and unique areas, canopy changes, view corridors, view scapes, and structures. Vegetative screening can help hide visitors from seeing each other, from urban or manmade structures, and from what's behind the bend. Also consider visitor comfort along the trail. Provide places where the visitor can rest. Avoid placing signage or resting benches in typically windy, hot, or sunny spots.

Trail Construction

Surfacing helps reduce trail widening, cutting, and erosion in problem areas. Evaluate your site according to accessibility needs, environmental requirements and limitations, aesthetic desires, visitor desires, and amount of use. Trail surfacing materials include asphalt, concrete, woodchips, packed limestone, and boardwalks. Crushed granite is frequently used. It holds edge and crown well, is handsome, and is accessible to wheelchairs.

Trail Interpretation

When selecting an interpretive trail method consider your budget, the number of visitors who will use the interpretation, and how they will use it. Some experts feel that brochures are more appropriate for trailside interpretation because several themes and information levels can be developed in multiple languages for one trail, they are less prone to vandalism, and they have take home value. However, others feel that most visitors do not read or keep trail brochures. This creates an expensive litter problem when printing costs do not match revenue. When they are used, visitor's attention is directed somewhere other than on the site. Most sites use a combination of interpretive signs and brochures keyed to numbered posts.

Trail signing systems should start with a provocative and professional trail head sign that identifies the trail head, trail theme, and managing agency. An orientation sign that maps out the rest of the site and shows the visitor where he or she is should follow. Also inform the visitor of the walking time required, walking distance, terrain difficulty, and any pertinent rules. Carry the interpretive messages on 3 to 12 signs. More will overload the visitor. It is more visually appealing to use small signs containing less information than to squeeze a great deal of information on a few large signs. Wrap up the trail experience with a conclusion sign.

Increase the chance signs will be read by placing them where the visitor might already like to rest, observe a specific feature, or congregate. Place signs where the interpretation relates to the site and where the best experiences are. They do not have to be placed evenly along the trail. Try to avoid placing signs too close together that visitors must crowd at interpretive stops. Some suggest that more signs placed at the middle or end of the trail increases the chance they will be read because visitors have an initially fast walking pace. As they progress they will tire, slow down, and read the interpretive message. Others believe that visitors are fresher and more likely to read interpretive signs placed at the beginning of the trail. Everyone agrees however, that the site and its features really dictates where interpretive stops should be.

Appendix 2-4
Interpretive Signs and Wayside Exhibits

Design Philosophy

Signs should be fun, employ Tilden's principles, and be site specific. Each should address just one clearly defined subject. Determine what is site appropriate in terms of color, scale, and visibility. Then determine what is appropriate to the audience.

Design information in tiers. Begin with a visual. Use good, colorful graphics to help tell the story. Then incorporate creative titles that ask a question or give a provocative phrase. Finally, organize the text into short, concise, dynamic units. Address something the visitor can see or bring to life something that happened on the site. Involve the audience by asking them to do something (i.e. look for, touch, smell), help them come to a preferred conclusion, or in some way inspire them.

Design

Sign colors are often dictated by the site. Look at the site. What colors blend well without becoming lost? What colors will enhance the signs readability and attract attention? In the National Parks and Forests earth tones are the most popular colors. Avoid using white in large amounts because it can cause glare. Also avoid "popular" colors that quickly go out of style.

When choosing a font style ask yourself "What is the story of the site?". Then try to match the font to the scene. Slanted fonts indicate action or motion. In historical interpretation Times and Roman are appropriate. Also consider the readability of the font style. Stay away from fancy fonts that are difficult to read or will soon be out of style. In most cases serif fonts are the most readable. Helvetica has good readability and is very popular for interpretive signage.

When a color and font style is selected be consistent on all site signage. This promotes theme unity. This is also true of sign borders, logos, sign face colors, and layout formats. A very important component of layout is open space.

Open space around visual elements and words, makes concepts more recognizable, and gives visitors "breathing room" to take in information. The more planned white space the better. However, the amount depends on the sign size, graphic, and design. The exact amount needed can not be defined by a % or formula.

Construction

There are a variety of sign and wayside materials available. Select material based on your site's vandalism considerations, physical environment, and sometimes theme. Keep in mind that costs include preparation and production of camera ready art, fabrication, mounting, and maintenance. The most commonly used materials are fiberglass embedment, porcelain enamel, metal micro imaging, and routed wood. Each of these materials has advantages and disadvantages.

1. Fiberglass embedment is very durable, vandal resistant, and artwork flexible. It is available in mat or gloss finish and a wide variety of bright, fade resistant colors. It does require a backing when mounted. Copies can be made for quick and easy replacement at a lower cost than the origi-
nal. These can be sold or given as "thank yous" to site volunteers and donors. The biggest expense is in planning and design.

2. Porcelain enamel is highly fade resistant, has a long lifespan, and is very durable. However, it is very susceptible to gun shot and blows from heavy objects. A frame is necessary to keep the edges from chipping. It is usually the most expensive of the four because all artwork is hand illustrated. For this reason, duplicates are not cheaper than the original.

3. Routed wood signs are another option. It can be difficult to produce nice, tight graphics with this material. Routed wood needs to be well sealed to keep it weather and graffiti resistant.

4. Metal micro imaging is very durable, even under UV light and high temperatures, and does not require a backing or frame. It can be cut to any shape. Almost anything can be reproduced including 1/2 tone photographs. The major disadvantage with this material is limited color options. Also, the costs of duplicates is not reduced with multiple copies of the same sign.

There are many types of sign supports that can be used with these materials. There are several successful methods for fiberglass embedment. One option is epoxying the sign face to a steel plate attached to stainless steel posts. Another is to slide the face into a metal frame and then mount it to supports. Porcelain signs are usually attached to a metal backing and then supported in a metal or wood frame. They can also be wrapped over a wood support structure. Whatever the support it should not steal the show. Wood is often preferred because it is more natural and subtle. Painted steel and aluminum are also frequently used.

Placement

Anchor supports in the ground below the frost line with T-bars, rebar through the base of the supports, anchored with concrete, or anchored deep into the ground. Using two posts instead of one along with these other methods reduces twisting and theft.

Consider the following questions before placing your signs. How will the audience be using the site? Will they be walking, driving, viewing signs from a distance or up close? What do you want to interpret? Do you want to encourage them to come down the trail or hide the trail head from immediate view to reduce the possibility of vandalism? What are the impacts to the site? What is the accessibility to the feature? While the answers to these questions are very site specific, some rules of thumb are appropriate to most sites.

Avoid southern exposures to reduce sign face fading, peeling, and chipping. Look for adequate, even lighting. Place signs at an appropriate height for children and handicapped visitors. Slope the sign face to drain water that might collect on the sign face and to reduce glare. Place signs in the proper perspective so the visitor does not have to turn around to see the thing interpreted. Position signs for visitor and site safety. Vistas and rest spots are good spots for interpretive signs and wayside exhibits.
Vandalism Control for Interpretive Signs, Trails, and Wayside Exhibits

Vandalism today is an over rated problem. However, interpreters are very sensitive to this subject because their budget is very limited. Often, vandalism is more of a maintenance and design issue. Are your facilities properly maintained? Is there a problem with the design of the trail?

Reduce vandalism by keeping your site neat, clean, and fix damage as soon as it occurs. Have all signs professionally built. Use screw/bolt combinations that require special screwdrivers for disassembly. Use good durable structural supports and cover signs with plexiglass when possible. Use scratch resistant and UV resistant materials. Duplicate materials for quick and easy replacement when necessary. Select affordable materials that can be replaced within your budget. In areas where sign theft is a severe problem use self-guiding brochures. Vandals are less interested in stealing numbered posts. Select trail sites near activity centers. Place the first sign or marker just around the first bend. Vandals are not as interested to walk down a trail to vandalize a sign as one that is readily available.
Wilderness Graphics - Marvin Cook

This agency is involved in interpretive facility and trail planning. Their projects include master planning, evaluating existing facilities, audio visuals, and indoor and outdoor exhibits. They deal only in natural history and environmental topics. They have some standard designs that are applicable to most sites. These designs, ordered through their catalog, do not require a site visit to develop. Custom projects usually require a site visit.

Interpretive Trails

What is your basic philosophy behind trail design?
First, the experience must be enjoyable and safe! Providing an opportunity for learning is the second objective.

Trail Planning
What is your first step in designing an interpretive trail?
Collect and examine the resources and constituency of the site. The client may have already done a user survey. If not, it may be necessary to make an educated guess about the site visitors.

What would you include in a site inventory?
1. Natural History - plants, wildlife, birds, distinctive features.
2. Cultural Resources - interpretive, identifiable, ways to reduce impact to the site.

Trail Design
How long are the typical interpretive trails you design?
This varies greatly. Generally short loops about 1/3 to 1/2 mile in length.

What traffic flow shape do you most commonly use?
Loops that bring the visitor back to near where they started but not back to the same exact point.

What are the most important aesthetic considerations involved in trail planning?
Designing for landscape compatibility and minimal intrusion on the site. Look for man made intrusions and try to avoid them.

Trail Construction
What trail surface do you most commonly use?
Each site must be evaluated according to accessibility needs, environmental requirements, and aesthetic desires. Possible materials include asphalt, concrete, woodchips, and packed limestone.

Trail Interpretation
Which interpretive method do you most frequently use on trails? (Sign in place; brochure keyed to markers, other.) Why?
The major consideration in selecting an interpretive method should not be aesthetics as much as budget and traffic flow. Both types are expendable. They just have longer life spans. Signs are more economical for high surface areas but can hold only limited information before becoming distracting and inviting vandalism. Brochures have take home value and the advantage of adding little visual impact on the landscape. Litter is a problem with brochures. Sometimes they are never read.
When using interpretive signs, is there a typical number you use on a trail?

This depends on what you are interpreting. On a specific feature trail you would start with a trail head sign with an identifying graphic. Then an orientation sign showing the visitor where he or she is, maps out the rest of the site. After this about 12 signs should carry the interpretive messages. At the end of the trail another orientation sign and or conclusion sign should wrap up the experience for the visitor and show them where they are and if appropriate, how to get back to their car or the structure they started from. On a concept trail three or four larger kiosks, following the trail head, graphic, and orientation signs, can carry the interpretive messages. To increase the chances of being read, they should be placed where the visitor might already like to rest or observe a specific feature of the site.

Is there a maximum or minimum interval for placing signs along a trail?

The placement of signs and wayside exhibits should relate to the resource. There should be one or two examples at the beginning of the trail of what they will see. Place more signs at the middle to end of the trail because after an initially fast starting pace visitors will slow down and read the signs.

Vandalism

What do you feel are the most common vandalism problems associated with trails?

Vandalism today is an overrated problem. Actually, it is not as bad as it once was. Clients are very sensitive to this subject because their budget is very limited. Usually, the environment is a greater vandal than visitors.

What solutions have you found to these problems?

The following are the general steps taken to reduce vandalism.

1. Use uncommon hardware.
2. Conceal access to hardware.
3. Use good, durable structural support.
4. Cover signs when possible with plexiglass that, when damaged, can be replaced easily and inexpensively.
5. Use scratch resistant and Ultra violet resistant materials.
6. Fix damage as soon as possible.
7. Duplicate materials for quick, easy replacement when necessary.
8. Select affordable materials that can be replaced within your budget.

Signs and Wayside Exhibits

What is your basic philosophy behind sign and wayside exhibit design?

Information should be designed in tiers. Start with a visual appeal. Creative titles that ask a question or give a provocative phrase should follow. The final tier of information is the text. It should be broken into digestible units. The size of these units relates to the resource and the graphics you have to work with. Generally, when you think your text is just about right, cut it in half.

Design

What color combinations are the most popular with outdoor signage?

This depends on the site.
What fonts do you believe are the most readable?
Any type face usually works for a title. You can mix titles and text type faces. For text we prefer non-serif type faces like Helvetica and Optima.

What % of the sign face should be white space?
No answer. Depends too much on each individual sign.

Construction
What materials are your signs and waysides typically made of?
Silk screen on aluminum substrate protected with plexiglass, fiberglass embedment, and porcelain enamel.

What are the advantages and disadvantages of this material? (please include cost)
Silk screen on aluminum holds up well in the environment. The plexiglass can be replaced when necessary. The graphic is seldom impacted. This is a cheap and effective material.
Fiberglass embedment is also resistant to the environment. It doesn’t require the additional protection like the silk screening method does. There is a 10 year prorated warranty. The sign face is available in mat or gloss finish to suit the site. They are also very vandal resistant.
Porcelain enamel is highly durable against fading. This material doesn’t have a warranty but has an extremely long life span. They are usually glossy. They are very durable and attractive. They are not bullet proof but neither are the others. They tend to be the more expensive of the three methods.

What types of supports do you use?
This question was accidentally missed.

Placement
How do you attach the sign face to the supports?
The silk screen on aluminum and the fiberglass imbediment are slid into a metal or wood frame. The porcelain signs are attached to a metal backing and then supported in a metal or wood frame or wrapped over a wood support structure.

How do you anchor the supports in the ground?
T-bars, rebar through the base of the supports, anchored with concrete, or anchored deep into the ground are the usual methods. In a cultural site it is important to know what is underground and where so that the site is not damaged.

What considerations are involved in sign and wayside placement?
Avoid southern exposures to sign faces to reduce fading, peeling, and chipping. Place them, when possible, in ambient light. Look for even and adequate lighting. Place at an appropriate height for children and handicapped visitors. Position them for site and visitor safety.

Vandalism
Which materials do you find the most vandal resistant?
All three can have spray paint removed. Procelain enamel does not hold up to gun shot. Where sun damage is high this material does hold up the best. Hammer blows can be destructive to fiberglass imbediment.

Do you apply special sealants to signs and waysides to reduce graffitti damage? If so, what kinds?
A clear acryllic sealer is available for indoor exhibits with touchable graphics. It is very effective.
How do you decrease the possibility of theft?

Stable installation is very effective. Mix special screws within one sign or wayside. Spanner head screws are a greater deterrent to maintenance than to vandalism. Avoid them.

Future Research

What are the future research questions in the area of signs, trails, and wayside exhibits that you would like to see answered?

Are we being effective? We assume the visitor is there for education but more often they are there for enjoyment. Pre and post tests and observations might help us answer this question.
**Please disregard questions that do not apply to your business or agency**

Veverka & Associates - John Veverka

This group works on interpretive planning and design of trails, exhibits, signs, and wayside exhibits. Their clients include zoos, aquaria, parks, nature centers, and museums.

**Interpretive Trails**

**What is your basic philosophy behind trail design?**

The trail design should be part of a planned and well written story where the stops along the trail illustrate the story but are not the story in themselves. The general "Stuff" trail should be avoided at all costs!

**Trail Planning**

**What is your first step in designing an interpretive trail?**

Look for an interpretive plan for the area. Determine the area theme. What is the obvious story? Plan the trail to go to these resources. What do you want the visitor to remember, learn, or feel. Write behavioral, cognitive, and emotional objectives in order to evaluate the effectiveness of the trail.

**What would you include in a site inventory?**

The cultural and seasonal resources, perceptually exciting nodes or areas (PENs) such as vistas, blooms, sounds or a combination of these should be included. Record your findings on a topographic map.

**Trail Design**

**How long are the typical interpretive trails you design?**

3/4th mile or less; an easy 45 minute walk.

**What traffic flow shape do you most commonly use?**

Loops.

**What are the most important aesthetic considerations involved in trail planning?**

Curves, edge habitat, interesting and unique habitats. Avoid straight lines.

**Trail Construction**

**What trail surface do you most commonly recommend?**

None unless it is really needed. Surface the trouble spots. Boardwalks over wet areas protect the environment and are visually appealing. People like the feeling of walking "over" something. If a trail surface is necessary to protect the site or to allow the visitor to experience it, fine crushed limestone is best. It doesn't float away with rain or in seasonally wet areas, it holds shape well, has good drainage, and is relatively cheap. Avoid woodchips. They tend to get soggy in the spring, after a heavy rain, or in naturally wet areas.

**Trail Interpretation**

**Which interpretive method do you most frequently use on trails?** (Sign in place; brochure keyed to markers; other.) Why?

Brochures keyed to markers. They are easier to change than interpretive signs. With this method it is possible to develop different themes for the same trail. Brochures should give examples.
of what to expect along the trail. The cover should motivate the visitor to experience the site by using photos or illustrations of people enjoying the site.

When using interpretive signs, is there a typical number you use on a trail?

Usually 7 - 10. After 10 the visitor starts to forget the information given. The trail entrance sign has special obligations to inform the visitor of the trail theme, name, walking time in place of distance if both can't be included, terrain difficulty, and any pertinent rules. Avoid rules that are negative constantly saying "No". The entire sign should be provocative and give a good impression.

Is there a maximum or minimum interval for placing signs along a trail?

Signs should be place at special features being interpreted. This is often something that can not be controlled. Don't worry about filling in gaps.

Vandalism

What do you feel are the most common vandalism problems associated with trails?

Theft of interpretive materials or walking off the trails. Often vandalism is more of a maintenance issue. Are your facilities properly maintained? Also, is there a problem with the design of the trail?

What solutions have you found to these problems?

Maintenance, proper design, and selecting the best materials for the job.

Signs and Wayside Exhibits

What is your basic philosophy behind sign and wayside exhibit design?

Design should employ Tilden's principles ( provoke, relate, reveal, address whole, message unity) and be interpretive, not merely educational! Interpret the site. Remember that most people attend hikes because they believe it will be fun. Signs should be designed to be fun. Signs and wayside exhibits should also be provocative. They should include graphics that illustrate the concept, a title that catches the visitor's attention, and interpretation that asks people to do something ( touch, smell, look for...). These things increase the possibility that the visitor will remember the concept.

Do you apply special sealants to signs and waysides to reduce graffitti damage? If so, what kinds?

This is not necessary with fiberglass imbediment.

How do you decrease the possibility of theft?

Use self-guiding brochures. There seems to be less interest in stealing numbered posts. Extra signs for sale in the gift shop can also help.

Design

What color combinations are the most popular with outdoor signage?

Look at the site. Keep colors consistent throughout the sequence of signs to promote message or theme unity. This can also be accomplished with similar borders, logos, sign face colors, layout formats, and fonts throughout the signs in a series. This also reduces the printing costs because layout is simplified.

What fonts do you believe are the most readable?

This depends on the story. Slanted fonts indicate action or motion. In historical interpretation pick a font appropriate to the time period. Using upper and lower case letters as opposed to all capitals also improves readability.
What % of the sign face should be white space?

One or two graphics, and ragged right lines are important in accommodating white space. The more white space the better. Avoid crowding in too much information or too many pictures. Avoid using more than 50 words in the text. Anything over that probably won't be read.

**Construction**
What materials are your signs and wayside exhibits typically made of?

Fiberglass imbedment

What are the advantages and disadvantages of this material? (please include cost)

Fiberglass embedment signs produce bright colors and are very vandal resistant. Multiple copies can be made for replacement when necessary or for sale in the gift shop as a souvenir. This is a good marketing and advertising scheme. They can also be signed and presented to donors as a "thank you." Additional prints are sequentially cheaper.

Cost - Project costs over 5 years. What will the maintenance and upkeep be of the methods under consideration? Then look for the most cost effective approach. Fiberglass imbediment is usually the best all around.

What types of supports do you use?

The sign face is epoxyed to a steel plate then attached to stainless steel posts.

**Placement**
How do you attach the sign face to the supports?

No response

How do you anchor the supports in the ground?

Using a T-Bar and sometimes concrete depending on the vandalism problems of the site.

What considerations are involved in sign and wayside exhibit placement?

Already answered in the trail section.

**Vandalism**
Which materials do you find the most vandal resistant?

Fiberglass imbedment. It doesn't scratch easily. It can't be burned. Any solvent can be used to wash graffiti off the face.

**Future Research**
What are the future research questions in the area of signs, trails, and wayside exhibits that you would like to see answered?

How do people learn in recreational settings? (museum settings vs. outdoor settings)
What are effective interpretive methods for different cultures and foreign visitors?
How much are visitors willing to pay for interpretive services?
What are the most cost effective interpretive methods and materials to use in different areas of the country?
How many signs along an interpretive trail do people actually read?
Do interpretive techniques really influence the visitor to read interpretive signs?
**Please disregard questions that do not apply to your business or agency**

Team Interpretation, Douglas Bruce McHenry

The focus of Team Interpretation is on the planning and design of indoor and outdoor signage, trails, and exhibits. They are seldom involved in project construction other than to suggest certain materials.

## Interpretive Trails

### What is your basic philosophy behind trail design?

Trail design should be responsive to the client's objectives and needs. It must fit in with other interpretive media and themes of the site not merely mirror other interpretation. It should have a specific theme and focus on the site. All site interpretation should attempt to lead the visitor to experience the site through its trails.

### Trail Planning

### What is your first step in designing an interpretive trail?

Research your client's site objectives and goals. Look for possible themes. Gather any research data done for the site.

### What would you include in a site inventory?

Frequently, the site determines or drives what should be included in a site inventory. The features and visitors to the site should be identified. Who are the visitors? What are their interests? How large is this group and what are their constraints in visiting the site? What other site constraints are there?

### Trail Design

### How long are the typical interpretive trails you design?

Length can be dictated by the client or the geography of the area. Trail design should be considered when determining trail length.

### What traffic flow shape do you most commonly use?

Loops are nice but not always possible. Destination trails are frequently used. They are harder to interpret because signs may not be read in sequence. Visitors tend to select stations that catch their eye as they travel back and forth along the trail. For this reason, each sign or stop should be able to stand alone as well as be a part of a broader sequenced theme. In loop trails the visitor is more apt to read signs or stops keyed to a brochure in the sequence they appear along the trail.

### What are the most important aesthetic considerations involved in trail planning?

Create excitement and surprise for the destination. This can be hard in an urban setting where distractions interfere with the visitor’s experience. Vegetative screening can help hide visitors from seeing others and from urban intrusions. Vegetative screening increases the visitor's feelings of relaxation and leisure. Also consider the comfort of areas along the trail. Avoid placing signage in typically windy, hot, or sunny spots.

### Trail Construction

### What trail surface do you most commonly recommend?

Surface is important. It helps to reduce trail widening, cutting, and erosion. However, selection depends on the site. A surface to avoid is pea gravel. It is noisy and gives bad footing. Chips
and bark are generally a good choice as long as they are contained. For areas that must be wheelchair accessible, a sand and clay mixture is a good choice. It is more visually appealing than concrete and blacktop and works just as well.

**Trail Interpretation**

Which interpretive methods do you most frequently use on trails? (Sign in place; brochure keyed to markers; other.) Why?

Brochures keyed to markers are more frequently used. They are easier to put together. They are also a good way to test your market and your interpretation. If the brochure is attractive, colorful, and easy to read the visitor will keep it as a souvenir thus, also reducing littering. In heavily used areas text in place is more appropriate, especially where good site specific illustrations are possible or necessary. Often a combination of these methods is most appropriate for foreign visitors. The brochure is good for multiple language text and the sign for universally understandable illustrations.

**When using interpretive signs, is there a typical number you use on a trail?**

This depends on the site. More important than number of signs is to have a minimal amount of text and a maximum amount of graphics.

**Is there a maximum or minimum interval for placing signs along the trail?**

Do not place signs so close that visitors will be crowded together. Some interpreters believe that you should see the next interpretive stop from the one you are standing at. Generally, signs in place are longer to reduce the appearance of being crowded.

**Vandalism**

What do you feel are the most common vandalism problems associated with trails?

We don't see too much vandalism.

What solutions have you found to these problems?

Most vandalism occurs at the trail head because of it's accessibility. To avoid problems try to select a site for the trail near activity centers. Place the first sign or marker just around the first bend. Vandals won't be as interested to walk down a trail to vandalize a sign as if they would be to vandalize one readily available. Usually, the stake and leaflet trail seems less appealing to vandals.

**Signs and Wayside Exhibits**

What is your basic philosophy behind sign and wayside exhibit design?

Use good, colorful graphics and as little text as necessary to get the point across.

**Design**

What color combinations are the most popular with outdoor signage?

Generally, natural earth tones are the best unless the site requires other colors.

What fonts do you believe are the most readable?

San - serif are easier to read. Helvetica is popular and used often.

What % of the sign face should be white space?

White space is good and pleasing to the visitor. The sign face should be 25 - 35 % of white space.

Appendix 2-16
Construction
What materials are your signs and waysides typically made of?
Fiberglass embedment.
What are the advantages and disadvantages of this material? (please include cost)
It is weather durable, vandal resistant, and artwork flexible. Multiple copies of the camera ready art are relatively inexpensive to reproduce and can be stored for future use. The biggest expense is in planning and design.
Routed wood is another option. It is difficult to produce nice, tight graphics therefore routed wood signs are often wordy. Routed wood needs to be well sealed to keep it weather and graffiti resistant.
Metal signs are better for small sign faces.
Porcelain enamel, another option, fractures when struck by heavy objects.
What types of supports do you use?
The supports should not steal the show. A dark, finished metal support can be attractive yet sturdy. Fiberglass embedment signs are slid into a metal frame and then mounted to supports.
Placement
How do you attach the sign face to the supports?
With special out of sight screws. A special nut and screw combination requires special equipment for disassembly. This deters vandals.
How do you anchor the supports in the ground?
They can be imbedded or tapped in. A T-Bar often reduces twisting and removal. For areas with extreme problems, supports can be imbedded in concrete.
What considerations are involved in sign and wayside exhibit placement?
They should not be placed so low that the visitor must bend over to read them. Signs placed too low may become seats. A sloping surface helps to drain water that might collect on the sign face. Placement should be related to the feature the sign is interpreting. Signs should be placed in the proper perspective, so that the visitor does not have to turn around to see the thing it interpretes, along the edge of the trail in an aesthetic spot, and out of the way of traffic.
Vandalism
Which materials do you find the most vandal resistant?
Fiberglass embedment.
Do you apply special sealants to signs and waysides to reduce graffiti damage? If so, what kinds.
Sealants can be helpful with routed wood. We have never tried them personally.
How do you decrease the possibility of theft?
See previous answers about special nut and screw combinations.
Future Research
What are the future research questions in the area of signs, trails, and wayside exhibits that you would like to see answered?
Who are today's vandals and what are their motivations?
How can we better design our signs, trails, and wayside exhibits to protect them from vandalism?
What are the comparative costs, longevity, and visitor preferences for different signage materials?
How can interpreters and environmental educators translate data on environmental issues into trail interpretation?
GS Images - Doug Wright
This agency deals only with signs and wayside exhibits. Most of their clientele already have text and graphic ideas. GS Images may simply lay out the sign. When they know their clients well, they may edit or suggest changes.

Interpretive Trails

What is your basic philosophy behind trail design?
Not applicable.

Trail Planning
What is your first step in designing an interpretive trail?
Not applicable.
What traffic flow shape do you most commonly use?
Not applicable.
What are the most important aesthetic considerations involved in trail planning?
Not applicable.

Trail Construction
What trail surface do you most commonly recommend?
Not applicable.

Trail Interpretation
Which interpretive method do you most frequently use on trails? (Sign in place; brochure keyed to markers, other.) Why?
Not applicable.
When using interpretive signs, is there a typical number you use on a trail?
Not applicable.
Is there a maximum or minimum interval for placing signs along a trail?
Not applicable.

Vandalism
What do you feel are the most common vandalism problems associated with trails?
Not applicable.
What solutions have you found to these problems?
Not applicable.

Signs and Wayside Exhibits

What is your basic philosophy behind sign and wayside exhibit design?
The ultimate goal of signs and wayside exhibits is to get the visitor to read them. Simple, eyecatching, short, and appealing graphics should tell a story not just serve as decoration. The sign face should be designed for easy understanding. No more than one subject should be included on each sign.
Most often the client decides what to include on their signs. This avoids expensive site visits. Generally, text editing is avoided to keep from insulting the client. Asking them to reduce the amount of copy is fine.

**Design**

What color combinations are the most popular with outdoor signage?

Earth tones are usually the most appropriate to the site. In warning situations bright colors are more eye catching. Avoid using white because it causes glare.

What fonts do you believe are the most readable?

Simple serif fonts like Palatino are soft and easy to read. Helvetica is a good blocky text frequently used in traffic areas because it is easy to read as you travel by in a car. Stay away from fancy styles like Old English.

What % of the sign should be white space?

This depends on the sign layout and design. Generally this is something the designer must have an eye for and can not be defined by a % or formula.

**Construction**

What materials are your signs and waysides typically made of?

Fiberglass embedment.

What are the advantages and disadvantages of this material? (please include cost)

Fiberglass embedment is flexible in graphic options. It offers a good selection of colors. Over the long term it is very cost effective. Extra back up copies printed but not embedded reduce the cost further. This material is very durable. Colors last. It is vandal resistant. Waxing and buffing with auto body wax eliminates white line scratches you may get when buffing with other materials. They are also non-glare. Gun shot will ruin the sign. The graphic and text will turn yellow where the bullet passed through the sign.

**Placement**

How do you attach the sign face to the supports?

They are slid into a painted aluminum frame. A drive rivet secures the frame to the supports. This material won't rust and can be repainted once the original paint begins to peel off. They are very cost effective because they require minimal maintenance and are relatively vandal resistant.

How do you anchor the supports in the ground?

Driving them into the ground is usually sufficient. In high vandalism areas pour concrete around the supports. In most cases the client knows what they desire on their site.

What considerations are involved in sign and wayside exhibit placement?

Not involved in this aspect in most cases. The client already knows where they want to place their signs.

**Vandalism**

Which materials do you find the most vandal resistant?

Fiberglass embedment for the reasons listed earlier.

Do you apply special sealants to signs and waysides to reduce graffitti damage?

We do not have any experience with them. On fiberglass imbedment, any solvent will remove graffitti, therefore sealants are not necessary.

How do you decrease the possibility of theft?

The drive rivet reduces this problem.

Appendix 2-20
Future Research
What are the future research questions in the area of signs, trail, and wayside exhibits that you would like to see answered?
No response.
DahnDesign - Richard Dahn
This agency produces only interpretive signs and wayside exhibits. Their clients often write the text and design the general layout of the sign. However, DahnDesign recommends techniques and approaches even when the client may already have started their own planning.

Interpretive Trails

What is your basic philosophy behind trail design?
Not applicable.

Trail Planning
What is your first step in designing an interpretive trail?
Not applicable.
What traffic flow shape do you most commonly use?
Not applicable.
What are the most important aesthetic considerations involved in trail planning?
Not applicable.

Trail Design
How long are the typical interpretive trails you design?
Not applicable.
What traffic flow shape do you most commonly use?
Not applicable.

Trail Construction
What trail surface do you most commonly recommend?
Not applicable.

Trail Interpretation
Which interpretive method do you most frequently use on trails? (Sign in place; brochure keyed to markers, other.) Why?
Not applicable.
When using interpretive signs, is there a typical number you use on a trail?
There should be at least 3 signs to emphasize a point or theme. When using more, five to seven are comfortable numbers for the visitor. It is usually better to have more small signs with less information than large signs with everything squeezed on one sign. Large, cluttered signs are harder to read and are structurally harder to install and maintain. For trails, 2X3ft. or 2X4ft. signs are easier for groups to gather around and view comfortably.
Is there a maximum or minimum interval for placing signs along a trail?
Not applicable.

Vandalism
What do you feel are the most common vandalism problems associated with trails?
Not applicable.
What solutions have you found to these problems?
Not applicable.
Signs and Wayside Exhibits

What is your basic philosophy behind sign and wayside exhibit design?

There are three important initial steps in sign design: 1) Determine what is appropriate to the site in terms of color, scale, and visibility, 2) Determine what is appropriate to the audience, 3) Establish a clear hierarchy of information. Often the client will have the text for their signs. Other times they just have ideas. Where possible, involve local parties familiar with the site in the sign and text design. If this is not possible, a site visit is extremely important.

Design

What color combinations are the most popular with outdoor signage?

Natural colors should be determined by the site. Avoid favorites or "popular" colors that may be out of style before the signs need replacing. Look for colors that enhance readability at the site. For example, avoid colors that blend in with the surroundings. Look for colors that attract attention to the sign. Avoid colors that look out of place.

What fonts do you believe are the most readable?

For information, facts, and lists Helvetica and Franklin Gothic are good choices. Times, Roman, and Baskerville are good choices where there is more than a little text to read. Select fonts that are well established. Avoid those that may soon be out of style.

What % of the sign should be white space?

Generally there can't be enough white space. The amount however, is very content dependent. This is something the designer must have an eye for.

Construction

What materials are your signs and waysides typically made of?

Porcelain enamel and fiberglass embedment.

What are the advantages and disadvantages of this material? (please include cost)

Porcelain enamel is the best material for color quality. Colors are much richer and will not fade in weather. Gun shot will shatter this material. Placing them in a podium position makes them a harder target. When mounted on cement or steel, bullets that ricochet off the sign face can cause other sorts of damage.

Colors are not as bright with fiberglass embedment and they will fade sooner than with porcelain enamel. They endure gun shot better. Ultra-violet protection in the silk screen ink can reduce fading.

Placement

How do you attach the sign face to the supports?

Not applicable.

How do you anchor the supports in the ground?

Not applicable.

What considerations are involved in sign and wayside exhibit placement?

How will the audience be using the site? Will they be walking, driving, viewing signs from a distance or up close? What do you want to interpret? Do you want to encourage them to come down the trail or hide the trail head from immediate view to reduce the possibility of vandalism? Place the signs 26-30 inches high at a podium angle for easy viewing by children and handicapped visitors. This also reduces glare.
Vandalism
Which materials do you find the most vandal resistant?
Both types used are vandal resistant. Wood framing is more susceptible to vandalism than
steel frames. Rocks or concrete can also be used when appropriate.
Do you apply special sealants to signs and waysides to reduce graffitti damage?
Porcelain signs can be covered with a clear plexiglass. Car polish on fiberglass embedment
can lessen the effects of scratching.
How do you decrease the possibility of theft?
No response.
Future Research
What are the future research questions in the area of signs, trail, and wayside exhibits that you
would like to see answered?
More awareness of the interpretive materials available.
A need for more funding.
**Please disregard questions that do not apply to your business or agency**

Inside/Outside Tom Christiansen for trails and Dr. John Hanna for signs and wayside exhibits

This agency is involved with interpretive planning of indoor and outdoor exhibits and signs as well as interpretive trails. They frequently conduct site visits.

## Interpretive Trails

### What is your basic philosophy behind trail design?

Trail design must consider the other elements in the area including buildings, landscape, features, and attractions. It is important to remember that trails are never designed in a vacuum. Design should be a mixture with other site interpretation and should be designed appropriately. In many cases trails are a secondary element of site interpretation.

### Trail Planning

#### What is your first step in designing an interpretive trail?

Determine the theme. What does the client want to get across to their audience? What are the natural resources of the site? The client usually knows the answers to these questions when beginning trail planning.

#### What would you include in a site inventory?

The major site considerations include; 1) natural features: vegetative, geologic, climactic, topographic, soil types and drainage. 2) visitor information: handicapped, ages, background, goals. In cases where little visitor information is available, focus groups and user analysis can be implemented for the site. Also find out what graphics and photographs are available to you. What is the budget of this project? Will phasing be a necessary component of the plan? If so, how and when will money be available (i.e. through donations, fees, seasonal events or use, etc.)?

### Trail Design

#### How long are the typical interpretive trails you design?

The trails are designed in layers. They are implemented as necessary or desired by site managers.

- Layer 1: "Warm Up Trail" - The trail access should be an interpretive experience. While it may not present a message per se it can ask a question or lure them further along the trail.
- Layer 2: "After Hours Trail" - This section of the trail is where the building, which is often the actual start of the interpretive experience, is located. This section offers the visitor an optional interpretive trail experience when the visitor center or nature center is closed. A trail head or kiosk identifies the "After Hours Trail."
- Layer 3: "Universal Trail" - This segment of the trail system is approximately 1/2 mile with cut backs available for those with physical or time limitations. The trail is clearly rated for distance, topography, and accessibility. This "Universal Trail" is more heavily interpreted. In reality, it is the extension of the kiosk, interpretive center, or outside exhibits.
- Layer 4: "Extended Trail" - This is for visitors wanting extended physical activity as well as interpretation.

Interpretive Outdoor Exhibit Plaza - Successful interpretation is usually a mixture of spaces. The area immediately outside a building or kiosk is a transition zone. Interpretation here draws the visitor...
outside onto the site while also providing a familiar experience. This area is especially important when the buildings may be closed. The outdoor exhibit area is based on the idea that often, the porch is the favorite part of a house. It provides the best mix of both worlds. It offers the safety of indoors with the appeal of the outdoors.

**What traffic flow shape do you most commonly use?**

This is site specific although the layer system should be used where possible. Most visitors come by private vehicle and therefore must get back to their car in a manner that they do not have to repeat part of the trail. A big question in trail flow shape is where do you want to bring them back to? Perhaps the client wants them to return to the visitor center or gift shop.

**What are the most important aesthetic considerations involved in trail planning?**

Geometry, design, and variety are all important aesthetic considerations. Include canopy changes. Look for view corridors and view scapes. Include places where the visitor can get off the trail mainstream.

**Trail Construction**

**What trail surface do you most commonly recommend?**

Finely crushed granite is handsome, holds edge and crown well. Frequently selecting a surface is determined from site limitations and design preferences. When used, edging techniques are very important in trail surfacing.

**Trail Interpretation**

**Which interpretive method do you most frequently use on trails?** (Sign in place; brochure keyed to markers, other.) Why?

There isn't a typical method we use. In many cases however, a kiosk may be appropriate instead of trailside interpretation. For example, on a bike trail. The best interpretive method to use depends on the trail site and uses.

**When using interpretive signs, is there a typical number you use on a trail?**

There is no typical number to use.

**Is there a maximum or minimum interval for placing signs along a trail?**

Signs are not necessarily spaced evenly along the trail. They should be placed where the best experiences are. Look for areas where visitors naturally stop or congregate.

**Vandalism**

**What do you feel are the most common vandalism problems associated with trails?**

Scratching, burning, pulling, and shaking sign structures. Vandalism problems seem to be the most common where vehicles are present.

**What solutions have you found to these problems?**

Place the trail head a bit farther down the trail where vandals can not see them easily from the parking lot or road.

Bad trail design and poorly marked routes also create vandalism when visitors go where they should not. Maintenance is an important aspect of vandalism control. Change vandalized signs quickly so your visitors do not think that this condition is okay. Plan ahead by making multiple copies of all signs. The second fiberglass imbediment sign is less expensive to produce. Have extras on hand. Polish out scratches quickly before they invite more of the same.

**Future Research**

**What are the future research questions in the area of signs trails, and wayside exhibits that you would like to see answered?**
What are the visitor's motivations for trail use, especially in urban areas?
How far should technology go down the trail in special use trails (auto, water vehicles etc.)?

**Signs and Wayside Exhibits**

What is your basic philosophy behind sign and wayside exhibit design?
Design with the environment in mind. Identify a clear theme.

**Design**

What color combinations are the most popular with outdoor signage?
Usually the client decides color. Tans are usually used as a base with darker border and text colors. Often the color selections depend on the environment. For example, in marine environments blue is an appropriate color. Vividness in color is important.

What fonts do you believe are the most readable?
New Century Schoolbook enlarges and bolds well. Serifs are the most readable. Times Roman is attractive for historical areas. It is a good idea to match the font to the scene where possible.

What % of the sign should be white space?
White space is an important aspect of sign design. However, the amount depends on the size of the sign, the graphics, and design. There should be a minimum text. Historical signs often use less white space because that is typical of the time period.

**Construction**

What materials are your signs and waysides typically made of?
Most are made of fiberglass. It has a good combination of cost, durability, and flexibility with graphics. Porcelain enamel is also good. Another technique where photos are accepted very well is a Daton process. The paper copy is imbeded in a fiberglass cover. This process does not use resins that permeate the photo. Ultra violet screens can be added to protect the photo. There is a 5 year life span before the sign begins to fade.

**Placement**

How do you attach the sign face to the supports?
Supports are attached at both ends of the sign. The sign itself is angled 45 degrees. Wood is preferred because it is more natural. In areas of high vandalism rust colored core steel can be used.

How do you anchor the supports in the ground?
Where vandalism is a problem the sign can be attached to a box steel post, welded, and mounted in concrete. Otherwise, bury posts below the frost line and reduce twisting and theft with a T-bar.

What considerations are involved in sign and wayside exhibit placement?
Don't get hung up on a formula. Generally however, more signs should be placed at the beginning of the trail where visitor interest is still high. Vistas and rest stops, in high altitudes and strenuous sites, are excellent places for interpretive signs and wayside exhibits. Create nodes, areas where the visitor can get of the main part of the trail. Place signs in comfortable areas (shade, soothing sounds etc.).
**Vandalism**

Which materials do you find the most vandal resistant?

Fiberglass is flexible, easy to repair, and non-reflective. Scratches are easily buffed out with rosin. Edges should be sealed within a metal or wood frame to avoid damage. However, it does not accept photos well. Silk screen with sun resistant ink can reduce fading.

Porcelain enamel is also frequently used and is vandal resistant. The color lasts indefinately. The quality of the color is very high. Porcelain enamel is a good choice where visitor contact is high. However, they are very susceptible to gun shot. Limited damage can be repaired in the field. Often extreme vandalism can not be repaired and the sign must be replaced.

Do you apply special sealants to signs and waysides to reduce graffiti damage?

We have no experience with these.

**How do you decrease the possibility of theft?**

Where supervision of the interpretive signage is low, consider special nut/screw combinations. Vandalism is not often a big problem.

**Future Research**

What are the future research questions in the area of signs, trails, and wayside exhibits that you would like to see answered?

Why don't people read signs? Focus group interviews that may provide information on a specific site may also be transferable to other similar sites.

What is working and what isn't in signs and wayside exhibit design?
**Please disregard questions that do not apply to your business or agency**

Interpretive Graphic Sign and Systems - Jim Peters

This agency is involved producing the camera ready art, design work, conceptual planning, and text writing for outdoor natural science and historical signage. Sometimes they work with combination indoor/outdoor signage.

## Interpretive Trails

**What is your basic philosophy behind trail design?**

Not applicable.

**Trail Planning**

**What is your first step in designing an interpretive trail?**

Not applicable.

**What would you include in a site inventory?**

Not applicable.

**Trail Design**

**How long are the typical interpretive trails you design?**

Not applicable.

**What traffic flow shape do you most commonly use?**

Not applicable.

**What are the most important aesthetic considerations involved in trail planning?**

Not applicable.

**Trail Construction**

**What trail surface do you most commonly use?**

Not applicable.

**Trail Interpretation**

**Which interpretive method do you most frequently use on trails? (Sign in place; brochure keyed to markers, other.) Why?**

Signs are most frequently selected. Brochures are more expensive, may cause litter problems, and are never read. However, when the client has already started the planning process the interpretive method may already be selected.

**When using interpretive signs, is there a typical number you use on a trail?**

The number of signs used and their placement along the trail is a function of the communication process. The attitudes, needs, and perceptions of the visitor should be considered along with the agency’s interpretive goal.

**Is there a maximum or minimum interval for placing signs along a trail?**

See above.

**Vandalism**

**What do you feel are the most common vandalism problems associated with trails?**

Not applicable.

**What solutions have you found to these problems?**

Not applicable.
Signs and Wayside Exhibits

What is your basic philosophy behind sign and wayside exhibit design?

Signs and wayside exhibits are a communication tool and through planning, should be used as such.

Design

What color combinations are the most popular with outdoor signage?

Metal signs produce the most contrast with light and dark colors and tones. Light sign faces have a tendency to reflect sunlight. This should be considered when selecting color combinations. Appropriate colors depend on the site.

What fonts do you believe are the most readable?

San-serif fonts are typically used for a more contemporary look. Serif is preferred in historical areas. Serif generally is the more readable style.

What % of the sign face should be white space?

White space gives the visitor "breathing room" within the sign face. It can increase visitor understanding and make concepts more recognizable.

Construction

What materials are your signs and waysides typically made of?

Novalloy - metal micro imaging
Fiber graphics - fiberglass imbediment
Porcelain graphics

What are the advantages and disadvantages of this material? (please include cost)

**Materials are usually recommended on the client's durability and color needs.**

Novalloy - Durability is indefinite, Almost anything can be reproduced including 1/2 tone photographs. This material does not require a backing or frame. Colors are limited. Costs of duplicates is not reduced.

Fiber graphics - They can silk screen any color. They have a 5-10 year durability. Costs of duplicates is reduced depending on the number of identical signs that are wanted. They are very cost effective for directional or rules signs where many duplicates are needed. These need a backing material.

Porcelain graphics - Any color can be used. The colors are extremely vivid, are hand illustrated, and very durable. Porcelain graphics can be chipped. Framing the edges helps. Seal the frame material to reduce rusting. This material is costlier. Duplicates are not cheaper. Keep in mind that costs include preparation and production of camera ready art, fabrication, and mounting.
1. Porcelain enamel is most expensive because of the hand illustration.
2. Fiber graphics and Novalloy are either equivalent or Fiber graphics is a bit more expensive depending on the number of colors needed.

What types of supports do you use?

Square posts.

Placement

How do you attach the sign face to the supports?

Srew the sign face to the supports.

How do you anchor the supports in the ground?

They are not usually involved with this aspect.
What considerations are involved in sign and wayside placement?
They are not usually involved with this aspect.

Vandalism
Which materials do you find the most vandal resistant?
All the materials described are vandal resistant. Novalloy is probably the sturdiest. Porcelain enamel can be shattered so they should be placed in safe areas. Fiber graphics can be scratched but polishing or buffing can repair some of the damage.

Do you apply special sealants to signs and waysides to reduce graffiti damage? If so, what kinds?
No.

Future Research Questions
What do you believe are the pertinent future research questions in the area of signs, trails, and wayside exhibits?
No response.
National Park Service, South West Region - Glen Kaye

Mr. Kaye is involved in signs and wayside exhibit design for the South West Region. He works with interpretive professionals at the specific parks in his region and works through Harper's Ferry to develop signs and waysides.

Interpretive Trails

What is your basic philosophy behind trail design?

The design must fit the resources. High visual interests and steady revelations of new views, called "serial vision" should be designed into the trail experience. Avoid long monotonous views.

Trail Planning

What is your first step in designing an interpretive trail?

Research, research, and more research. Look for information about the site that will reveal a process or event that may be overlooked by the visitor. Safety factors, traffic flow and pull offs, and site constraints are also important factors.

What would you include in a site inventory?

Trail Design

How long are the typical interpretive trails you design?

This depends on what you want to achieve. Do you want a high turnover, especially where parking is limited? Will hikers want all day hikes at that particular spot? Trails often enhance preservation by preventing bushwacking because it helps visitors see the feature they are interested with minimal disturbance to the site.

What traffic flow shape do you most commonly use?

Loop trails are used whenever possible.

What are the most important aesthetic considerations involved in trail planning?

Consider soil types or wetland habitats that need surface materials, fragile sites, control of elevation gain, wheel chair accessibility, crossing distinctive boundaries, edge effects that increase visual interest and information.

Trail Construction

What trail surface do you most commonly recommend?

Trail surfaces should be as natural as possible. The surface material appropriate to a site depends on the needs of the visitors and the numbers who visit the site. Keep in mind that at high elevations trail recovery is slow because of a shorter growing season.

Crushed granite is good and solid for wheel chairs. At the seashore, crushed oyster shell fit the needs of the site and visitor well. Using no trail surface or only surfacing in trouble spots is also an option.

Trail Interpretation

Which interpretive method do you most frequently use on trails? (Sign in place; brochure keyed to markers, other.) Why?
Most often used are the brochures. They are a tool for family experiences and give information on concepts that the visitor can carry with them. Brochures stand on their own. Information might coorespond to key features but should not simply identify them.

Where features are identified and explained to the visitor, plaques should be used.

**When using interpretive signs, is there a typical number you use on a trail?**

The significance of the story and how well it is written is more important than the number of signs. If the first few signs are poorly written then the visitor won't read the rest. Signs should make the visitor leave wanting more.

**Is there a maximum or minimum interval for placing signs along a trail?**

If signs are placed too close together the visitor will feel that they aren't progressing along the trail. The best interval would be from 50 to 200 yards apart.

**Vandalism**

**What do you feel are the most common vandalism problems associated with trails?**

This depends on the site. Frequent problems include pulling posts, littering brochures.

**What solutions have you found to these problems?**

Have all materials professionally built. Make sure the site is neat and clean. Don't give the visitor the message that staff doesn't take care of the site and aren't around to see that they do.

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**Signs and Wayside Exhibits**

**What is your basic philosophy behind sign and wayside exhibit design?**

The principles of good writing are essential. Don't try to do too much. Avoid being trite. Try to inspire the visitor by subtly combining the story of the site with a familiar situation in their lives. Design for the visitor to come to a preferred conclusion but let them come to those conclusions on their own.

**Design**

**What color combinations are the most popular with outdoor signage?**

We are trained to read dark on light however the light colors can reflect sunlight. Pick colors with reasonable contrast, that are easy to read, and that are not garish.

**What fonts do believe are the most readable?**

Fonts should fit the subject content. Serif type faces are easy to read. Times, Roman, Trump, and Medieval are good examples.

**What % of the sign face should be white space?**

People rarely give enough white space. Consider the reward to effort ratio. How much white space should be included in a sign is part of the design decision. It should not be what is left over. Frequently 50-60% is an good amount of white space.

**Construction**

**What materials are your signs and waysides typically made of?**

Aluminum alloy or fiberglass imbedment are the most frequently used products.

**What are the advantages and disadvantages of this material? (please include cost)**

Aluminum alloy holds up well under ultra violet light and high temperatures. Fiberglass embedment has the advantage that multiple copies can be made and kept on hand if needed. Under high temperatures they can delaminate. Bullet holes create a problem in high vandalism areas. Costs of these materials is comparable.

Appendix 2-33
What types of supports do you use?
   Usually one or two wood or metal posts. Massive stone bases are too obtrusive and keep wheelchairs from getting close.

Placement
How do you attach the sign face to the supports?
   Blind tabs and tamper proof screws hinder vandalism and are effective at attaching the sign face to the supports. Fiberglass imbediment signs are framed in metal and may be attached to a metal or wood backing.
How do you anchor the supports in the ground?
   Using two posts instead of one reduces twisting and removal. Where necessary the supports can be cemented in the ground. A dead man on the post also secures the sign well.

What considerations are involved in sign and wayside exhibit placement?
   Visual interest, convenience to off trail access so not to block the area from other foot traffic, handicapped accessibility, and impacts on the site are all placement considerations.

Vandalism
Which materials do you find the most vandal resistant?
   Both fiberglass imbediment and aluminum alloy are vandal resistant.
Do you apply special sealants to signs and waysides to reduce graffiti damage?
   Epoxy in fiberglass will help reduce the severity of scratches.

How do you decrease the possibility of theft?
   See the question on anchoring the supports.

Future Research
What are the future research questions in the area of signs, trails, and wayside exhibits that you would like to see answered?
   How can design increase visitor’s attention to a sign or wayside?
   Case studies that examine various interpretive trails and trail brochures to determine which worked or failed and why?
   How can we make quality signs cheaper?
   What writing techniques capture people’s attention?
**Please disregard questions that do not apply to your business or agency**

National Park Service, Arizona Group - Ed Tanner Pilley

Mr. Pilley is involved in planning interpretive signs and wayside exhibits for trail interpretation throughout the Arizona Park Service Region. They work closely with Harper's Ferry but still suggest the materials, layout, copy, and artwork for the signs and waysides because they are closer and more familiar with the site.

Interpretive Trails

What is your basic philosophy behind trail design?

Trail design should be subtle and integrated with the environment or historic site. The designer should try to anticipate what the visitor needs and wants to know. Trails should have themes that are carried throughout the trail experiences. Themes should give the visitor a complete picture of something.

Trail Planning

What is your first step in designing an interpretive trail?

Determining the theme should be the first step in designing an interpretive trail. What message can the visitor get from the trail that they won't get in the Nature Center. The trail should not duplicate the Nature Center message.

What would you include in a site inventory?

Trail Design

How long are the typical interpretive trails you design?

A 1/4 th mile generally works the best. It will comfortably accommodate the elderly, handicapped, and visitors with time constraints.

What traffic flow shape do you most commonly use?

A clockwise loop is the most popular design. It has the advantages of eliminating the need for cross traffic, confusion, and backtracking.

What are the most important aesthetic considerations involved in trail planning?

The trail should blend in well with the environment, be accessible to wheelchairs, take the visitor to special features of the site, steer away from roads and manmade structures. It is also a good practice to pass through different ecosystems for variety and increased interest.

Trail Construction

What trail surface do you most commonly recommend?

Trail surfaces are important in protecting the site from erosion and in historical and archeological sites it can protect the area from other types of damage. DuraWeld, a blacktop bases with glue and sand, is the most frequently used especially in areas of high use. In areas where cold and freezing in a problem a CR32 Oil is applied to peat gravel.

Trail Interpretation

Which interpretive method do you most frequently use on trails? (Sign in place; brochure keyed to markers, other.) Why?

Trail signing is preferred over brochures. Usually revenue does not match costs involved in printing the brochures. Brochures boxes can be difficult to maintain and stock and often cause a litter
problem. Visitor attention is also directed somewhere other than on the site while they are reading the brochures. Low cost versions on white paper can even be difficult to read. If a change must be made in the brochure text it is a big task. Also, the visually impaired and foreign visitor can not read the brochure.

When using interpretive signs, is there a typical number you use on a trail?

The best limit is about 10 signs. Don't integrate trail interpretation with plant identification. It is better to make two different signs in different sizes. Visitors generally like checklists to accompany plant identification markers. The interpretive signs should be 150-175 words per sign arranged in 3-4 paragraphs, double spaced an identifiable title, and artwork that is explained and relevant to the sign. It is important to exercise restraint and not overload the visitor. You can get 2-3 point across in each interpretive stop.

Is there a maximum or minimum interval for placing signs along a trail?

If possible place more signs at the beginning of the trail where people are fresher and more interested. Diffuse the interpretive signs more as the trail continues. Placing signs at benches stationed increases the chances that the visitors will contemplate the interpretive message while they rest.

Vandalism

What do you feel are the most common vandalism problems associated with trails?

Litter is a big problem with interpretive trails. Tacky signs can invite vandalism.

What solutions have you found to these problems?

Employees that constantly pick up litter at the site eliminate giving other visitors the impression that it is tolerated. Also, professional looking and appropriately placed signs can reduce sign vandalism at the site.

Signs and Wayside Exhibits

What is your basic philosophy behind sign and wayside exhibit design?

Signs should be subtle and blend in with the environment. They should be unobtrusive and not compete with the site. Signs should inspire the visitor.

Design

What color combinations are the most popular with outdoor signage?

Colors should be incorporated in different interpretive media such as slide shows and films. On a trail the visitor should concentrate on the site. Bright, flashy colors divert the visitor's attention from the site to the sign. Generally, a dark bronze sign face is attractive, professional, and effective. Gold and brass colors are appropriate for lettering and line art in historical areas.

What fonts do you believe are the most readable?

The most often used are the San Serifs (Helvetica med. - bold for titles, Souvenir, and Corina). Often, the Serif fonts (Century Schoolbook) are also used. It is a good practice to pick a font that fits the "feeling" of the site. For example, Meteor goes well in a ranching setting, Palatino fits Spanish area, and Baskerville is appropriate to Civil War sites. The lettering should be up to standards for the visually impaired: 24 point for text, 60-120 point for titles, and 18 point for captions.

What % of the sign face should be white space?

The sign face should be 1/3 text, 1/3 graphics, and 1/3 white space.
Construction
What materials are your signs and waysides typically made of?
Novalloy - anodized aluminum-micro metal imaging.

What are the advantages and disadvantages of this material? (please include cost)
This material has a 10-15 year life span. It resists fading. It is vandal resistant. Weathers well. It is cost effective and professional looking. This material is not limited to squares and rectangles.

What types of supports do you use?
The supports are the same color of aluminum as the sign face.

Placement
How do you attach the sign face to the supports?
This depends on the size of the sign face. A 3/8" sign doesn't need a frame or supports. A post is welded to the top at a 30 degree angle and the plate is bolted to the post. In fiberglass embedment, when used, needs both a frame and a back. It is usually placed with a support on each side.
National Park Service Harper's Ferry - Ray Price, Chief of Wayside Division

Harper's Ferry is one of two long term planning offices of the National Park Service. Harper's Ferry deals only with planning, designing, and constructing all interpretive services for National Park Service sites. Site work is done as a basis for a proposal, reviewed by the park and the park's region. Once approved, a planner writes the copy and develops a production ready copy which includes all artwork and design specifications. They feel that planning is extremely important in dealing with the construction contractor who needs to know exactly what the project entails.

He distinguished between wayside exhibits and signs. Signs serve a directional, or identification purpose. Wayside exhibits are interpretive.

Interpretive Trails

What is your basic philosophy behind trail design?
Not applicable.

Trail Planning
What is your first step in designing an interpretive trail?
Not applicable.
What traffic flow shape do you most commonly use?
Not applicable.
What are the most important aesthetic considerations involved in trail planning?
Not applicable.

Trail Construction
What trail surface do you most commonly recommend?
Not applicable.

Trail Interpretation
Which interpretive method do you most frequently use on trails? (Sign in place; brochure keyed to markers, other.) Why?
Not applicable.
When using interpretive signs, is there a typical number you use on a trail?
Not applicable.
Is there a maximum or minimum interval for placing signs along a trail?
Not applicable.

Vandalism
What do you feel are the most common vandalism problems associated with trails?
Not applicable.
What solutions have you found to these problems?
Not applicable.
Signs and Wayside Exhibits

What is your basic philosophy behind sign and wayside exhibit design?
   Wayside exhibits should be understood and properly used by planners. It is important to address something the visitor can see or to bring to life something that happened on the site. The more abstract the wayside is the less effective it will be. They should also be well suited to interpretive goals and ideas. Text should be kept to the minimum. Try not to tell everything in one exhibit.

Design
What color combinations are the most popular with outdoor signage?
   They try to limit the palate to 4 colors depending on the site. This usually consists of the background color, black and white photos or in some cases color graphics or photos, and black for text.

What fonts do you believe are the most readable?
   Fonts should be picked for legibility not for subject content.

What % of the sign should be white space?
   There is no formula for white space. It is usually variable but an important consideration in design.

Construction
What materials are your signs and waysides typically made of?
   Fiberglass embedment is the most commonly used. It provides a built in rehabilitation factor which is advantageous (multiple copies of the camera ready copy). Etched and anodized aluminum is another choice as well as porcelain enamel. Select based on vandalism considerations, the physical environment, and sometimes the topic.

What are the advantages and disadvantages of this material? (please include cost)
   See above for some information.

Placement
How do you attach the sign face to the supports?
   They use their own aluminum hardware system that is flexible in terms of sizes, shapes, and groupings.

How do you anchor the supports in the ground?
   Dig down two feet and then pour concrete around the supports trying not to get it actually on the supports themselves.

What considerations are involved in sign and wayside exhibit placement?
   Accessibility, the relationship to the feature, and the configuration of the site are all considerations in placement.

Vandalism
Which materials do you find the most vandal resistant?
   They are all pretty resistant.

Do you apply special sealants to signs and waysides to reduce graffiti damage?
   They have never tried them.

How do you decrease the possibility of theft?
   Set the supports firmly in concrete. Many are attached to a masonry wall with hidden fasteners. The sign faces are locked in the frame with special tools that require special devices to remove. Vandalism is more of a problem than theft.
Appendix 3

Determining Future Research Questions Materials

Delphi Panel
Thank You for Participating Letter
Survey Round 1
Survey Round 2
Survey Round 3
Survey Round 4
Delphi Panel

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Appendix 3-2
Dear Dr. Wagar,

Thank you for agreeing to serve on our blue-ribbon panel to determine future research questions related to signs, trails, and wayside exhibits. Future researchers will benefit from your shared expertise.

A simple three stage process will help the panel reach a consensus on future research needs in the area of signs, trails, and wayside exhibits. This will require a minimal amount of your time.

The study results will be submitted to NAI’s professional journal for publication. You will also receive a summary of the results.

Your participation will help to direct future research in this field. Ultimately, your efforts will help create more effective signs, trails, and wayside exhibits.

Sincerely,

Suzanne Trapp
Graduate Student
College of Natural Resources
University of Wisconsin - Stevens Point

Project Advisors

Dr. Michael Gross  Mr. Ron Zimmerman  Dr. Robert Brush  Dr. Joseph Passineau
Toward Effective Signs, Trails, and Wayside Exhibits

Survey for Determining Future Research

College of Natural Resources
University of Wisconsin
Stevens Point, WI 54481
Dear Survey Participant,

Once again, thank you for agreeing to serve on our Delphi panel to determine future research questions related to signs, trails, and wayside exhibits. Your expertise in this area is a valuable asset to our survey.

This is phase one of a four part process to attain a consensus on research priorities for signs, trails, and wayside exhibits. The questions contained in this survey were identified through a literature review and telephone interviews with interpretive consultants and governmental professionals. This list is not comprehensive, but is intended to stimulate additional questions of equal or greater importance in this area.

You and eleven other panel members will help us decide research needs in signs, trails, and wayside exhibits in the following manner.

Round 1
Please respond to each question on this initial list as to whether or not you feel it is a valid research question and if it is properly stated. While this round requires the most effort, it should take no more than 30-40 minutes of your time. Add related research questions in the space provided. There is room on the last page of this survey for additional research questions that may not fit in the categories presented. Once returned, responses will be compiled into a master list of future research questions for panel review.

Round 2
Approximately two weeks later you will receive a revised list of research questions. Here you will be asked to rank each question on a likert scale as to importance for immediate research. The results of round two will again be summarized.

Round 3
Again, in approximately two weeks you will receive round three showing how you ranked each question and the mean score each question received from the panel. You will be asked to reconsider your second round responses in light of this additional information. If you disagree with the mean score, you will be asked to state your reason.

Round 4
A final summary will provide you with the revised consensus and a summary of the minority opinions for you to consider in assigning each question a final score.
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Approximately two weeks later you will receive a revised list of research questions. Here you will be asked to rank each question on a likert scale as to importance for immediate research. The results of round two will again be summarized.

Round 3
Again, in approximately two weeks you will receive round three showing how you ranked each question and the mean score each question received from the panel. You will be asked to reconsider your second round responses in light of this additional information. If you disagree with the mean score, you will be asked to state your reason.

Round 4
A final summary will provide you with the revised consensus and a summary of the minority opinions for you to consider in assigning each question a final score.
Please return your initial comments on this preliminary list of research questions by June 4. Simply turn the back page and staple the survey closed. The return address and stamp are already included for your convenience. Your prompt response is appreciated.

Thank you again for sharing your time and expertise.

Sincerely,

Suzanne Trapp, Graduate Student

Dr. Michael Gross, Professor
College of Natural Resources
Resource Management

Dr. Joseph Passineau, Director
Central Wisconsin Environmental Station

Mr. Ron Zimmerman, Director
Schmeeckle Reserve

Dr. Robert Brush, Associate Professor
College of Natural Resources
Forestry
Directions: Please circle the appropriate response. Space is provided for you to rephrase the research question where necessary. Please add research questions that you feel should be included in the space provided. Additional room on the last page of this survey is for questions that may not fit in the categories presented.
59. How can sign, trail, and wayside exhibit design be improved for greater protection against vandalism?
Is this a valid research question? yes no
Is it properly stated? yes no

What other pressing research questions fall under this category?

60. Will a vandalism oriented display at the visitor or nature center, explaining site problems and their monetary costs and lost opportunities, decrease the number and severity of vandalistic incidents at the site?
Is this a valid research question? yes no
Is it properly stated? yes no

What other pressing research questions fall under this category?

61. What interpretive devices and practices (interpretation, public education campaigns, being an example, publicity) reduce interpretive site vandalism?
Is this a valid research question? yes no
Is it properly stated? yes no

What other pressing research questions fall under this category?

62. What management practices (patrol, removal, maintenance) reduce interpretive site vandalism?
Is this a valid research question? yes no
Is it properly stated? yes no

What other pressing research questions fall under this category?
5. How can environmental issues be interpreted on trails?
   Is this a valid research question? yes no
   Is it properly stated? yes no
   What other pressing research questions fall under this category?

The Visitor

6. Do people learn differently in outdoor recreational settings rather than in museums?
   Is this a valid research question? yes no
   Is it properly stated? yes no
   What other pressing research questions fall under this category?

7. Do visitors prefer to learn about the site through indoor exhibits or outdoor interpretive trails? Why?
   Is this a valid research question? yes no
   Is it properly stated? yes no
   What other pressing research questions fall under this category?

8. What themes interest visitors most today?
   Is this a valid research question? yes no
   Is it properly stated? yes no
   What other pressing research questions fall under this category?

Vandalism

55. Who is responsible for vandalism today?
    Is this a valid research question? yes no
    Is it properly stated? yes no
    What other pressing research questions fall under this category?

56. What are the trends?
    Is this a valid research question? yes no
    Is it properly stated? yes no
    What other pressing research questions fall under this category?

57. What are the characteristics (age, socio-economic background, motive) of today's interpretive sign and wayside vandals?
    Is this a valid research question? yes no
    Is it properly stated? yes no
    What other pressing research questions fall under this category?

58. What current vandalism problems are associated with signs, trails, and wayside exhibits?
    Is this a valid research question? yes no
    Is it properly stated? yes no
    What other pressing research questions fall under this category?
51. What trail surfaces do visitors prefer?
   Is this a valid research question? yes no
   Is it properly stated? yes no

   What other pressing research questions fall under this category?

52. What trail surfaces are most effective for protecting the site?
   Is this a valid research question? yes no
   Is it properly stated? yes no

   What other pressing research questions fall under this category?

53. What vegetative management practices can enhance the recreational and interpretive trail experience?
   Is this a valid research question? yes no
   Is it properly stated? yes no

   What other pressing research questions fall under this category?

54. What vegetative management practices on trails protect the site?
   Is this a valid research question? yes no
   Is it properly stated? yes no

   What other pressing research questions fall under this category?

9. What are the visitors' motives for using trails? Are their motives different in urban areas?
   Is this a valid research question? yes no
   Is it properly stated? yes no

   What other pressing research questions fall under this category?

10. Why do visitors use self-guiding interpretive trails and what are their expectations?
   Is this a valid research question? yes no
   Is it properly stated? yes no

   What other pressing research questions fall under this category?

11. How can self-guiding interpretive trails be made more rewarding to visitors?
   Is this a valid research question? yes no
   Is it properly stated? yes no

   What other pressing research questions fall under this category?

12. Which self-guiding interpretive method do visitors prefer, the sign in place, brochure keyed to markers, or brochure keyed to landmarks?
   Is this a valid research question? yes no
   Is it properly stated? yes no

   What other pressing research questions fall under this category?
13. What interpretive sign techniques are more effective in communicating for different cultures and foreign visitors?
Is this a valid research question? yes no
Is it properly stated? yes no

What other pressing research questions fall under this category?

Interpretive Signs and Waysides

Are the following definitions complete? Please make comments in the space provided:

Interpretive sign - a sign, usually one in a series, that is designed to bring natural processes, historical events, or physical features of an area to the visitor's attention with the feeling of participation and personal discovery unstructured by interpretive personnel (Sharpe, 1982).

Interpretive wayside exhibit - an outside interpretive exhibit that displays more information and/or objects that singly interpret a unique feature or broader theme in more detail (Sharpe, 1982 and Grater, 1976).

General Questions

14. What proportion of visitors read signs?
Is this a valid research question? yes no
Is it properly stated? yes no

What other pressing research questions fall under this category?

47. What is the most effective design configuration for self-guiding interpretive trails?
Is this a valid research question? yes no
Is it properly stated? yes no

What other pressing research questions fall under this category?

48. How can aesthetic components (complexity, diversity, viewscapes, view corridors, and physical changes) enhance the visitor's trail experience?
Is this a valid research question? yes no
Is it properly stated? yes no

What other pressing research questions fall under this category?

49. How can aesthetic components be incorporated into trail design criteria for the practitioner?
Is this a valid research question? yes no
Is it properly stated? yes no

What other pressing research questions fall under this category?

50. What interpretive structures can allow visitors to enter fragile environments without site damage?
Is this a valid research question? yes no
Is it properly stated? yes no

What other pressing research questions fall under this category?
### How can audio messages be effectively used as a method of trail interpretation?

<table>
<thead>
<tr>
<th>Is this a valid research question?</th>
<th>yes</th>
<th>no</th>
</tr>
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<tbody>
<tr>
<td>Is it properly stated?</td>
<td>yes</td>
<td>no</td>
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</table>

What other pressing research questions fall under this category?

### How can cost, vandalism and weather damage be reduced in outdoor audio interpretive messages?

<table>
<thead>
<tr>
<th>Is this a valid research question?</th>
<th>yes</th>
<th>no</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is it properly stated?</td>
<td>yes</td>
<td>no</td>
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</table>

What other pressing research questions fall under this category?

### How can interpretive devices such as viewing towers, blinds, spotting scopes, and tunnels be designed and placed to enhance the visitor's trail experience?

<table>
<thead>
<tr>
<th>Is this a valid research question?</th>
<th>yes</th>
<th>no</th>
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<tbody>
<tr>
<td>Is it properly stated?</td>
<td>yes</td>
<td>no</td>
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</table>

What other pressing research questions fall under this category?

### What is an optimal length for self-guiding interpretive trails?

<table>
<thead>
<tr>
<th>Is this a valid research question?</th>
<th>yes</th>
<th>no</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is it properly stated?</td>
<td>yes</td>
<td>no</td>
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What other pressing research questions fall under this category?

### What are the characteristics of those who read signs and those who do not?

<table>
<thead>
<tr>
<th>Is this a valid research question?</th>
<th>yes</th>
<th>no</th>
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</thead>
<tbody>
<tr>
<td>Is it properly stated?</td>
<td>yes</td>
<td>no</td>
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</table>

What other pressing research questions fall under this category?

### What interpretive techniques really influence the visitor to read interpretive signs?

<table>
<thead>
<tr>
<th>Is this a valid research question?</th>
<th>yes</th>
<th>no</th>
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<tbody>
<tr>
<td>Is it properly stated?</td>
<td>yes</td>
<td>no</td>
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</table>

What other pressing research questions fall under this category?

### Do visitors prefer the more comprehensive wayside exhibits or an interpretive sign system where more signs are used to interpret a theme?

<table>
<thead>
<tr>
<th>Is this a valid research question?</th>
<th>yes</th>
<th>no</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is it properly stated?</td>
<td>yes</td>
<td>no</td>
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</tbody>
</table>

What other pressing research questions fall under this category?

### Which research findings on indoor exhibits are transferable to outdoor exhibits such as signs and waysides?

<table>
<thead>
<tr>
<th>Is this a valid research question?</th>
<th>yes</th>
<th>no</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is it properly stated?</td>
<td>yes</td>
<td>no</td>
</tr>
</tbody>
</table>

What other pressing research questions fall under this category?
Interpretive Methods

19. Are signs that explain the reasons behind rules more effective than traditional authoritative rule statements?
   Is this a valid research question? yes no
   Is it properly stated? yes no

20. What methods and materials are effective for signs, trails, and wayside exhibits in special use trails such as underwater and canoe trails?
   Is this a valid research question? yes no
   Is it properly stated? yes no

21. What interpretive methods are most effective at serving audiences of different abilities and handicaps?
   Is this a valid research question? yes no
   Is it properly stated? yes no

Design

22. What variations in color, graphics, layout, white space, and font choice increase the visitor's preference for a sign or wayside exhibit?
   Is this a valid research question? yes no
   Is it properly stated? yes no

39. Are brochures more frequently used and kept if they must be purchased?
   Is this a valid research question? yes no
   Is it properly stated? yes no

40. How much are visitors willing to pay for self-guiding brochures of differing length and styles?
   Is this a valid research question? yes no
   Is it properly stated? yes no

41. What graphic design criteria improve the reading and retention of interpretive information given in self-guiding trail brochures?
   Is this a valid research question? yes no
   Is it properly stated? yes no

42. Do visitors use self-guiding brochures again after the on site experience and for what purposes?
   Is this a valid research question? yes no
   Is it properly stated? yes no

What other pressing research questions fall under this category?
General Questions

35. How can disadvantages (e.g., one-way communication) in self-guiding trail interpretation be reduced?
   Is this a valid research question? yes no
   Is it properly stated? yes no

36. How can a combination of interpreter-guided and self-guided trails be utilized to take advantage of both methods?
   Is this a valid research question? yes no
   Is it properly stated? yes no

37. What are effective methods to promote interpretive self-guiding trail use?
   Is this a valid research question? yes no
   Is it properly stated? yes no

23. How can Tilden's principles (provoke, relate, reveal, address the whole) be incorporated into the text to influence the visitor to read signs and learn from them?
   Is this a valid research question? yes no
   Is it properly stated? yes no

24. Are signs and wayside exhibits that are based on behavioral, cognitive, and emotional objectives more effective than those that are not?
   Is this a valid research question? yes no
   Is it properly stated? yes no

25. Is effectiveness dependent on including all three types of objectives?
   Is this a valid research question? yes no
   Is it properly stated? yes no

26. How can signs, trails, and wayside exhibits be designed to be more rewarding and involving for the visitor?
   Is this a valid research question? yes no
   Is it properly stated? yes no

Trail Interpretation

38. What optimal number of signs will visitors read on an interpretive trail?
   Is this a valid research question? yes no
   Is it properly stated? yes no

What other pressing research questions fall under this category?
27. What is the optimal amount of text for various audiences?
   Is this a valid research question? yes no
   Is it properly stated? yes no

   What other pressing research questions fall under this category?

28. How does the arrangement of interpretive text (message level) influence the visitor to read and retain interpretive information?
   Is this a valid research question? yes no
   Is it properly stated? yes no

   What other pressing research questions fall under this category?

29. How do signage materials compare in terms of cost, longevity, and visitor preference?
   Is this a valid research question? yes no
   Is it properly stated? yes no

   What other pressing research questions fall under this category?

30. What aesthetic and comfort factors increase the probability interpretation will be read?
   Is this a valid research question? yes no
   Is it properly stated? yes no

   What other pressing research questions fall under this category?

31. What other sign and wayside placement factors increase the chance that visitors will read the material?
   Is this a valid research question? yes no
   Is it properly stated? yes no

   What other pressing research questions fall under this category?

32. How does placement of interpretive signs increase readability?
   Is this a valid research question? yes no
   Is it properly stated? yes no

   What other pressing research questions fall under this category?

33. Do visitors find signs and wayside exhibits in natural areas offensive?
   Is this a valid research question? yes no
   Is it properly stated? yes no

   What other pressing research questions fall under this category?

34. What variables (placement, layout, color, size, panel supports) can be used to make a sign or wayside in an outdoor setting acceptable?
   Is this a valid research question? yes no
   Is it properly stated? yes no

   What other pressing research questions fall under this category?
Toward Effective Interpretive Signs, Trails, and Wayside Exhibits

Survey for Determining Future Research

Round 2

College of Natural Resources
University of Wisconsin
Stevens Point, WI 54481
Dear Survey Participant,

Thank you for responding to Round 1 of this survey. We received very detailed comments on the initial set of possible research questions in the area of interpretive signs, trails, and wayside exhibits. From your responses we have developed more precise and valuable questions.

Round 2 will determine which questions are the most important for immediate research. In this round, please rank each question as to its importance for immediate research on the Likert scale provided below each question.

In approximately 2 weeks you will receive round three showing how you ranked each question and the mean score each question received from the panel. You will be asked to reconsider your second round responses in light of this additional information. If you disagree with the mean score, you will be asked to state your reason.

Please return your comments as soon as possible. Due to time constraints, I am unable to consider surveys received after July 14 in preparation of Round 3. If you have any questions or concerns please contact me at (715) 677-3506.

Again, simply turn the back page and staple the survey closed. Your prompt response is appreciated.

Thank you again for sharing your time and expertise.

Sincerely,

Suzanne Trapp, Graduate Student
Directions: Please rank the following research questions as to their importance for immediate research by assigning each a score on the Likert scale provided BELOW the question. When over 40% of the survey participants responded that a question was not valid, it was dropped from the list. Additional questions, based on Round 1 responses, have been added in italics. If you feel any of these questions should be eliminated, assign them a 0 on the scale.

Please complete this round as soon as possible. Due to time constraints, surveys received after July 14 cannot be considered in Round 3.
Funding Interpretive Signs, Trails, and Wayside Exhibits

1. How are interpretive signs, trails, and wayside exhibits funded?

2. What sources of funding are available for interpretive signs and waysides?

3. What funding amounts are available for interpretive signs and waysides from these sources?

- What characteristics promote successful funding for interpretive signs and waysides from these sources?

4. What funding sources are available for interpretive trails?

5. What funding amounts are available for interpretive trails?

6. What characteristics promote successful funding for interpretive trails from these sources?

*Italicized questions are additional questions based on Round 1 responses*
96. Under what conditions will educational methods and techniques (interpretation, public education campaigns, publicity campaigns) reduce incidental interpretive site vandalism?

97. Under what conditions will management practices (patrol, regulation, maintenance) reduce intentional interpretive site vandalism?

98. Under what conditions will management practices (patrol, regulation, maintenance) reduce incidental interpretive site vandalism.

Interpretive Signs, Trails, and Wayside Exhibits in Other Countries

8. What interpretive methods are appropriate for the development of interpretive signs, trails, and wayside exhibits in countries having limited money and materials?

9. What material and skill options are available to countries with limited money and materials who wish to develop interpretive signs, trails, or wayside exhibits?

10. What are the message needs, literacy level, and cultural considerations for designing interpretive signs, trails, or wayside exhibits in other countries?

Visitor Motivations for Interpretive Sign, Trail, and Wayside Exhibit Use

11. What motivates visitors to use interpretive trails?

12. What motivates visitors to read interpretive signs and wayside exhibits?
13. How are visitor motivations different for museum learning than for outdoor recreational learning?

14. What interpretive themes interest visitors today?

15. How can visitor motives be used to increase the number of visitors who read interpretive signs and wayside exhibits?

16. How are motives for urban interpretive trail use different than motives for rural interpretive, wilderness, or other interpretive trails?

17. How are motives for using urban, rural, and wilderness interpretive trails changing?

18. How are urban resident's motives for using interpretive trails different from the rural or suburban resident?

89. What are today's trends in interpretive trail vandalism?

90. What are the characteristics (age, socio-economic background, motive) of today's intentional interpretive sign and wayside vandals?

91. What are the characteristics (age, socio-economic background, motive) of today's unintentional interpretive sign and wayside vandals?

92. What current vandalism problems are associated with interpretive signs, trails, and wayside exhibits?

93. How can interpretive sign, trail, and wayside exhibit production be improved for greater protection from vandalism?

94. Which types of vandalistic acts (intentional, incidental) can be eliminated or reduced using a vandalism oriented display at the visitor or nature center, explaining site problems and their monetary costs and lost opportunities?

95. Under what conditions will educational methods and techniques (interpretation, public education campaigns, publicity campaigns) reduce intentional interpretive site vandalism?
Interpretive Sign and Wayside Exhibit
Design

84. What is the best spacial balance of text and illustrative material to increase the number of visitors willing to read an interpretive sign or wayside exhibit?

85. What is the best spacial balance of text and illustrative material to improve visitor message comprehension?

Interpretive Sign and Wayside Exhibit
Materials

86. What sign and wayside exhibit materials are most durable for underwater and canoe trails?

87. How do signage materials compare in terms of cost, maintenance, longevity, and visitor preference?

Interpretive Sign, Trail, and Wayside Exhibit Vandalism

88. What are today's trends in interpretive sign and wayside vandalism?

Visitor Learning in Outdoor Recreational Setting

19. How do people learn in outdoor recreational settings as compared to museum settings?

20. Which research findings on indoor exhibits are transferable to outdoor interpretive exhibits such as signs and waysides?

21. What special characteristics of the outdoor environment enhance or detract from the interpretive learning experience?

Self-Guiding Interpretive Trails
Expectations, Preferences, and Benefits

22. What influences visitor preference toward indoor interpretive exhibits or outdoor interpretive trails?

23. What are visitor's expectations when using self-guiding interpretive trails?

24. To what extent are visitor's expectations of self-guiding interpretive trails being met?
25. How are visitor’s expectations for self-guided interpretive trails similar to or different from the expectations of interpretive planners and managers?

26. What are the visitor benefits and rewards of self-guiding interpretive trails?

Interpretive Trails
Interpretive Methods

27. Under what conditions do visitors prefer, the sign in place; brochure keyed to markers; brochure keyed to landmarks; or audio tapes for self-guided trail interpretation?

28. How can trail design increase visitor involvement in the site?

29. How can the effects of disadvantages (e.g., one-way communication) in self-guiding interpretive trails be reduced?

78. What are the minimal and optimal font sizes for titles, body, copy and captions for reading ease?

79. When is color an asset or detriment in interpretive signs and waysides?

80. How can graphics (photographs, line drawings, illustrations) be used to increase the number of visitors that read interpretive signs and waysides?

81. How can graphics (photography, line drawings, illustrations) be used to improve message comprehension?

82. What design elements (size, color, shape, supports, font choice, graphics) influence the level of signage visitors find offensive in natural, cultural, historical, archeological, and wilderness sites?

83. How does the effectiveness of various interpretive sign elements (color, layout, graphics, font choice) change with different cultures?
Interpretive Sign and Wayside Exhibit
Design Elements

72. How does effectiveness of interpretive sign elements (color, layout, font choice) change in underwater and canoe trails?

73. What interpretive sign and wayside design elements (color, layout, font choice) improve communication of the interpretive message to non-English speaking visitors?

74. What criteria for interpretive sign and wayside exhibit design elements (color, layout, font choice) communicate effectively for the sight impaired?

75. How do variations in color, graphics, layout, white space, and font choice increase the visitor’s preference for an interpretive sign or wayside exhibit?

76. How do variations in color, graphics, layout, white space, and font choice increase the number of visitors that read interpretive signs or wayside exhibits?

30. What controllable aesthetic and comfort factors (shade, benches, seclusion, habitat variety, mystery) considered in placement of interpretive signs and waysides affect whether interpretation will be read?

31. How do interpretive sign and wayside physical placement variables (angle, height, proximity to other signs) affect readability?

32. How does the level of signage visitors find offensive change in natural, cultural, historical, archaeological, and wilderness sites?

33. What determines the number of signs specific visitors will read under specific circumstances?

Interpretive Trails
Interpretive Sign Placement and Numbers

34. Under what circumstances is a brochure more frequently used if a requested donation is attached to it?

35. Under what circumstances is a brochure more frequently used if a charge is attached to it?
36. What influences the amount visitors are willing to pay for self-guiding brochures?

| 0 | 1 | 2 | 3 | 4 | 5 |

37. What graphic design elements (layout, graphics, color, writing styles, length, complexity) increase the number of visitors who read self-guiding trail brochures?

| 0 | 1 | 2 | 3 | 4 | 5 |

38. What graphic design elements (layout, graphics, color, writing styles, length, complexity) improve information retention in self-guiding trail brochures?

| 0 | 1 | 2 | 3 | 4 | 5 |

39. What influences visitors to use self-guiding brochures after the on-site experience?

| 0 | 1 | 2 | 3 | 4 | 5 |

40. When visitors use self-guiding trail brochures after the on-site experience, how are they used?

| 0 | 1 | 2 | 3 | 4 | 5 |

41. How are visitors influenced to use self-guiding trails when several different themed brochures are offered to them?

| 0 | 1 | 2 | 3 | 4 | 5 |

65. What determines the amount of text a visitor is willing to read in an interpretive sign or wayside exhibit?

| 0 | 1 | 2 | 3 | 4 | 5 |

66. How does the organization of interpretive text into message levels (primary, secondary, tertiary paragraphs) influence the visitor to read interpretive signs and waysides?

| 0 | 1 | 2 | 3 | 4 | 5 |

67. How does the organization of interpretive text into message levels (primary, secondary, tertiary paragraphs) increase visitor message comprehension in interpretive signs and waysides?

| 0 | 1 | 2 | 3 | 4 | 5 |

68. How does interpretive sign and wayside text style (first person, third person, and straight declarative style) affect comprehension?

| 0 | 1 | 2 | 3 | 4 | 5 |

69. How does interpretive sign and wayside message style (first person, third person, and straight declarative style) affect information retention?

| 0 | 1 | 2 | 3 | 4 | 5 |

70. What interpretive approaches to rule presentation increase visitor compliance with site rules?

| 0 | 1 | 2 | 3 | 4 | 5 |

71. How does the tone of an interpretive rules message (authoritative rule statement, explanatory rule presentation) affect visitor compliance with site rules?

| 0 | 1 | 2 | 3 | 4 | 5 |
Interpretive Signs and Wayside Exhibits

Objectives

60. How do behavioral objectives influence message comprehension of a sign or wayside exhibit?

61. How do cognitive objectives influence message comprehension of a sign or wayside exhibit?

62. How do emotional objectives influence message comprehension of a sign or wayside exhibit?

63. How does using all three types of objectives, behavioral, emotional, and cognitive, influence message comprehension of an interpretive sign or wayside exhibit?

Interpretive Trails

Interpretive Audio Devices

42. How do interpretive audio messages improve message comprehension?

43. How does the availability of interpretive audio messages increase visitor motivation for using self-guiding interpretive trails?

44. How can damage (weather, intentional vandalism, incidental vandalism) to audio interpretive devices along self-guided interpretive trails be reduced?

Interpretive Trails

Other Interpretive Devices

45. How do visitors respond to species identification labels along interpretive trails?

46. How does visitor response to trail species identification labels vary according to personal visitor characteristics (experience level, motives, knowledge, age)?
### Interpretive Trails

#### Trail Layout, Construction, and Maintenance

<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>47. How can interpretive devices (viewing towers, blinds, spotting scopes, and tunnels) enhance the visitor's trail experience?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>48. How can interpretive trail devices (viewing towers, blinds, spotting scopes, tunnels) minimize impacts on the site?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>49. How is the optimal length for self-guiding interpretive trails affected by interpretive methods (sign in place, waysides, audio tapes, brochures keyed to landmarks, brochures keyed to numbered posts)?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>50. How is the optimal length for self-guiding interpretive trails affected by site variables (visitor age and group size, trail subject, and main destination feature)?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>51. How can aesthetic components (complexity, diversity, view scapes, view corridors, and physical changes) enhance the visitor's trail experience?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>52. What interpretive structures allow visitors to enter fragile environments with minimal site damage, taking into account site variables (visitor traffic, soil types)?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>53. How do interpretive structures that allow visitors to enter fragile environments attract visitor use?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>54. What trail surfaces do visitors prefer?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>55. What trail surfaces best balance cost, maintenance, and physical and aesthetic resource impacts?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>56. What trail surfaces are most effective at reducing soil erosion and compaction?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>57. What vegetative management practices (creating openings, controlled burns, creating views, selective cutting) enhance the interpretive trail experience?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>58. How effective are vegetative management practices designed to reduce site impact (planting barriers to reduce trail cutting, planting &quot;unfriendly plants,&quot; replacing trampled vegetation, giving trails a rest period)?</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>59. How much manipulation of vegetation is appropriate along an interpretive trail?</td>
<td>0 1 2 3 4 5</td>
</tr>
</tbody>
</table>
Toward Effective Interpretive Signs, Trails, and Wayside Exhibits

Survey for Determining Future Research

Round 3

College of Natural Resources
University of Wisconsin
Stevens Point, WI 54481
Dear Survey Participant,

Thank you for your response to Round 2 of this survey. We are on the home stretch!

In Round 3 we will continue to rank the research questions as to their importance for immediate research. You and each participant will have an opportunity to:

1. Compare your question score to the group average.
2. Reconsider your score.
3. Revise your original scores if you desire.
4. Indicate your reason for ranking questions as you have where your score is significantly different (1.5 to 2 points higher or lower) from the average score. These comments will be included anonymously in the last round of the survey.

Please return your comments as soon as possible or at the latest by August 25. If you have any questions or concerns, please contact me at (715) 677-3506.

Again, simply turn the back page and staple the survey closed. Your prompt response is appreciated.

Thank you again for sharing your time and expertise.

Sincerely,

Suzanne Trapp, Graduate Student
96. Under what conditions will educational methods and techniques (interpretation, public education campaigns, publicity campaigns) reduce incidental interpretive site vandalism?
   average score: 3.35
   your score:
   revised score:
   comments:

97. Under what conditions will management practices (patrol, regulation, maintenance) reduce intentional interpretive site vandalism?
   average score: 3.07
   your score:
   revised score:
   comments:

98. Under what conditions will management practices (patrol, regulation, maintenance) reduce incidental interpretive site vandalism.
   average score: 2.88
   your score:
   revised score:
   comments:

Directions: Please review the following research questions as to their importance for immediate research. Compare your score to the group average. After reconsidering your score, if you wish to rerank a question, assign a revised score in the space provided. Scores should be on a Likert scale:

Low Importance | High Importance

0 1 2 3 4 5

If you do not wish to revise a score please mark through "revised score". This makes it clear that the question was not skipped or missed.

If a score is significantly different (1.5 to 2 points higher or lower) from the average score, please indicate your reason for scoring the question as you did in the "Comments" space provided.

Please complete this round as soon as possible. Surveys should be returned by August 25.
Funding Interpretive Signs, Trails, and Wayside Exhibits

1. How are interpretive signs, trails, and wayside exhibits funded?
   average score: 1.85
   your score:
   revised score:
   comments:

2. What sources of funding are available for interpretive signs and waysides?
   average score: 2.25
   your score:
   revised score:
   comments:

3. What funding amounts are available for interpretive signs and waysides from these sources?
   average score: 1.25
   your score:
   revised score:
   comments:

4. What funding approaches are successful with these sources for interpretive signs and waysides?
   average score: 1.90
   your score:
   revised score:
   comments:

92. What current vandalism problems are associated with interpretive signs, trails, and wayside exhibits?
average score: 3.35
your score:
revised score:
comments:

93. How can interpretive sign, trail, and wayside exhibit production be improved for greater protection from vandalism?
average score: 3.49
your score:
revised score:
comments:

94. Which types of vandalistic acts (intentional, incidental) can be eliminated or reduced using a vandalism oriented display at the visitor or nature center, explaining site problems and their monetary costs and lost opportunities?
average score: 2.76
your score:
revised score:
comments:

95. Under what conditions will educational methods and techniques (interpretation, public education campaigns, publicity campaigns) reduce intentional interpretive site vandalism?
average score: 2.99
your score:
revised score:
comments:
Interpretive Sign, Trail, and Wayside Exhibit Vandalism

88. What are today's trends in interpretive sign and wayside vandalism?
   average score: 3.58
   your score:
   revised score:
   comments:

89. What are today's trends in interpretive trail vandalism?
   average score: 3.03
   your score:
   revised score:
   comments:

90. What are the characteristics (age, socio-economic background, motive) of today's intentional interpretive sign and wayside vandals?
   average score: 3.48
   your score:
   revised score:
   comments:

91. What are the characteristics (age, socio-economic background, motive) of today's unintentional interpretive sign and wayside vandals?
   average score: 3.10
   your score:
   revised score:
   comments:

5. What funding sources are available for interpretive trails?
   average score: 2.1
   your score:
   revised score:
   comments:

6. What funding amounts are available for interpretive trails?
   average score: 1.48
   your score:
   revised score:
   comments:

7. What funding approaches are successful with these sources for interpretive trails?
   average score: 1.79
   your score:
   revised score:
   comments:

Interpretive Signs, Trails, and Wayside Exhibits in Other Countries

8. What interpretive technologies are appropriate for the development of interpretive signs, trails, and wayside exhibits in countries having limited money and materials?
   average score: 2.96
   your score:
   revised score:
   comments:
9. What material and skill options are available to countries with limited money and materials who wish to develop interpretive signs, trails, or wayside exhibits?
   average score: 2.41
   your score:
   revised score:
   comments:

10. What are the message needs, literacy levels, and cultural considerations for designing interpretive signs, trails, or wayside exhibits for other cultures?
    average score: 3.39
    your score:
    revised score:
    comments:

Visitor Motivations for Interpretive Sign, Trail, and Wayside Exhibit Use

11. What motivates visitors to use interpretive trails?
    average score: 4.33
    your score:
    revised score:
    comments:

12. What motivates visitors to read interpretive signs and wayside exhibits?
    average score: 4.46
    your score:
    revised score:
    comments:

85. What is the best spatial balance of text and illustrative material to improve visitor message comprehension?
    average score: 2.73
    your score:
    revised score:
    comments:

Interpretive Sign and Wayside Exhibit Materials

86. What sign and wayside exhibit materials are most durable for underwater and canoe trails?
    average score: 1.89
    your score:
    revised score:
    comments:

87. How do signage materials compare in terms of cost, maintenance, longevity, and visitor preference?
    average score: 2.84
    your score:
    revised score:
    comments:
82. What design elements (size, color, shape, supports, font choice, graphics) influence the level of signage visitors find offensive in natural, cultural, historical, archeological, and wilderness sites?
naverage score: 2.66
your score:
revised score:
comments:

83. How does the effectiveness of various interpretive sign elements (color, layout, graphics, font choice) change with different cultures?
average score: 3.10
your score:
revised score:
comments:

Interpretive Sign and Wayside Exhibit Design

84. What is the best spacial balance of text and illustrative material to increase the number of visitors willing to read an interpretive sign or wayside exhibit?
average score: 2.83
your score:
revised score:
comments:

13. How are visitor motivations different for museum learning than for outdoor recreational learning?
average score: 4.05
your score:
revised score:
comments:

14. What interpretive themes interest visitors today?
average score: 3.23
your score:
revised score:
comments:

15. How can visitor motives be used to increase the number of visitors who read interpretive signs and wayside exhibits?
average score: 4.49
your score:
revised score:
comments:

16. How are motives among urban interpretive trail use different than motives for rural interpretive, wilderness, or other interpretive trails?
average score: 3.90
your score:
revised score:
comments:
17. How are motives for using urban, rural, and wilderness interpretive trails changing?
   average score: 3.90
   your score:
   revised score:
   comments:

18. How are urban resident's motives for using interpretive trails different from the rural or suburban resident?
   average score: 3.28
   your score:
   revised score:
   comments:

Visitor Learning in Outdoor Recreational Settings

19. How do people learn in outdoor recreational settings as compared to museum settings?
   average score: 3.68
   your score:
   revised score:
   comments:

20. Which research findings on indoor exhibits are transferable to outdoor interpretive exhibits such as signs and waysides?
   average score: 3.56
   your score:
   revised score:
   comments:

78. What are the minimal and optimal font sizes for interpretive sign and wayside titles, body, copy and captions that increase reading ease for the visitor?
   average score: 2.92
   your score:
   revised score:
   comments:

79. When is color an asset or detriment in interpretive signs and waysides?
   average score: 2.27
   your score:
   revised score:
   comments:

80. How can graphics (photographs, line drawings, illustrations) be used to increase the number of visitors that read interpretive signs and waysides?
   average score: 3.20
   your score:
   revised score:
   comments:

81. How can graphics (photography, line drawings, illustrations) be used to improve message comprehension?
   average score: 3.58
   your score:
   revised score:
   comments:
74. What criteria for interpretive sign and wayside exhibit design elements (color, layout, font choice) communicate effectively for the sight impaired?
   average score: 3.65
   your score:
   revised score:
   comments:

75. How do variations in color, graphics, layout, white space, and font choice increase the visitor's preference for an interpretive sign or wayside exhibit?
   average score: 3.18
   your score:
   revised score:
   comments:

76. How do variations in color, graphics, layout, white space, and font choice increase the number of visitors that read interpretive signs or wayside exhibits?
   average score: 3.46
   your score:
   revised score:
   comments:

77. How do variations in color, graphics, layout, white space, and font choice improve message comprehension by the visitor?
   average score: 2.90
   your score:
   revised score:
   comments:

21. What special characteristics of the outdoor environment enhance or detract from the interpretive learning experience?
   average score: 3.79
   your score:
   revised score:
   comments:

Self-Guiding Interpretive Trails
Expectations, Preferences, and Benefits

22. What influences visitor preference toward indoor interpretive exhibits or outdoor interpretive trails?
   average score: 4.04
   your score:
   revised score:
   comments:

23. What are visitor's expectations when using self-guiding interpretive trails?
   average score: 4.00
   your score:
   revised score:
   comments:

24. To what extent are visitor's expectations of self-guiding interpretive trails being met?
   average score: 3.68
   your score:
   revised score:
   comments:
25. How are visitor's expectations for self-guided interpretive trails similar to or different from the expectations of interpretive planners and managers?
average score: 4.14
your score:
revised score:
comments:

26. What are the visitor benefits and rewards of self-guiding interpretive trails?
average score: 3.70
your score:
revised score:
comments:

27. Under what conditions do visitors prefer the sign in place; brochure keyed to markers; brochure keyed to landmarks; or audio tapes for self-guided trail interpretation?
average score: 3.10
your score:
revised score:
comments:

71. How does the tone of an interpretive rules message (authoritative rule statement, explanatory rule presentation) affect visitor compliance with site rules?
average score: 3.07
your score:
revised score:
comments:

Interpretive Sign and Wayside Exhibit Design Elements

72. How does effectiveness of interpretive sign elements (color, layout, font choice) change in underwater and canoe trails?
average score: 2.33
your score:
revised score:
comments:

73. What interpretive sign and wayside design elements (color, layout, font choice) improve communication of the interpretive message to non-English speaking visitors?
average score: 3.34
your score:
revised score:
comments:
67. How does the organization of interpretive text into message levels (primary, secondary, tertiary paragraphs) increase visitor message comprehension in interpretive signs and wayside exhibits?
average score: 3.41
your score:
revised score:
comments:

68. How does interpretive sign and wayside text style (first person, third person, and straight declarative style) affect comprehension?
average score: 3.18
your score:
revised score:
comments:

69. How does interpretive sign and wayside message style (first person, third person, and straight declarative style) affect information retention?
average score: 3.11
your score:
revised score:
comments:

70. What interpretive approaches to rule presentation increase visitor comprehension of site rules?
average score: 3.56
your score:
revised score:
comments:

28. How can trail design increase visitor involvement in the site?
average score: 3.65
your score:
revised score:
comments:

29. How can the effects of disadvantages (e.g., one-way communication) in self-guiding interpretive trails be reduced?
average score: 3.44
your score:
revised score:
comments:

Interpretive Trails
Interpretive Sign Placement and Numbers

30. What controllable aesthetic comfort factors (shade, benches, seclusion, habitat variety, mystery) considered in placement of interpretive signs and waysides affect whether interpretation will be read?
average score: 3.30
your score:
revised score:
comments:

31. How do interpretive sign and wayside physical placement variables (angle, height, proximity to other signs) affect readability?
average score: 3.34
your score:
revised score:
comments:
32. How does the amount of signage visitors find offensive change in natural, cultural, historical, archeological, and wilderness sites?
   average score: 2.71
   your score:
   revised score:
   comments:

33. What determines the number of signs specific visitors will read under specific circumstances?
   average score: 2.49
   your score:
   revised score:
   comments:

Interpretive Trails
Interpretive Self-Guiding Brochures

34. Under what circumstances is a brochure more frequently used if a requested donation is attached to it?
   average score: 2.46
   your score:
   revised score:
   comments:

35. Under what circumstances is a brochure more frequently used if a charge is attached to it?
   average score: 2.57
   your score:
   revised score:
   comments:

64. How does organization of interpretive information into message levels (primary, secondary, and tertiary paragraphs) affect message retention by the visitor?
   average score: 3.96
   your score:
   revised score:
   comments:

65. What determines the amount of text a visitor is willing to read in an interpretive sign or wayside exhibit?
   average score: 3.40
   your score:
   revised score:
   comments:

66. How does the organization of interpretive text into message levels (primary, secondary, tertiary paragraphs) increase visitor message comprehension in interpretive signs and waysides?
   average score: 3.69
   your score:
   revised score:
61. Does the use of cognitive objectives by interpretive sign and wayside planners influence visitor message comprehension of the sign or wayside exhibit?
   average score: 3.54
   your score:
   revised score:
   comments:

62. Does the use of emotional objectives by interpretive sign and wayside planners influence visitor message comprehension of the sign or wayside exhibit?
   average score: 3.32
   your score:
   revised score:
   comments:

63. Does using all three types of objectives, behavioral, emotional, and cognitive by interpretive sign and wayside planners, influence visitor message comprehension of the interpretive sign or wayside exhibit?
   average score: 3.54
   your score:
   revised score:
   comments:

36. What influences the amount visitors are willing to pay for self-guiding brochures?
   average score: 2.65
   your score:
   revised score:
   comments:

37. What graphic design elements (layout, graphics, color, writing styles, length, complexity) increase the number of visitors who read self-guiding trail brochures?
   average score: 3.79
   your score:
   revised score:
   comments:

38. What graphic design elements (layout, graphics, color, writing styles, length, complexity) improve information retention in self-guiding trail brochures?
   average score: 3.99
   your score:
   revised score:
   comments:

39. What influences visitors to use self-guiding brochures after the on-site experience?
   average score: 3.08
   your score:
   revised score:
   comments:
40. When visitors use self-guiding trail brochures after the on-site experience, how are they used?
   average score: 2.93
   your score:
   revised score:
   comments:

41. How are visitors influenced to use self-guiding trails when several different themed brochures are offered to them?
   average score: 2.63
   your score:
   revised score:
   comments:

Interpretive Trails
Interpretive Audio Devices

42. Do interpretive audio messages improve message comprehension?
   average score: 3.03
   your score:
   revised score:
   comments:

43. Does the availability of interpretive audio messages increase visitor motivation for using self-guiding interpretive trails?
   average score: 2.96
   your score:
   revised score:
   comments:

58. How effective are vegetative management practices designed to reduce site impact (planting barriers to reduce trail cutting, planting "unfriendly plants," replacing trampled vegetation, giving trails a rest period)?
   average score: 3.01
   your score:
   revised score:
   comments:

59. How much manipulation of vegetation is appropriate along an interpretive trail?
   average score: 2.11
   your score:
   revised score:
   comments:

Interpretive Signs and Wayside Exhibits
Objectives

60. Does the use of behavioral objectives by interpretive sign and wayside planners influence visitor message comprehension of the sign or wayside exhibit?
   average score: 3.65
   your score:
   revised score:
   comments:
54. What trail surfaces do visitors prefer?
   average score: 2.79
   your score:
   revised score:
   comments:

55. What trail surfaces best balance cost, maintenance, and physical and
    aesthetic resource impacts in specific environmental conditions?
   average score: 3.25
   your score:
   revised score:
   comments:

56. What trail surfaces are most effective at reducing soil erosion and compac-
    tion?
   average score: 3.51
   your score:
   revised score:
   comments:

57. What vegetative management practices (creating openings, controlled
    burns, creating views, selective cutting) enhance the interpretive trail ex-
    perience?
   average score: 3.45
   your score:
   revised score:
   comments:

44. How can damage (weather, intentional vandalism, incidental vandalism)
    to audio interpretive devices along self-guided interpretive trails be
    reduced?
   average score: 2.61
   your score:
   revised score:
   comments:

Interpretive Trails
Other Interpretive Devices

45. How do visitors respond to species identification labels along interpretive
    trails?
   average score: 2.90
   your score:
   revised score:
   comments:

46. How does visitor response to trail species identification labels vary accord-
    ing to personal visitor characteristics (experience level, motives, knowl-
    edge, age)?
   average score: 2.79
   your score:
   revised score:
   comments:
47. How can interpretive devices (viewing towers, blinds, spotting scopes, and tunnels) enhance the visitor's trail experience?

average score: 3.40

your score:

revised score:

comments:

50. How is the optimal length for self-guiding interpretive trails affected by site variables (visitor age and group size, trail subject, and main destination feature)?

average score: 3.03

your score:

revised score:

comments:

48. How can interpretive trail devices (viewing towers, blinds, spotting scopes, tunnels) minimize impacts on the site?

average score: 3.58

your score:

revised score:

comments:

51. How can aesthetic components (complexity, diversity, view scapes, view corridors, and physical changes) enhance the visitor's trail experience?

average score: 3.85

your score:

revised score:

comments:

49. How is the optimal length for self-guiding interpretive trails affected by interpretive methods (sign in place, waysides, audio tapes, brochures keyed to landmarks, brochures keyed to numbered posts)?

average score: 2.80

your score:

revised score:

comments:

52. What interpretive structures allow visitors to enter fragile environments with minimal site damage, taking into account site variables (visitor traffic, soil types)?

average score: 4.24

your score:

revised score:

comments:

53. How do interpretive structures that allow visitors to enter fragile environments attract visitor use?

average score: 3.64

your score:

revised score:

comments:
Toward Effective Interpretive Signs, Trails, and Wayside Exhibits

Survey for Determining Future Research

Round 4

College of Natural Resources
University of Wisconsin
Stevens Point, WI 54481
Dear Survey Participant,

Congratulations! You made it to the last round of this survey.

In Round 4 you have a final opportunity to rank the research questions as to their importance for immediate research. However, in this round additional information is given to you to help in this task.

Respondent's reasons for ranking questions 1.5 to 2 points higher or lower from the average score are anonymously provided where they were given.

Please consider these responses and then again:

1. Compare your question score to the group average.
2. Reconsider your score.
3. Revise your original scores if you desire.

You will receive a copy of the compiled and interpreted results as soon as possible. You will also receive a copy of the paper to be presented at the 1990 National Association of Interpretation conference in Charleston this fall.

In order to meet closing deadlines, please return your comments as soon as possible or at the latest by October 12. If you have any questions or concerns, please contact me at (715) 677-3506.

Again, simply turn the back page and staple the survey closed. Your prompt response is appreciated.

Thank you for your participation

Sincerely,

Suzanne Trapp, Graduate Student
Directions: Please review the following research questions as to their importance for immediate research. Consider respondent's additional comments. Each comment begins with a *. You can determine how many respondents were in favor of either a higher or lower average score by the number of * presented.

Compare your score to the group average. After reconsidering your score, if you wish to rerank a question, assign a revised score in the space provided. Scores should be on a Likert scale:

Low Importance | High Importance

If you do not wish to revise a score please mark through "revised score". This makes it clear that the question was not skipped or missed.

Additional space for your comments is provided at the end of the survey.

Please complete this round as soon as possible. Return surveys by October 12.
Funding Interpretive Signs, Trails, and Wayside Exhibits

1. How are interpretive signs, trails, and wayside exhibits funded?
   average score: 1.27
   your score: 
   revised score: 
   Favor a lower average score: *Research funds are limited. Priority should be placed on interpretive effectiveness and design variables. *This is too generic to be useful to various agencies and organizations. *This is not a research question.
   Favor a higher average score: *It is important that field personnel understand funding sources in general.

2. What sources of funding are available for interpretive signs and waysides?
   average score: 1.65
   your score: 
   revised score: 
   Favor a lower average score: *This is not a research question. *Funding is an administrative matter and the general thrust of research on interpretation needs to be on effectiveness.
   Favor a higher average score: *It is important that field personnel understand funding sources in general.

3. What funding amounts are available for interpretive signs and waysides from these sources?
   average score: .89
   your score: 
   revised score: 
   Favor a lower average score: *Research funds are limited. Priority should be placed on interpretive effectiveness and design variables. *This is too generic to be useful to various agencies and organizations. *This is listing or cataloging, not research.
Please make any additional comments, general or specific, about the survey on this page. Comments will be addressed in a summary of results.

4. What funding approaches are successful with these sources for interpretive signs and waysides?
   average score: 1.46
   your score:
   revised score:
   Favor a lower average score: *This question is too generic to be useful to various agencies and organizations.

5. What funding sources are available for interpretive trails?
   average score: 1.72
   your score:
   revised score:
   Favor a lower average score: *Again, funding is an administrative matter. Research into funding is really on organizational behavior and how organizations and executives form priorities. I suspect there's already a huge literature on this and other researchers available with the required skills.

6. What funding amounts are available for interpretive trails?
   average score: 1.21
   your score:
   revised score:
   Favor a higher average score: *This question is important to grasping potential success of a proposal.

7. What funding approaches are successful with these sources for interpretive trails?
   average score: 1.58
   your score:
   revised score:
   Favor a higher average score: *Approaches are essential to know if funding is to be obtained.
Interpretive Signs, Trails, and Wayside Exhibits in Other Countries

8. What interpretive technologies are appropriate for the development of interpretive signs, trails, and wayside exhibits in countries having limited money and materials?
   average score: 2.69
   your score:
   revised score:

   Favor a higher average score: *Countries with little cash often have abundant and inexpensive labor, which can be substituted for money. I think some analyses of strategies for exploiting the unique resources of a country or culture (and harnessing them for effective interpretation) may break some critical bottlenecks.

9. What material and skill options are available to countries with limited money and materials who wish to develop interpretive signs, trails, or wayside exhibits?
   average score: 2.47
   your score:
   revised score:

   Favor a lower average score: *This is not really a research question.
   Favor a higher average score: *This question is important to the success of interpreting many global environmental issues. *Please see the previous comment in question 8.

10. What are the message needs, literacy levels, and cultural considerations for designing interpretive signs, trails, or wayside exhibits for other cultures?
    average score: 3.76
    your score:
    revised score:

    Favor a higher average score: *Cross cultural questions are most important in a world society.

94. Which types of vandalistic acts (intentional, incidental) can be eliminated or reduced using a vandalism oriented display at the visitor or nature center, explaining site problems and their monetary costs and lost opportunities?
   average score: 2.91
   your score:
   revised score:

   Favor a lower average score: *I doubt the effectiveness could be proved wrong.

95. Under what conditions will educational methods and techniques (interpretation, public education campaigns, publicity campaigns) reduce intentional interpretive site vandalism?
   average score: 2.99
   your score:
   revised score:

96. Under what conditions will educational methods and techniques (interpretation, public education campaigns, publicity campaigns) reduce incidental interpretive site vandalism?
    average score: 3.32
    your score:
    revised score:

97. Under what conditions will management practices (patrol, regulation, maintenance) reduce intentional interpretive site vandalism?
    average score: 3.11
    your score:
    revised score:

98. Under what conditions will management practices (patrol, regulation, maintenance) reduce incidental interpretive site vandalism.
    average score: 2.89
    your score:
    revised score:

    Favor a lower average score: *This has already been fairly well researched.
Visitor Motivations for Interpretive Sign, Trail, and Wayside Exhibit Use

11. What motivates visitors to use interpretive trails?
   average score: 4.62
   revised score:
   Favor a lower average score: *This is a question of priority. This would be helpful to know but what motivates visitors to use the signage may be

12. What motivates visitors to read interpretive signs and wayside exhibits?
   average score: 4.37
   revised score:
   Favor a lower average score: *There is a lack of theme related research.

13. How are visitor motivations different for museum learning than for outdoor recreational learning?
   average score: 4.13
   revised score:
   Favor a higher average score: *Natural or human made environments can structure the visitor experience. Environmental psychology can teach interpreters a great deal.

14. What interpretive themes interest visitors today?
   average score: 3.15
   revised score:
   Favor a lower average score: *We're here to tell them what they should know not just what they think they want to hear about.
   Favor a higher average score: *There is a lack of theme related research.

15. How can visitor motives be used to increase the number of visitors who read interpretive signs and wayside exhibits?
   average score: 4.40
   revised score:
16. How are motives among urban interpretive trail use different than motives for rural interpretive, wilderness, or other interpretive trails?
   average score: 3.80
   your score:
   revised score:

17. How are motives for using urban, rural, and wilderness interpretive trails changing?
   average score: 3.90
   your score:
   revised score:

Favor a higher average score: *Managers need early warning about shifting motives. Interpretation trying to move people to where they already are could go pretty flat.

18. How are urban resident's motives for using interpretive trails different from the rural or suburban resident?
   average score: 3.21
   your score:
   revised score:

Favor a lower average score: *On the one hand, motives undoubtedly differ among different populations. On the other hand, dimensions other than urban-rural may be more useful.
Favor a higher average score: *Interpreters, at least those over 40, tend to come from a rural, small community setting yet we primarily talk to urbanites.

Visitor Learning in Outdoor Recreational Settings

19. How do people learn in outdoor recreational settings as compared to museum settings?
   average score: 3.58
   your score:
   revised score:

Favor a lower average score: *While this is important, there has been a fair bit of research conducted in this area. *The dynamics of learning seem pretty generic and I'm not sure the outdoor-museum dichotomy is especially important.

85. What is the best spatial balance of text and illustrative material to improve visitor message comprehension?
   average score: 2.82
   your score:
   revised score:

Favor a lower average score: *This is too design specific. *If they read it comprehension is already largely under control.
Favor a higher average score: *Comprehension seems to be at the basis of all communication.

Interpretive Sign and Wayside Exhibit Materials

86. What sign and wayside exhibit materials are most durable for underwater and canoe trails?
   average score: 1.68
   your score:
   revised score:

Favor a lower average score: *There is no great demand for the answer to this question.
Favor a higher average score: *We need to turn more to the oceans and inland waters as educational environments.

87. How do signage materials compare in terms of cost, maintenance, longevity, and visitor preference?
   average score: 2.49
   your score:
   revised score:

Interpretive Sign, Trail, and Wayside Exhibit Vandalism

This comment applies to questions 88-98.
Favor a higher average score: *These questions are management issues that must be addressed. If we do not do it for our interpretive materials someone will do the job for us. Interpreters need to be gaining organizational ground, not giving it up.
80. How can graphics (photographs, line drawings, illustrations) be used to increase the number of visitors that read interpretive signs and waysides?
average score: 3.11
your score: 
revised score:
Favor a lower average score: *This is too design specific.

81. How can graphics (photography, line drawings, illustrations) be used to improve message comprehension?
average score: 3.55
your score: 
revised score:
Favor a lower average score: *This is too design specific. *This is too dependent on context.

82. What design elements (size, color, shape, supports, font choice, graphics) influence the level of signage visitors find offensive in natural, cultural, historical, archeological, and wilderness sites?
average score: 2.64
your score: 
revised score:

83. How does the effectiveness of various interpretive sign elements (color, layout, graphics, font choice) change with different cultures?
average score: 3.12
your score: 
revised score:
Favor a higher average score: *Cross cultural issues are critical to our success in the 21st century. *Cross cultural communication is important and still an unknown area. *I've seen some big differences among cultures on what is considered appropriate.

Interpretive Sign and Wayside Exhibit Design

84. What is the best spatial balance of text and illustrative material to increase the number of visitors willing to read an interpretive sign or wayside exhibit?
average score: 2.76
your score: 
revised score:
Favor a lower average score: *This is too design specific.

20. Which research findings on indoor exhibits are transferable to outdoor interpretive exhibits such as signs and waysides?
average score: 3.60
your score: 
revised score:
Favor a higher average score: *The search for generic principles seems useful.

21. What special characteristics of the outdoor environment enhance or detract from the interpretive learning experience?
average score: 3.90
your score: 
revised score:

Self-Guiding Interpretive Trails
Expectations, Preferences, and Benefits

22. What influences visitor preference toward indoor interpretive exhibits or outdoor interpretive trails?
average score: 4.06
your score: 
revised score:
Favor a lower average score: *Results of such research would seem likely to be unique to each clientele and location or provide few general principles that could be widely applied. If undertaken, such research should be aimed at understanding why rather that what. Favor a higher average score: *Needs and preferences are what we should be focusing on in design.

23. What are visitor's expectations when using self-guiding interpretive trails?
average score: 3.99
your score: 
revised score:
Favor a lower average score: *The answer would seem unique to each setting. Often, visitors seem to have only a generalized expectation of "having an experience" without many expectations about what that experience should be. Studying question 24 will normally take care of the issue.
24. To what extent are visitor's expectations of self-guiding interpretive trails being met?
   average score: 3.83
   your score: 
   revised score:

   Favor a lower average score: *Expectation research in leisure settings is generally ineffective.
   Favor a higher average score: *Trail evaluation is for the most part never done or inadequately done. We need a higher emphasis here.

25. How are visitor's expectations for self-guided interpretive trails similar to or different from the expectations of interpretive planners and managers?
   average score: 4.17
   your score: 
   revised score:

26. What are the visitor benefits and rewards of self-guiding interpretive trails?
   average score: 3.95
   your score: 
   revised score:

   Favor a higher average score: *We must always consider "What's in it for the visitors?"

Interpretive Trails
Interpretive Methods

27. Under what conditions do visitors prefer the sign in place; brochure keyed to markers; brochure keyed to landmarks; or audio tapes for self-guided trail interpretation?
   average score: 2.89
   your score: 
   revised score:

   Favor a lower average score: *This has been researched (i.e. Mochel, 1972 OSU). *Quality of media, money available, type of audience and environment have so many different effects that this would be hard to generalize from research.

76. How do variations in color, graphics, layout, white space, and font choice increase the number of visitors that read interpretive signs or wayside exhibits?
   average score: 3.26
   your score: 
   revised score:

   Favor a lower average score: *This is too design specific. *This is already known.

77. How do variations in color, graphics, layout, white space, and font choice improve message comprehension by the visitor?
   average score: 2.68
   your score: 
   revised score:

   Favor a lower average score: *This is too design specific. *This is already known.

78. What are the minimal and optimal font sizes for interpretive sign and wayside titles, body, copy and captions that increase reading ease for the visitor?
   average score: 2.55
   your score: 
   revised score:

   Favor a lower average score: *This is too design specific. *This is already known.
   Favor a higher average score: *Ease of reading is necessary to convey moderately indepth messages. More indepth messages are needed to create an environmentally literate society.

79. When is color an asset or detriment in interpretive signs and waysides?
   average score: 2.15
   your score: 
   revised score:

   Favor a lower average score: *This is too design specific.
   Favor a higher average score: *This is an essential question in planning trail interpretation.
Interpretive Sign and Wayside Exhibit
Design Elements

72. How does effectiveness of interpretive sign elements (color, layout, font choice) change in underwater and canoe trails?
   average score: 2.19
   your score:
   revised score:

73. What interpretive sign and wayside design elements (color, layout, font choice) improve communication of the interpretive message to non-English speaking visitors?
   average score: 3.25
   your score:
   revised score:

    Favor a lower average score: *Much literature is available on fonts, color, and layout. Why should language affect this?

74. What criteria for interpretive sign and wayside exhibit design elements communicate effectively for the sight impaired?
   average score: 3.44
   your score:
   revised score:

     Favor a higher average score: *According to the Disabilities Act of 1990, special populations would greatly benefit from any interpretive services.

75. How do variations in color, graphics, layout, white space, and font choice increase the visitor's preference for an interpretive sign or wayside exhibit?
   average score: 3.35
   your score:
   revised score:

     Favor a lower average score: *This is too design specific. *This is already known.

28. How can trail design increase visitor involvement in the site?
   average score: 3.55
   your score:
   revised score:

     Favor a lower score: *There have been a number of studies on designing mystery into trails and successful interpretive writing. This should not be a priority. *We know this already from landscape architecture studies.

     Favor a higher average score: *Involvement and identification with the site is the key.

29. How can the effects of disadvantages (one-way communication, gearing information to a variety of audience levels, difficulties grabbing and holding attention) in self-guiding interpretive trails be reduced?
   average score: 3.46
   your score:
   revised score:

     Favor a lower average score: *This question is too vague. *There have been a number of studies on designing mystery into trails and successful interpretive writing. This should not be a priority now.

     Favor a higher average score: *Involvement and identification with the site is the key. Non personal services reach large numbers but the message is often not strong or personal. We need stronger environmental messages that reach a large audience.

Interpretive Trails
Interpretive Sign Placement and Numbers

30. What controllable aesthetic comfort factors (shade, benches, seclusion, habitat variety, mystery) considered in placement of interpretive signs and waysides affect whether interpretation will be read?
   average score: 3.48
   your score:
   revised score:

     Favor a lower average score: *This is relatively obvious. There is no need to spend money here on a research basis.

     Favor a higher score: *I'm over 40. I need the shade! We work mostly in people's leisure time. Some comfort is demanded. *Signs are read or not read in the context of the environment. The environment is important.
31. How do interpretive sign and wayside physical placement variables (angle, height, proximity to other signs) affect readability?
average score: 3.10
your score:
revised score:

Favor a lower average score: *This again is relatively obvious. There is no need to spend research dollars on this. *A little common sense and existing literature should handle the issue. Those without the common sense won't follow or accept research results that "document the obvious" in any case.
Favor a higher average score: *Environmental acceptability of the setting, sign, etc. is a prerequisite to higher level educational attainment.

32. How does the amount of signage visitors find offensive change in natural, cultural, historical, archeological, and wilderness sites?
average score: 2.47
your score:
revised score:

Favor a lower average score: *This information is already known. *We already know this or could find out with minimal effort.

33. What determines the number of signs specific visitors will read under specific circumstances?
average score: 2.36
your score:
revised score:

Favor a lower average score: *Psychology studies on how many new concepts we can remember at one learning have been done. i.e. the magical number 7, plus or minus two. *This can not be generalized such that it would be useful.

Interpretive Trails
Interpretive Self-Guiding Brochures

34. Under what circumstances is a brochure more frequently used if a requested donation is attached to it?
average score: 2.15
your score:
revised score:

Favor a higher average score: *This is a growing need. *We need to charge but what are the educational benefits associated with these costs?

67. This question has been eliminated. It was noted by a respondent that this question was identical to number 66.

68. How does interpretive sign and wayside text style (first person, third person, and straight declarative style) affect comprehension?
average score: 3.21
your score:
revised score:

Favor a lower average score: *The answer is pretty well known.

69. How does interpretive sign and wayside message style (first person, third person, and straight declarative style) affect information retention?
average score: 3.14
your score:
revised score:

Favor a lower average score: *The answer is pretty well known.

70. What interpretive approaches to rule presentation increase visitor comprehension of site rules?
average score: 3.67
your score:
revised score:

Favor a lower average score: *Too many other behavioral variables influence rule compliance besides interpretive approaches. This question is too simple. *Some work has already been done on this.
Favor a higher average score: *This is a major issue in U.S. Forest Service areas and it will continue to grow in "low-control" areas.

71. How does the tone of an interpretive rules message (authoritative rule statement, explanatory rule presentation) affect visitor compliance with site rules?
average score: 3.51
your score:
revised score:
Favor a lower average score: *Some work has already been done on this.
63. How can behavioral, emotional, and cognitive objectives be used by interpretive sign and wayside planners, to increase visitor message comprehension of the interpretive sign or wayside exhibit?

average score: 3.49
your score:
revised score:

Interpretive Signs and Wayside Exhibits
Writing Interpretive Text

64. How does organization of interpretive information into message levels (primary, secondary, and tertiary paragraphs) affect message retention by the visitor?

average score: 3.88
your score:
revised score:

Favor a lower average score: *I think others already know the answer. It might be useful for someone to dig it out from journalism and other areas and make it more accessible to interpreters.

65. What determines the amount of text a visitor is willing to read in an interpretive sign or wayside exhibit?

average score: 3.47
your score:
revised score:

Favor a lower average score: *This is pretty much known from past research. *A good deal of work has already been done on this.

66. How does the organization of interpretive text into message levels (primary, secondary, tertiary paragraphs) increase visitor message comprehension in interpretive signs and waysides?

average score: 3.60
your score:
revised score:

Favor a lower average score: *I think others already know the answer. It might be useful for someone to dig it out from journalism and other areas to make it more accessible to interpreters.

35. Under what circumstances is a brochure more frequently used if a charge is attached to it?

average score: 2.24
your score:
revised score:

Favor a higher average score: *There is a growing need. *We need to charge but what are the educational benefits and costs associated with a charge?

36. What influences the amount visitors are willing to pay for self-guiding brochures?

average score: 2.44
your score:
revised score:

Favor a lower average score: *This is not very important. If so, it is easy to get. *Responses will be idiosyncratic and not site transferable.
Favor a higher average score: *We need to charge but what are the educational benefits and costs associated with a charge?

37. What graphic design elements (layout, graphics, color, writing styles, length, complexity) increase the number of visitors who read self-guiding trail brochures?

average score: 3.73
your score:
revised score:

Favor a lower average score: *Too much variance is possible. *There is a huge literature on this in advertising, communications, and "readability work". Why re-invent the wheel?

38. What graphic design elements (layout, graphics, color, writing styles, length, complexity) improve information retention in self-guiding trail brochures?

average score: 3.98
your score:
revised score:

Favor a lower average score: *Too much variance is possible. *Again, there is a huge literature on this in advertising, communications, and "readability work". Why re-invent the wheel?
39. What influences visitors to use self-guiding brochures after the on-site experience?
   average score: 3.01
   your score:
   revised score:

   Favor a lower average score: *This depends on whether such post-experience use is an objective of brochure design. The issue is interesting, perhaps just not as high priority as some others.
   Favor a higher average score: *Natural or human made environments can structure the visitor's experience. Environmental psychology can teach interpreters a great deal. Also, environmental acceptability of the setting, sign etc. is a prerequisite to higher level educational attainment.

40. When visitors use self-guiding trail brochures after the on-site experience, how are they used?
   average score: 2.86
   your score:
   revised score:

   Favor a lower average score: *Question is vague.
   Favor a higher average score: *It may be important to know if we get some continued mileage and effort.

41. How is the rate of self-guided trail use affected when visitors are offered several different themed brochures?
   average score: 3.29
   your score:
   revised score:

   Favor a higher average score: *Too little work has been done on trails with multiple themes.

Interpretive Trails
Interpretive Audio Devices

42. Do interpretive audio messages improve message comprehension?
   average score: 3.02
   your score:
   revised score:

   Favor a lower average score: *Research has already been done in the education and interpretive fields.
   Favor a higher average score: *Assessment of variables and delivery systems to improve message comprehension is always highest priority.

59. How much manipulation of vegetation is appropriate along an interpretive trail?
   average score: 2.41
   your score:
   revised score:

   Favor a lower average score: *This is an administrative issue that depends on the legislation and objectives governing each area. The answer will be different for interpreting a logging area, a cornfiled, or a relict tallgrass prarie where manipulation might be necessary to maintain it.
   Favor a higher average score: *This is important for wilderness and many natural areas. *We manage by knee jerk reactions to this situation. Some parks look like lawns; others gardens; most second growth and a few wilderness. If we are going to intrude then what are we trying to achieve and for whom? Data base decision making is needed.

Interpretive Signs and Wayside Exhibits
Objectives

60. How can behavioral objectives be used by interpretive sign and wayside planners to increase visitor message comprehension of the sign or wayside exhibit?
   average score: 3.36
   your score:
   revised score:

61. How can cognitive objectives be used by interpretive sign and wayside planners to increase visitor message comprehension of the sign or wayside exhibit?
   average score: 3.12
   your score:
   revised score:

62. How can emotional objectives be used by interpretive sign and wayside planners to increase visitor message comprehension of the sign or wayside exhibit?
   average score: 3.04
   your score:
   revised score:
55. What trail surfaces best balance cost, maintenance, and physical and aesthetic resource impacts in specific environmental conditions?

average score: 2.91
your score:
revised score:

Favor a lower average score: *We know the answer. *This varies with local availability, physiographic region of the country etc.
Favor a higher average score: *What are we doing to the environment and at what costs? Our impacts as managers will last long beyond our managerial tenure.

56. What trail surfaces are most effective at reducing soil erosion and compaction?

average score: 3.10
your score:
revised score:

Favor a lower average score: *Much work on this topic has already been done. We know the answers. *This isn't interpretive research.

Favor a higher average score: *Much has already been done. We know the answers. *This isn't interpretive research.

57. What vegetative management practices (creating openings, controlled burns, creating views, selective cutting) enhance the interpretive trail experience?

average score: 2.85
your score:
revised score:

Favor a lower average score: *This has been studied and it is too specific. *We know the answer. Research results will be so site specific they'll add little to the state-of-the-art.

58. How effective are vegetative management practices designed to reduce site impact (planting barriers to reduce trail cutting, planting "unfriendly" plants, replacing trampled vegetation, giving trails a rest period)?

average score: 3.14
your score:
revised score:

Favor a lower average score: *Much has already been done.

43. Does the availability of interpretive audio messages increase visitor motivation for using self-guiding interpretive trails?

average score: 2.98
your score:
revised score:

Favor a higher average score: *Motivation is the key!

44. How can damage (weather, intentional vandalism, incidental vandalism) to audio interpretive devices along self-guided interpretive trails be reduced?

average score: 2.32
your score:
revised score:

Favor a higher average score: *Too much of our interpretive signs are identification labels which promote identification of... We need people to internalize messages. Proper signage may help do this. More research is needed.

45. How do visitors respond to species identification labels along interpretive trails?

average score: 2.72
your score:
revised score:

Favor a lower average score: *I'm not sure what we'd do with the answer. Favor a higher average score: *This is fundamental information for many of the other considerations re: signage, content, delivery, etc. * See comment under question 45.

46. How does visitor response to trail species identification labels vary according to personal visitor characteristics (experience level, motives, knowledge, age)?

average score: 2.94
your score:
revised score:

Favor a lower average score: *Good segmentation but once again the research will be so specific to a site, individuals, and environmental factors that it will not be largely useful. Favor a higher average score: *This is fundamental information for many of the other considerations re: signage, content, delivery, etc. * See comment under question 45.
47. How can interpretive devices (viewing towers, blinds, spotting scopes, and tunnels) enhance the visitor's trail experience?
average score: 3.43
your score:
revised score:

48. How can interpretive trail devices (viewing towers, blinds, spotting scopes, tunnels) minimize impacts on the site?
average score: 3.38
your score:
revised score:

Interpretive Trails
Trail Layout, Construction, and Maintenance

49. How is the optimal length for self-guiding interpretive trails affected by interpretive methods (sign in place, waysides, audio tapes, brochures keyed to landmarks, brochures keyed to numbered posts)?
average score: 2.73
your score:
revised score:

Favor a lower average score: *This is too site and situation dependent.
*This has been studied enough. *There is too much site variation.
Favor a higher average score: *The setting is all important to the message.

50. How is the optimal length for self-guiding interpretive trails affected by site variables (visitor age and group size, trail subject, and main destination feature)?
average score: 2.80
your score:
revised score:

Favor a higher average score: *This is fundamental information for many of the other considerations re: signage, content, delivery etc.

51. How can aesthetic components (complexity, diversity, viewscapes, view corridors, and physical changes) enhance the visitor's trail experience?
average score: 3.75
your score:
revised score:

Favor a lower average score: *This has been done.

52. What interpretive structures allow visitors to enter fragile environments with minimal site damage, taking into account site variables (visitor traffic, soil types)?
average score: 3.80
your score:
revised score:

Favor a higher average score: *The key word here is fragile.
Favor a lower average score: *We've known and practiced the answer for at least 40 years. There's only so much you can do: sacrifice a corridor, build a walkway, use surface materials.

53. How do interpretive structures that allow visitors to enter fragile environments attract visitor use?
average score: 3.82
your score:
revised score:

Favor a lower average score: *Again, we've known and practiced the answer for at least 40 years.

54. What trail surfaces do visitors prefer?
average score: 2.44
your score:
revised score:

Favor a lower average score: *This problem was solved 50 years ago.
Favor a higher average score: *Administrators and budget people all too often make this decision with little real data.
Appendix 4

Survey Raw Data

Raw Data Round 1
Raw Data Round 2
Raw Data Round 3
Raw Data Round 4
Survey Round 1 Raw Data

Ten of the twelve panel members returned completed surveys within the time allotted. Only 6 of the original 62 research questions were eliminated after 40% or more of the panel responded that the questions were not valid for research. The following are the questions eliminated from the survey.

5. How can environmental issues be interpreted on trails?

23. How can Tilden's principles (provoke, relate, reveal, and address the whole) be incorporated into the text to influence the visitor to read signs and learn from them?

34. What variables (placement, layout, color, size, panel supports) can be used to make a sign or wayside in an outdoor setting acceptable?

36. How can a combination of interpreter-guided and self-guided trails be utilized to take advantage of both methods?

47. What is the most effective design configuration for self-guiding interpretive trails?

49. How can aesthetic components be incorporated into trail design criteria for the practitioner?

55. Who is responsible for vandalism today?

Many respondents commented that questions needed to be more specific, reworded to eliminate research that would produce only yes and no answers, and simplified to ask just one researchable question. Some of the original research questions prompted respondents to add other research questions within a category. As a result the list increased from 62 research questions to 98 research questions.

Research question categories were also redefined in this round. Question were originally presented under ten categories. After compiling respondents comments these categories were increased to sixteen. Respondents felt that more specific categories, improving organization, would make the job of ranking research questions by priority for immediate research easier in successive rounds.

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<tr>
<td>The Visitor</td>
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<tr>
<td>Interpretive Signs and Waysides - General Questions</td>
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<td>Interpretive Signs and Waysides - Interpretive Methods</td>
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<td>Vandalism</td>
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Appendix 4-2
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<th>Revised Question Categories</th>
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* Respondents did not return completed surveys in the time allotted. Their scores were not computed in the group average.
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## Survey Round 2 Raw Data Continued

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* Respondents did not return completed surveys in time to compute their scores in the group average.

H indicates the question was scored higher in this round.; L indicates the question was scored lower in this round.
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**H** indicates the questions was scored higher in this round. ; **L** indicates the question was scored lower in this round.

* Respondents did not return completed surveys in time to compute their scores in the group average.
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- Question 66 and 67 were identical. Number 67 was deleted in this round.
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Appendix 5

Bibliography

Selected Literature on "Importance of Interpretation"
Selected Literature on Interpretive Signs and Wayside Exhibits
Selected Literature on Interpretive Trails
Selected Literature on Vandalism
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Selected Literature on Importance of Interpretation


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Interviews


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National Park Service SW Region: Glen Kaye, Interpretive Planner, 1990.


GS Images: Doug Wright, President, 1990.