The Great Trinity Forest Management Plan

Volume 8
Recreation

Recreation

Volume 8

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<u>Great Trinity Forest Management Plan</u>

RECREATION

CIP Guide

A guide to comprehensive interpretive planning.

CIP Guide

A Guide to Comprehensive Interpretive Planning

Essential Tools for Interpreters
Office of Interpretation and Education, Intermountain Region

Welcome

Interpretive Foundation

CIP Guide is based on *Interp Guide: The Philosophy and Practice of Connecting People to Heritage*, the anchor publication in our office's *Essential Tools for Interpreters* series. *Interp Guide* compellingly defines the profession of interpretation within the context of contemporary culture. It explores how cutting-edge interpretive philosophy and practice can help interpreters and managers provide interpretive services that accomplish the mission of interpretation: *Providing enhanced opportunities for visitors to explore their own intellectual and emotional connections to the natural and cultural resources that comprise shared heritage.*

Implementation Planning

CIP Guide builds on the thinking presented in *Interp Guide* to construct a practical and effective approach to comprehensively planning a park's interpretation & education program. It offers a detailed description of the comprehensive interpretive planning process used by the Office of Interpretation and Education, Intermountain Region, National Park Service (NPS). It describes this planning process for those who might be participants in, or conductors of, the process.

This planning process provides an effective framework for strategically envisioning, organizing, justifying, and delivering interpretive and informational services that achieve the desired outcome of the park's program.

Pragmatic Planning Tools

This edition of *CIP Guide* includes new content as well as content that was found in several previous publications of our office's *Essential Tools for Interpreters* series. The *CIP Guide* that you are reading now includes:

- New content based on the January 2005 publication, *Interp Guide: The Philosophy and Practice of Connecting People to Heritage*;

- Updated content from the previous version of *CIP Guide: A guide to the comprehensive interpretive planning process used by the Intermountain Support Office of the National Park Service*;

- Updated content from *CIP Guide: Planner's Assistant — Templates and other support materials useful to planners conducting the comprehensive interpretive planning process used by the Intermountain Support Office of the National Park Service*;

- Updated content from the *Interpretive Planners' Workshop Guide: First Workshop* and *Interpretive Planners' Workshop Guide: Second Workshop*; and

- Updated content from *Theme Guide: A guide to the thematic approach to interpretation used by the Intermountain Support Office of the National Park Service*.

This new *CIP Guide* focuses on aiding interpreters at all levels of an interpreting organization, and interpretation planners — specifically those people who will be conducting comprehensive interpretive planning using our approach. This guide supplies virtually all of the "material infrastructure" that planners will need. In *CIP Guide*, you'll find the same materials that the authors use to describe the interpretive planning process and to organize, inform, track, and conduct pre-workshop tasks, the two workshops themselves, and the follow-through tasks that hand off the draft plan to the park for final decision-making, completion, and implementation.

The kinds of information found in this guide include a scope of work template, a checklist to start things off on the right foot, an example invitation letter to stakeholders, sign-in sheets and agendas, the planners' preparation-presentation guides used to organize and conduct the workshops, the workshop handouts, references to available electronic template files, more than 30 sets of significance statements and primary interpretive themes from a variety of parks, and more. Workshop materials are designed to be customized and printed directly from this publication — modify them as needed.

Using this Guide

The authors often copy the electronic version of *CIP Guide* to a project directory, then customize it for use throughout the project. One example of such customization is to search for the placeholder "{parkname}" and globally replace it with the project's specific park name. Other words-in-braces placeholders (including workshop dates, for example) are designed to be similarly modified.

CIP Guide is intended to be used as a working toolkit for planners. Accordingly, we've designed it so that the folios (page numbers) at the bottom of the pages match the actual page count. This matched format ensures that you'll always be printing the pages that you're intending to print. For example, these references and input strings all represent the same data:

- Page 14 in the table of *Contents*.
- Page 14 in a printed hard copy.
- Page 14 in the electronic MS Word® file, displayed as "Page 14" in the status bar at the bottom-left corner of your computer screen.
- Entering "14" on the "Page range: Pages: __" printing dialog box.

The term *planner* is almost always used in plural form (*planners*). We conduct comprehensive interpretive planning in teams of two planners and strongly suggest this method for others.

Located in the "CIP Kit" section of the guide, please review the table, "Comprehensive Map of Planning Materials." This reference is intended to accomplish several things. It indicates:

- *what* materials are used throughout the process;
- the *sequence* for materials usage;
- the *location* of materials in *CIP Guide*. (Some materials are used multiple times in the process — such as in both the first and second CIP workshops. However, such items only appear *once* in this guide. Within the table, any item that is used multiple times in the process is indicated by a white background for its first instance, and a grey background for all subsequent instances.)
- specifications for *two-sided printing*. (If you have the ability to print workshop materials in duplex format, please note that a black dot indicates side one and a grey dot indicates side two.)

This approach to comprehensive interpretive planning is centered on two workshops. These are described in detail in two *Planners' Guide* sections. These preparation-presentation guides indicate materials needed for each workshop, when to use them, contextual descriptions to provide to stakeholders, and much more. The authors print these guides and use them during real-time facilitation, customizing their use as needed as a workshop evolves.

Help Us Help You

We plan to update this publication periodically, and would greatly appreciate your feedback regarding how to improve this guide's approach and content. Contact information is located inside the back cover, where you'll also find information about related publications in the *Essential Tools for Interpreters* series.

We wish you great success in all of your interpretive planning endeavors.

Richard Kohen & Kim Sikoryak
Lakewood, Colorado
February 2005 ••

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Planning a Park's Interpretation & Education Program

Context for Planning a Park's Interpretation & Education Program

A park's interpretation & education program exists within a context much larger than the park itself. The contextual framework within which a park's interpretation & education program plans and operates might be diagrammed like this:

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┌─────────────────────────────────────────────────┐
│          Profession of Interpretation            │
│  ┌───────────────────────────────────────────┐   │
│  │      Nation's Constitution and Civil Law   │   │
│  │  ┌─────────────────────────────────────┐   │   │
│  │  │       Interpreting Organization      │   │   │
│  │  │ ┌─────────────────────────────────┐ │   │   │
│  │  │ │            THE PARK             │ │   │   │
│  │  │ │ Foundational Information for     │ │   │   │
│  │  │ │ Planning and Management          │ │   │   │
│  │  │ │   Management Planning            │ │   │   │
│  │  │ │     Program Planning             │ │   │   │
│  │  │ │    Implementation Planning       │ │   │   │
│  │  │ │    Individual Service Planning   │ │   │   │
│  │  │ │ Planning Tasks for Specific      │ │   │   │
│  │  │ │ Presentations of an Interpretive │ │   │   │
│  │  │ │ or Informational Service         │ │   │   │
│  │  │ └─────────────────────────────────┘ │   │   │
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Profession of Interpretation

The profession of interpretation is larger than any single organization, including any country or its government. It is characterized by its mission, ethics, standards, and practices. The interpretation & education program of any organization that interprets heritage resources is — in large measure — conducted within the context established by the profession at large. This is not to imply that interpretation is above the law — it just has standards and practices that extend beyond political boundaries.

Nation's Constitution and Civil Law

In practice, the profession is influenced by the majority worldview of any society in which it is conducted. A nation's constitution, along with the body of laws that flow from it,

embody its collective ideals and philosophy, and the pragmatic application of them. These things form the actual context within which interpretation operates. For instance, in the United States, the First Amendment to the Constitution provides guarantees that enable candid public discussions of ideas without fear of government reprisal — guarantees that also enable candid exchanges regarding resource meanings and their management.

Interpreting Organization

The interpretation function of an organization that manages heritage resources flows from the combination of the profession of interpretation at large, extant social architecture, and the organization's mission, policies, procedures, and traditions. For instance, the National Park Service is an interpreting organization.

The Park

Management activities of the park occur under the umbrella of the interpreting organization. The interpretation function of the park is directed by the park's mission, mandates, legislation, types of resources, their locations, and more.

Foundational Information for Planning and Management

All park planning stands upon the park's critical, foundational information. Against it, all park decisions will be measured. This information includes the park's purpose, significance, fundamental resources and values, primary interpretive themes, mission, and mission goals. This information is developed with input from stakeholders and staff from each of the park's programs. Interpreters, by virtue of the work they do, are especially well-versed in discussing heritage resources with others and helping the workgroup arrive at consensus content for this critical park foundation.

Management Planning

Based on the foundational information for planning and management, the park's management plan defines the overall vision of how the park will be managed. It broadly describes desired future conditions for resources and visitor enjoyment, addressing these topics in a parkwide, comprehensive, multidisciplinary way. The management plan outlines how

the interpretation & education program fits into the larger park management picture. Interpreters correctly view their participation in this planning process as their most influential opportunity to help strategize a management approach that best enhances visitor enjoyment of resources while preserving the integrity of those resources in perpetuity. The management plan is the most expansive and far-reaching aspect of interpretation planning since all other levels beneath it are directed by its guidance.

Program Planning

Based on the park's management plan, each program plan describes how its subject program (function) will successfully implement the vision for park operations, visitor enjoyment, and resource preservation. Each plan provides direction for all management decisions for that program.

For a park's interpretation & education program, the program plan is often called the *Comprehensive Interpretive Plan* (CIP). All interpretive activities are based on it and coordinated by it. This plan defines what the program will accomplish and how it will be operated during the next five years or so. Its most important feature is the desired future interpretation & education program, which describes primary interpretive themes, informational topics, audiences, and the services that will best enable those audiences to meaningfully explore park resources.

Implementation Planning

Program plans, such as a park's CIP, are often reinforced by implementation plans that provide additional detail about the program. For the interpretation & education program, implementation plans usually address media for which planning in sets is effective (such as a plan for a set of exhibits or publications) or interpretive facilities or infrastructure (such as a visitor center rehabilitation plan or visitor transportation plan). Implementation plans may also include audience-specific plans, such as a curriculum-based education plan.

Individual Service Planning

Like implementation plans, individual service plans (ISPs) provide additional direction and detail for the program. However, the scale of ISPs is smaller and of a different character than implementation plans. Each ISP describes one type of interpretive service, its locations, primary interpretive theme(s) or informational topic(s), and audience(s) addressed. It also outlines logistical and operational concerns for the service type. ISPs are generated for services as varied as evening programs, cultural demonstrations, site bulletins, bulletin boards, information desk duties, and classroom activities. These concise plans (often a single page) are especially useful to the individual interpreter assigned to present a particular service.

Planning Tasks for Specific Presentations of an Interpretive or Informational Service

The interpreter responsible for presenting a specific interpretive service (such as next Wednesday's guided hike) must make preparations to successfully achieve the desired outcomes of providing that service. Planning tasks are wide ranging and can include such individual actions as writing the outline for an interpretive talk, designing a page on the park's Website, writing a fourth-grade teacher's guide to accompany

a traveling trunk, conducting interviews to prepare an illustrated program, and much more. This is the individual level of interpretation planning — the level that ultimately implements the CIP and the parkwide vision for visitor enjoyment that is envisioned in the management plan.

— *Context in which the park and its programs are planned and managed* —

Tangible and Intangible Heritage Resources of the Park

Foundational Information for Planning and Management

Management Planning

Program Planning
(Comprehensive Interpretive Plan)

Component 1	Component 2	Component 3
Long-Range Interpretive Plan	**Annual Implementation Plans**	**Interpretive Database**
Includes the desired future interpretation & education program.	Generated annually from the LRIP.	Finding aid (electronic and/or printed) for operational information.

Implementation Planning
(media, infrastructure/facility, or audience-specific plans)

Examples

Audiovisual Plan
Education Plan
Museum Exhibit Plan
Publications Plan
Transportation Plan
Visitor Center Rehabilitation Plan
Wayside Exhibit Plan

Individual Service Plans
(developed at this level but stored or referenced in CIP above)

Planning Tasks for Specific Presentations of an Interpretive or Informational Service

Personal Interpretive and Informational Services (presented in person)	**Non-personal Interpretive & Informational Services** (media)
Examples	*Examples*
Outlining a specific interpretive talk.	Selecting slides to use in updating an automated slide show.
Reviewing information updates for sales desk duties.	Designing a specific museum exhibit.
Conducting research for a specific interpretive cultural demonstration.	Writing or editing a specific site bulletin.
Preparing for an interactive Web broadcast or event.	Writing teacher's guides or ordering replicas to accompany a traveling trunk.

Presentation of Services

Visitors explore their own intellectual & emotional connections to natural & cultural resources that comprise shared heritage.

Comprehensive Interpretive Planning — A Detailed Look

Comprehensive interpretive planning, like thematic interpretation itself, is a philosophy, framework, and process. It embodies the mission of interpretation, and the context in which the mission is pursued. It entails a progressive flow of idea development.

Tenets of Comprehensive Interpretive Planning

The spirit and intent of comprehensive interpretive planning is embodied in the following tenets.

Integrated Training, Planning, and Operations. Complete integration of all aspects of the profession of interpretation is essential to mission achievement. Only through such integration will the park's interpretation & education program be equipped to most successfully achieve its potential. Aspects applicable to integration include philosophy, training and employee development, desired outcomes, methodologies, reporting systems, and more.

The comprehensive interpretive planning process must, therefore, be built on the strengths of an organization's training program for individual interpreters. The process must implement the philosophy and approach taken toward training individuals, and broaden it to include the entire interpretation & education program of the park, creating a seamless whole.

Future-focused Planning. Comprehensive interpretive planning focuses on the future, first and foremost (to strategically develop a vision for the program), then determines how to get from here to there based on the reality of existing and anticipated conditions. By not focusing foremost on the current program's structure, comprehensive interpretive planning avoids turning the endeavor into a self-justification exercise for the current program.

Structure Flexibly Applied. Deciding how to most efficiently and effectively achieve desired outcomes is aided by a structured approach, as well as the flexible application of that structure, as conditions warrant. Employing the appropriate balance of structure and flexibility produces the most useful and enduring plans.

Comprehensive Planning. The scope of comprehensive interpretive planning includes personal and non-personal services. It addresses both interpretive and informational services. It includes services that occur on site, off site, and remotely via technology. It involves stakeholders, including park staff, partners, and other vested interests. It looks ahead about five years, but also speaks to the work schedule for next weekend. And, it addresses the entire spectrum of services and duties performed by interpreters, from interpretive talks to classroom programs, development of trail guides to exhibits, to working the information desk.

Train Interpreters to Plan Perpetually. Successful planning empowers group participants to use a logical process to develop the park's plan — rather than the group simply providing information to a planner who writes the plan and later presents it to the park. Participants in a comprehensive interpretive planning process will understand much about

interpretive planning when the process is completed. This is an intended result of our process. This is important because planning continues in perpetuity — even after the first CIP is signed and implementation has begun. As time goes on, changing conditions will require new decisions from the interpretive manager, and from the entire interpretation staff. By participating in this comprehensive interpretive planning process, interpreters will be better prepared to respond to changes in ways that continue moving the interpretation & education program toward the common vision. They'll better understand how their individual decisions affect all parts of the program. They'll be better prepared to update the document as often as needed to maintain the currency and usefulness of their park's CIP. Comprehensive interpretive planning equips participants with the knowledges, skills, and abilities necessary to successfully employ the plan and maintain its relevance and usefulness. Such fostering of employee development in "real-world" situations is one way that comprehensive interpretive planning serves to integrate all aspects of the profession of interpretation.

Plan for Change. Comprehensive interpretive planning produces a plan that retains its usefulness over time as conditions change. The plan is *designed* to encourage and enable modification by its users without the need for further involvement of planners.

Plan Pragmatically for All CIP Users. Comprehensive interpretive planning produces a practical plan to be used by both the interpretive manager and all individuals performing interpretive and informational services, including partners.

Plan Thematically to Help Visitors Explore Meanings. *Story* is a key element in facilitating an exploration of meanings related to park resources. Comprehensive interpretive planning emphasizes thematic interpretation by presenting park resource significance through interpretive services based on primary interpretive themes, offered to diverse audiences, inclusive of multiple points of view. It maximizes the diversity of presentations while consistently focusing on facilitating an exploration of the meanings ascribed to park resources.

Involve Decision-Makers Throughout the Process. The process works best when decision-makers are active participants rather than the recipients of a planner's "recommendations." Involving managers provides real-time feedback to ideas generated throughout the process, fostering managerial "buy-in," understanding, and commitment. It also helps other participants understand the mind of decision-makers to whom they may not normally be exposed.

Make Decisions Throughout the Process. As much as is practical, decisions should be made during the course of the process rather than delaying them. This aids in the resulting CIP being a statement of intent ("This is the interpretation & education program we intend to conduct in the future."). This is a much more powerful approach than the "recommending" approach ("This is the interpretation & education program we suggest that the park considers implementing if later approvals, and a variety of other prerequisite conditions, are granted.") because of its inclusive, real-time nature.

Comprehensive interpretive planning creates a situation where the participants (including managers) expect the plan to be enacted because well-founded decisions are made within the process itself, at appropriate times, for appropriate mission-focused reasons. All these things mutually interconnect and reinforce each other, and create important momentum.

Explain the Planning Process. Comprehensive interpretive planning can be conducted in a variety of ways. Any process is explainable and should be described in detail to the "customer park" by the planners, to the satisfaction of park management. In so doing, the proposed process can be compared to others and easily customized by the park staff as needed.

Integrate Evaluation. Comprehensive interpretive planning integrates any and all extant evaluations and studies into the process. Scholarly source material and anecdotal data are both important. When used together, they reinforce each other and create a more valuable context for planning.

Comprehensive interpretive planning implements these tenets in an organized manner to most efficiently and effectively facilitate visitor exploration of meanings ascribed to heritage resources. The process defines an interpretation & education program that implements the philosophy and best practices of the profession of interpretation.

Clearly-defined Roles for Participants in the Planning Process

Who is a Stakeholder? The term *stakeholders* refers to those individuals and groups that have a significant stake in how the park's interpretation & education program is managed. Stakeholders often live at or near the park, have studied it, are culturally affiliated with the site, or have other extensive knowledge of the place. These interested parties — both external and internal to the park's staffing and operation — often include the following types of disciplines, groups, and organizations:

- Affiliated cultures
- Chamber(s) of commerce
- Concessioners that provide interpretive, educational, or informational services
- Cooperating association
- Friends group
- Media specialists
- Museums
- Non-governmental conservation and historical organizations
- Other agencies (federal, state, local)
- Other appropriate park partners
- Park's management staff
- Park's subject-matter experts from all divisions of the staff
- Schools and universities

Role of Stakeholders. Stakeholders form the body of subject-matter experts for the park's heritage resources. Their participation provides expert understandings of multiple views regarding resource significance, the park's overall mission, the role of interpretation, the specific mission of the interpretation & education program, and more. They make invaluable contributions by bringing all of that information, history, insight, and expertise to the planning process.

Role of Interpretation Planners. Interpretation planners are the subject-matter experts regarding the planning process. Interpretation planners need to be thoroughly versed in interpretation philosophy, practice, and typical issues and procedures involved in park operations. The planners' primary role is to guide the participants through the comprehensive interpretive planning process, explaining the various components, their interrelationships, the reasons for each component, how they are used in this process, how they apply to *this* park, and facilitate stakeholder participation.

Interpretation planners can never possess the breadth and depth of knowledge about park resources equal to that of park stakeholders. That's okay. Stakeholders are the subject-matter experts regarding park resources and significance. The planners primarily need to know enough about this specific park to understand what kinds of questions to ask participants, why, and when.

Sometimes, planners receive invitations to visit the park a day or two (or a week) before the workshop — often centered on a specially planned, adventurous activity. The intent of the park's staff is to immerse the planners in an enjoyable, first-hand experience of the park. While these invitations are attractive, planners need to remember that such activities can be expensive (in dollars and energy) and are not usually required for them to effectively perform their role. The workshop itself is very intensive and will require lots of energy. Therefore, such invitations should only be accepted if the planners can ensure that they will start the workshop refreshed, energized, and focused. If the park experience will be too taxing, it should be politely declined.

Declining such an opportunity might seem rude to the park staff — who care deeply about the park and want nothing more than for the planners to share those same feelings. The planners need to clearly articulate that, unlike the park's stakeholders who need extensive first-hand knowledge of the park's resources to fulfill their role, planners can sufficiently familiarize themselves with the park by reviewing documents, talking with park staff in preparation for the workshops, and briefly experiencing the park on the arrival day. This comprehensive interpretive planning approach achieves desired outcomes by focusing on which roles best fit those involved throughout the process.

How These Roles Foster "Buy In." This set of roles fosters "buy-in" from stakeholders. The planners have no hidden agenda, and are *perceived* to have no hidden agenda. The stakeholders, and later just the CIP core team (the subset of stakeholders who are responsible for actually managing interpretation in the park), directly control the content of the plan. The park's staff is responsible for designing, implementing, and ensuring the continuing usefulness of its CIP. It is also the responsibility of park staff to demand that the interpretive planning assistance they receive matches

their needs, and to initiate any necessary course corrections in this regard throughout the process.

Comprehensive Interpretive Plan Components

The process of comprehensively planning an interpretation & education program includes establishing a long-range vision for the program, then determining the short-range actions necessary to achieve that vision. The process concurrently addresses all personal and non-personal interpretive and informational services (media), regardless of provider. It considers diverse audiences and multiple perspectives, and addresses those who experience park interpretation both at the park and off site (remotely).

All interpretive, educational, and informational activities performed by the program are based on, and coordinated by, the CIP. It forms the overall vision and basis for decision-making relating to the program.

The three components of a comprehensive interpretive plan are:

- Long-Range Interpretive Plan (LRIP)
- Annual Implementation Plan (AIP)
- Interpretive Database (ID)

Comprehensive Interpretive Plan		
CIP Component 1	CIP Component 2	CIP Component 3
Long-Range Interpretive Plan **LRIP**	Annual Implementation Plan **AIP**	Interpretive Database **ID**

Completion of all three components is critical to ensuring that the program's resources are coordinated and focused on achieving management's vision for the park. All three components should be customized (while retaining their original intent) to best address each park's needs and conditions.

CIP Component 1: Long-Range Interpretive Plan (LRIP)

An LRIP is not a stand-alone plan. It is intended to always be accompanied by the other two components of the CIP. The LRIP describes the foundational information that will guide the development of the future interpretation & education program (the long-range vision of the program) and the actions needed to achieve it. The LRIP is composed of several essential elements:

- Foundational information
- Future interpretation & education program (program overview table)
- LRIP action list

Foundational Information. Foundational information is used to guide the development of the future interpretation & education program. It includes a wide range of subject matter: management goals for interpretation, a description of the significance ascribed to the place and its resources, primary

interpretive themes (overarching stories), a description of those aspects of visitor experience affected by the program, an exploration of support for the interpretation & education program provided by other park functions, stakeholder suggestions for improving the program, and more. Through the course of the process, all of these elements are discussed and described, issues are raised, and solutions are voiced so that the development and implementation of the future interpretation & education program will be successful. Stakeholders play a vital role in shaping the future program by collaboratively establishing this foundation.

Future Interpretation & Education Program (Program Overview Table). The *program overview table* of the future interpretation & education program embodies the long-range vision of the program. It describes primary interpretive themes and informational topics, audiences for the program, and the interpretive and informational services that most effectively provide opportunities for visitors to explore the meanings of the place and explore connections to park resources.

The relationships of these elements are strategically displayed via this table format to enable a bird's eye view of the entire program, and to allow for comparisons and adjustments to be easily made. It enables an interpretive manager to more easily balance the overall operation, as well as organizing the park's efforts to perform more detailed functions — such as developing a wayside exhibit plan from information in this table.

LRIP Action List. The LRIP action list is a list of "to do" tasks that need to be accomplished to successfully implement the future interpretation & education program. These actions develop and support the interpretive and informational services the park intends to offer, as described in its future interpretation & education program.

Updating the LRIP. The CIP core team updates the LRIP as changing conditions warrant. If major modifications to the LRIP are determined to be necessary, thought should be given to the cycle of the current CIP and at what time external stakeholder participation should again be invited to fully review and update the plan.

CIP Component 2: Annual Implementation Plan (AIP)

An AIP is not a stand-alone plan. It is intended to always be accompanied by the other two components of the CIP. While the LRIP component is estimated to be useful for about five years before a major update is needed, a new AIP is created each year. This CIP component is a one-year operating plan for the interpretation & education program. It is a working blueprint describing what interpretive and informational services will be offered this year.

Each year, new services identified in the LRIP's future program will be "brought on line." The frequency and duration of existing services may change to accommodate new services. Such services may also be modified in response to what is learned from ongoing evaluation. The offering of existing, modified, and new interpretive and informational services implements the long-range vision in annual increments until the long-range vision is achieved.

Successive AIPs are developed directly from the LRIP and follow virtually the same structure. Each AIP is composed of several essential elements:

- Foundational information — *repeated from the LRIP, lending the same context to the AIP*
- Annual interpretation & education program (program overview table) — *a year-specific version of the LRIP's future interpretation & education program*
- AIP action list — *a year-specific portion of the LRIP action list*
- Additional year-specific information

Foundational Information. The foundational information in an AIP is essentially the same as that described in the LRIP. In both cases, this component lends important context to the rest of the document and establishes the basis for decision-making throughout.

Annual Interpretation & Education Program (Program Overview Table). The *program overview table* of the annual interpretation & education program embodies a one-year portion of the LRIP's long-range program. The annual program is developed directly from the long-range program, concretely linking them together. It cites all of the services that apply to the current year.

AIP Action List. The AIP action list cites those actions slated for the current year in the LRIP's action list, usually with increased detail to facilitate their completion.

Additional Year-specific Information. Additional year-specific information that can be useful in the AIP includes budgeting and staffing, training, an analysis of the previous year's interpretation & education program, and any management emphases that will influence the interpretation & education program in the current year.

The AIP-LRIP Updating Loop. Like the LRIP, the AIP is updated by park staff as park circumstances change. Any of these changes that may have an effect beyond the current year are also used to update the LRIP. This ensures that the LRIP remains relevant and an up-to-date template for subsequent AIPs.

Integration with the Park's Other Plans. Because streamlining an operation maximizes effectiveness and efficiency, the material in the CIP should be developed by the park staff to be integrated with any of the park's other plans for which this is appropriate. Gathering data only once, in a transferable format, then "pasting" it into a variety of reports, is a desirable practice.

CIP Component 3: Interpretive Database (ID)

An ID is not a stand-alone plan. It is intended to always be accompanied by the other two components of the CIP. It contains information that directly supports the interpretation & education program. The database is often most useful if constructed as a computer file to facilitate information searches and make updating convenient. A printed copy of the database is often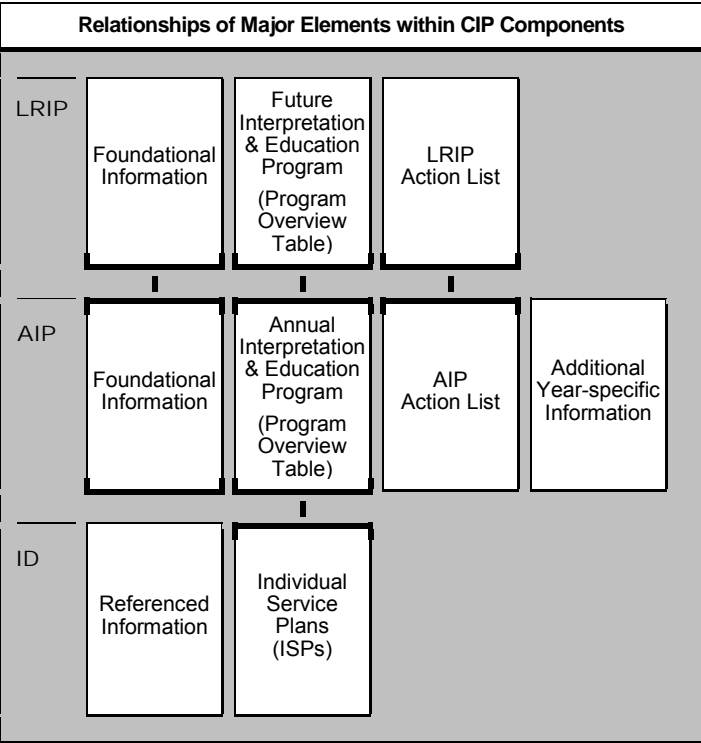 stored with some of the original documents and materials to which it refers. The ID is composed of several essential elements:

- Referenced information
- Individual service plans

Referenced Information. The ID also serves as a reference database for information such as the park reading list, research documents, other planning documents, funding proposals, media evaluations, various reports, and more.

Individual Service Plans. The ID file contains the program's individual service plans. These brief (often one-page) plans provide operational detail that underpin and more fully describe the services listed on the LRIP and AIP program overview tables.

Developing the ID. Development of the reference components in the ID can usually proceed independently of the other two components — as this is often an exercise in compiling existing information. Consequently, work on the reference aspects of the ID is often initiated at an early stage in the planning process. However, development of individual service plans occurs in conjunction with development of the future interpretation & education program in the LRIP.

Relationships of Major Elements within CIP Components

LRIP	Foundational Information	Future Interpretation & Education Program (Program Overview Table)	LRIP Action List	
AIP	Foundational Information	Annual Interpretation & Education Program (Program Overview Table)	AIP Action List	Additional Year-specific Information
ID	Referenced Information	Individual Service Plans (ISPs)		

The Comprehensive Interpretive Planning Process

The comprehensive interpretive planning process is structured around two workshops. The first workshop focuses on developing foundational information. The second workshop focuses on the application of this information in creating the draft future interpretation & education program. Both workshops mostly serve to develop components of the LRIP.

Summary of the First CIP Workshop

The first workshop generates material that will be directly applied in the second workshop. The first workshop primarily focuses on clearly describing management's intent for the interpretation & education program, articulating the significance of the park's resources, development of primary interpretive themes and audiences for the program, discussing visitor experience considerations, and noting extant operating conditions — and actions likely to improve them. Stakeholder participation is critical to the success of the first workshop.

Summary of the Second CIP Workshop

The second workshop involves only the CIP core team. During the second workshop, this team develops the first draft version of the future interpretation & education program based on all of the foundational information addressed in the first workshop. Additionally in this second workshop, planners provide a more in-depth explanation regarding the three components of the CIP, how an integrated approach to each component will keep the AIPs firmly grounded in the LRIP's vision while streamlining the annual planning process, and how the park's partners (cooperating association and others) can be usefully and appropriately integrated with the park's interpretation & education program.

Writing the CIP

The information gathered in the first and second workshops forms the vast majority of the LRIP. And the LRIP is the heart of the CIP. Each workshop session is designed to:

- address subjects necessary to the plan;
- focus only on the subject and task at hand;
- ensure that all participants have a relatively common understanding of the subject and task at hand;
- maximize the synergy of the subject-matter experts, interpretive experts, and decision-makers concurrently involved in the process to make meaningful operational decisions throughout the process, determining what it is they intend to do and how best to get from here to there;
- ask for and record information in essentially the same way as it will be formatted and used in the LRIP (if brief statements are needed, brief ones are solicited; if longer narratives are needed, more detailed information is solicited).

In other words, the workshops themselves "write" most of the plan based on careful set up, design, and facilitation of the workshops. The planners input all workshop information and create the draft plan. But let's be more specific:

CIP Component 1: LRIP

More than 90 percent of this component is developed in the two workshops and entered into electronic files by the planners. The subjects discussed in the workshops are the same as those in the LRIP.

The CIP core team is primarily responsible for developing the last ten percent. This group must make additional decisions that refine the draft future interpretation & education program, the actions that need to be accomplished, and the content of the individual service plans for the first year of implementation — elements that cannot profitably occur during the two workshops — to finalize and clarify the approach, intent, and specific operational details embodied in this CIP component.

CIP Component 2: AIP

More than 90 percent of each AIP is copied directly from the LRIP. Once the LRIP is fully developed, the park's CIP core team creates the AIP from it by duplicating the LRIP file. All transferred information that is not specific, or not applicable, to the particular year addressed by the AIP is then stripped out.

The CIP core team is primarily responsible for developing the last ten percent. This group must add several other items such as budgeting and staffing information, training information, and an analysis of the previous year's program. This additional information — and the decisions that the team needs to make as it reviews the one-year portion of the future interpretation & education program and finalizes and clarifies the approach, intent, and specific operational details embodied in this CIP component — cannot profitably occur during the two workshops.

CIP Component 3: ID

The ID is developed separately from the other two components and, other than instructional discussion, is not developed in any substantial way via the workshops themselves. The CIP core team develops the ID by assembling in-park materials that it references, and by writing the individual service plans that provide operational details for the program overview tables. The team can start on this at any time by simply compiling existing information.

The ISPs that correspond with the first AIP are written in conjunction with the development of the LRIP program overview table, and later adjusted via the development of the AIP program overview table. Subsequent ISPs are written before these services are scheduled to be initiated (as described in the program overview table of the LRIP future interpretation & education program).

Throughout all of these development phases, the planners provide guidance, editing assistance, and advice. Although the park is ultimately responsible for its CIP, the planners are continuing partners in the development of a plan that works best for the park.

Concluding Thoughts

Through this specific approach and process, the most attention is paid to those subjects that require it. It's a very lean approach that best capitalizes on each individual's role, producing a CIP that the participants will stand behind and find useful in daily operations. It minimizes travel and development costs. It minimizes input time and document formatting since the process is designed to gather the exact information needed for the plan, record it in a format that requires little translation from flipchart sheets into electronic files, and deliver the draft plan to the CIP core team in a format that the team can easily manipulate. It efficiently achieves desired results. ••

Initiating a CIP Planning Process

Information Applicable to National Park Service Units
in the Intermountain Region

Every park needs to have a current strategic, comprehensively planned, long-range vision for its interpretation & education program, arrived at through a process involving stakeholders. Every park needs a comprehensive interpretive plan (CIP).

Once a park has determined the timing to develop their first CIP, or to conduct a major update to their existing CIP, the park interpretive manager contacts the Office of Interpretation and Education, Intermountain Region. Options for assistance are discussed with staff interpretation planners or interpretive specialists. Parks are often directed to the annual regional call for work requests (made each summer in preparation for the federal fiscal year, beginning in October) and to Servicewide Consolidated Calls that now (or soon will) include interpretive planning work conducted by Harpers Ferry Center.

The call for work requests includes field-approved criteria to which the parks respond to ensure that the work most critical to the achievement of the interpretive mission in the region is accomplished first. When it is determined that a park's request for assistance can be accommodated by the regional office, the following activities occur.

Information Applicable to Any Park or Interpreting Organization

A Scope of Work is Approved

The park's interpretive manager, superintendent, and the planners begin the planning process by collaboratively establishing a common set of expectations, roles, and responsibilities. This agreement takes the form of a *Scope of Work* — essentially a contract between the park and the planners. It includes what will be done and why, when it will be accomplished, who will do it, what it will cost, and how it will be funded.

This collaborative effort begins with a discussion of the roles and responsibilities of the planners and leader of the CIP core team (the park's planning team that is responsible for developing and implementing their CIP). The park superintendent and planners' supervisor approve the Scope of Work.

Two Planners Conduct the Process

Our office's approach uses a team of two interpretation planners to conduct the planning process. The benefits of using two seasoned interpretive professionals who are experts in this planning process are many:

- Co-planners can bounce ideas off of each other so that appropriate planning strategies can be put in place and implemented with fewer unforeseen complications arising — saving time and money, and focusing effort.
- Co-planners can tag-team each other in the workshops so that the participants don't tire of them, and so that fresh energy is always up in front leading the group.
- Co-planners can better keep the process on track, helping ensure the successful completion of the many details associated with useful workshops and follow-up tasks.
- Co-planners can present information to workshop participants in two different styles while reinforcing the same information, points, objectives, and goals. Such a rich mixture often provides an increased opportunity for participants to find relevance and meaning in what is being presented or discussed.
- Co-planners can more easily and swiftly synthesize workshop participants' ideas so that a useful product results from them. This is especially helpful when work must be accomplished under some time pressure.
- Co-planners can assist each other in smoothing out transportation and logistic challenges that always seem to arise when travel is involved.

External Planners Offer Advantages

No matter what process is used or from what office or park the planners emanate, we recommend that the interpretation planners be from outside the park. Although a park can perform such planning internally, an outside perspective is useful and often results in ideas that might not be voiced by park staff. Non-park employees also approach the task without the perceived or actual agenda or bias that may be attached to park employees and/or the current program.

Interpretation Planner Qualifications

Interpretation planners should be experienced interpreters who are specifically trained in interpretation planning philosophy and methodology. The primary goal of interpretation planners is to assist a park in determining what its interpretation & education program will consist of in the future, and how to effectively move the program from where it is to where the park has determined it needs to go.

Successful interpretation planners possess strong skills in applying philosophy to "real-world" situations, team facilitation and consensus-building skills, leadership skills, problem-solving and analytical skills, and technical and interpretive writing skills. They possess a thorough understanding of personal-service and media applications in various park settings. And they have a detailed understanding of how and when to best use various techniques in *interpretive* services, and in what ways these techniques might differ for *informational* services.

Park Staff Controls Content

A member of the park staff — usually the interpretive manager of the park — leads the *CIP core team.* This planning team is responsible for developing, decision-making, editing, refining, and finalizing the CIP, securing management approval, and implementing its vision (including keeping it up to date so that it remains relevant to operations).

Information is Exchanged, Preparations are Made

Concurrent with development of the Scope of Work, the planners run through a project initiation checklist with the park and additional information is transmitted in both directions:

- The planners request park documents that provide background information on the park and specific information regarding the interpretation & education program.

- The planners describe and answer questions about the planning process, and send additional information to the park. Customization of the planning process for the specific situation of the park is discussed and initiated.

Additionally, the following also occurs:

- Compilation of CIP Component 3: Interpretive Database may begin during this period.

- The first and second workshops are scheduled.

- Meeting and travel arrangements are made.

- Stakeholders are discussed and the park superintendent selects and invites those who will attend the first two days of the first CIP workshop.

- The Scope of Work is finalized and signed by all parties.

The planners discuss the park, read the materials sent by the park, strategize their approach to the project, print handouts and pack, and travel to the park or meeting location. ••

First CIP Workshop

Arrival Tasks

Planners Meet with Park Managers

On the day of arrival — the day before the workshop begins — the planners meet with the superintendent and park interpretation manager to discuss last-minute arrangements, potential challenges during the workshop, the status of parkwide planning as it affects the interpretation & education program, and other workshop- or process-related questions.

The planners relate that the workshop includes an introduction exercise that they will conduct, so the opening of the meeting may be as brief as the superintendent desires, followed by the interpretation manager saying a few words, then introducing the planners.

The planners also remind the superintendent that the question, "What does management expect the interpretation & education program to accomplish for the park?" will be asked in open session at the beginning of the third day to help establish the sideboards within which the interpretation & education program functions now, and will function in the future.

Planners Set Up the Meeting Room

It is *critical* that the planners set foot in the meeting room the day before the workshop begins. Before arriving, the planners have helped the interpretation chief understand that an inspection needs to occur the day before the workshop if at all possible. It has been our experience — despite the planners' best instructions to the interpretation manager, and he or she passing them on to the person responsible for setting up the meeting room — that the room is usually not quite set up the way the planners need it to be. Therefore, planners should schedule a portion of this afternoon or evening to be taken up with final chair-and-table-moving chores.

Planners Experience the Park, if Possible

Only after the room is set up (since it's such a vital piece of workshop infrastructure), and if time allows, are the planners able to also briefly experience the park firsthand. This is useful, but not critical, since the stakeholders will be the park resource experts for the project (rather than the planners serving this function.)

The Workshop Setting

How Many Participants?

The first CIP workshop includes stakeholders and park staff (who are themselves internal stakeholders). The optimal number of participants is 20-30 to assure diversity of perspectives while still allowing enough time for those perspectives to be voiced.

What about Attire, Especially Uniforms?

In general, the wearing of uniforms is discouraged (for planners and participants) in order to remove anything that might get in the way of the participant group thinking of itself as a single group, unified in working towards a better interpretation & education program. The planners first pass this idea to the park when working through the project initiation checklist. The park staff passes this idea on to external and internal stakeholders.

Exceptions to the no-uniform idea are often participants who have concurrent duties while attending the workshop. For instance, some of the participants are usually members of the park's law enforcement ranger staff who are "on call" while participating. It should also be noted that some participants may simply think it appropriate to wear their organization's uniform when participating in such workshops with other agencies. That's okay. This no-uniform thing isn't a requirement, just a good idea to the extent that it makes sense in a specific situation.

Participant Attendance

The workshops are far more useful to the park when stakeholders are able to participate for the full two days asked of them by the park. That's because the workshop sessions are designed to build on one another. It's a cumulative process rather than independently modular. In other words, if a stakeholder walks in halfway through the first day, it'll be difficult for that person to understand what's going on, and the planners may have to spend valuable time repeating information that was discussed earlier. We know it's difficult for some stakeholders to get away from their normal duties for a couple days in a row (including park staff), but the park's interpretation manager should do what he or she can to entice stakeholders to commit to fully participating on both days. Without exception, a much better workshop results from such efforts.

Workshop Location

The location for the workshop is usually in or near the park, and functions most effectively if participants are not interrupted by daily business.

Meeting Room

The meeting room contains tables and chairs, and a great deal of wall space — enough for about 20 flipchart sheets to be visible all at once. Room practicality is far more important to the success of the workshop than the quality of the room's ambiance or the views from its windows. (In fact, attractive views can distract from the business at hand.)

Tables and chairs are ideally arranged in a large "U" shape, facing the wall that has the most space for hanging flipchart sheets. Two flipchart easels with paper pads attached are in the room — one centered in the space, the other standing ready in a corner. The planners usually sit at a table adjoining one of the ends of the semicircle, facing into it.

Reliable, Simple Technologies

Many of the workshop sessions include generating new information as well as reviewing existing information. All workshop sessions are recorded on flipchart paper pads by the planners to emphasize the process's collaborative nature and to maintain a common focus on the work at hand. This also provides participants a real-time ground-truthing opportunity to ensure that what is being heard and recorded by the planners is what the participants are really intending to convey. Participants are encouraged to voice corrections.

This low-technology approach (relying only upon a flipchart easel with paper pad, tape, markers, and printed handouts) is wonderfully customizable to the specific needs of the moment, and seldom fails unrecoverably — unlike electricity-dependent methods of presentation.

DAY ONE

Welcome and Introductions

The park superintendent opens the workshop by welcoming participants, then introduces the park interpretation manager, who introduces the planners. Although it varies by park, usually the superintendent or interpretation manager stresses the importance of this endeavor, the importance of stakeholder participation in it, and thanks stakeholders for taking the time to participate.

Following his or her introduction, the first planner engages the group and personally answers these questions:

- Who are you?
- Who do you represent?
- Why is this park special or important to you?

The planner then asks the nearest participant to address these questions, then each participant in turn. The second planner answers them last. This type of sharing is both informative and, frequently, emotive.

Why These Three Questions?

"Who are you?" On the table in front of each seat is a sheet of cardstock and a marker. As each participant chooses a place to sit, each one writes his or her name on both sides of the sheet and folds it so others in the room can see it. (The planners have done the same thing for themselves before participants arrive.) Some interesting things are often written — sometimes with artistic embellishment. Through these sheets, and by answering this question, the group begins to learn about each other by observing how each person represents himself or herself.

"Who do you represent?" It's also useful for everyone to know who works for, or speaks for, what group. This also lends insight into viewpoints that will be expressed throughout the workshop.

"Why is this park special or important to you?" The planners point out that the "to you" part of the question means to you *personally*, rather than generically to your group or organization. This question provides an opportunity for participants to express strongly-held personal views about park significance. This is an important first step in the workshop as it provides a forum for individuals to grow more familiar with each other, and initiates a cohesive group dynamic. Nothing that is said is recorded, enhancing the safety of this opportunity to speak from the heart. This step also establishes some informational and experiential groundwork among the participants since common viewpoints often emerge — sometimes from unexpected sources.

As each participant answers this question, a bond is initiated among most people in the room. It's a useful and rewarding way to set the tone for the workshop, as it becomes evident that most people in the room want to work together to improve the opportunities for visitors to this special place.

Overview of the Workshop

Park, Park System, and Mission of Interpretation

Important workshop context sets the stage for the work sessions to come. The planners connect the stories that were just shared with the reasons for the establishment of the park. The idea of heritage is discussed, along with how this park is part of a system (if applicable).

The group explores the profession of interpretation — a critical function of the park. The role of interpretation is described as "providing enhanced opportunities for visitors to explore their own intellectual and emotional connections to the natural and cultural resources that comprise shared heritage."

How is this mission accomplished? The interpretation & education program provides *interpretive and informational services* with the express purpose of providing opportunities for people to connect to park resources. Effective services result from thoughtful, comprehensive planning — the methodical assessment of desired outcomes and a well-organized process that structures the discussion of how best to achieve them.

Comprehensive Interpretive Planning

The transition is then made to frame the purpose of this first workshop — the first two days specifically. This workshop will build the foundation of the interpretation & education program that will be conducted here in the future. Each participant will play an important role in shaping the program that will be conducted here over the next five years or so.

Comprehensive interpretive planning results in a CIP, a blueprint for the program. The planner continues to provide a brief overview of park planning and the philosophy and components of the CIP to provide context for the workshop. Participants learn that they are participating in what will become the foundation of the LRIP component of the CIP.

Planners address the roles of everyone in the room. The role of stakeholders is to generate ideas and represent their constituencies' perspectives. The role of planners is to guide the stakeholders through the planning process, keep the workshop visionary, and keep it from getting bogged down in inappropriate specificity. The planners will keep the process on course and drive towards the kind of information necessary to create an effective plan.

Today's Activities and Facilitation Essentials

The planners then present information about the workshop structure: They distribute the day's agenda, comment sheets for those who may wish to communicate with the planners in writing, and a sign-in sheet for recording those who are present.

Meeting logistics (lunch and break schedule, restroom and telephone locations, and any similar concerns) are briefly discussed.

"Rules of the Road" — consensus guidelines for discourse throughout the workshop — are solicited from the participants and posted.

Last, a "Parking Lot" sheet is posted to record participant ideas or questions that are best addressed later in the workshop.

Importance of Park Resources — Statements of Significance

Significance of the park's resources is first shared when the participants addressed why this place is special or important to them. This introductory session lays the foundation for later discussion of resource significance, and then meanings and stories. Although the term "significance" is used singly, it represents multiple ideas about importance rather than implying that there is only one valid idea. Invariably, every park elicits multiple significance ideas that vary from individual to individual and from group to group.

Park Resources

The resources themselves comprise the anchor to which all other levels in the framework are tethered. Park resources are always the initial level in thematic interpretation. These heritage resources (natural and cultural) help us remember, consider, affirm, and improve who we are — as individuals and as a society. Important people, places, events, and things

facilitate our unquenchable exploration of meanings, ideas, beliefs, and values. Heritage resources possess a variety of characteristics: Some are tangible, some are intangible, and to some are ascribed meanings that tend to have a cross-cultural universality to them. Characteristics are assigned to these resources by individuals and groups. Characteristics and meanings may differ markedly among individuals or groups.

Tangible Characteristics. Most heritage resources have physical characteristics. They can be experienced through our senses: We can see, touch, hear, taste, and/or smell them. For example, trees, canyon walls, historic buildings, or ancient artifacts are examples of tangible resources.

Intangible Characteristics. All heritage resources are ascribed with intellectual, emotional, and spiritual characteristics. They are most often expressed as ideas, meanings, beliefs, and values. Natural processes (such as erosion, the water cycle, and wildland fire) and human activities (such as copper mining, architectural design, and religious traditions) are examples of intangible resources. They all have tangible manifestations (or we could not experience them in any shared way) but are especially important for the *whys* and *hows* behind their physical aspects. Their tangibility is the entrance into the world of the *whys* and *hows* that they represent.

Universal Concepts. Some intangibles are understood beyond cultural boundaries, almost at an innate level. These *universal concepts* are ideas to which we can all relate, although the meanings we independently assign to them may vary greatly. For instance, life, learning, cooperation, happiness, freedom, nature, and morality are all examples of universal concepts.

Note: Please see the section "Universal Concepts are Essential Elements of All Themes" below for more information.

Natural and Cultural Resources. As people study the world around us, and develop new methods and disciplines, it has often been useful to categorize subject matter more and more narrowly. Specialization facilitates studying specific aspects of the world in greater depth. It occurs in academic and technical disciplines, and also occurs in the management of parks and other special places. This is often the reasoning behind dividing heritage resources into the categories of *natural resources* and *cultural resources*.

In the quest for increased knowledge, it has been habitual to identify *natural resources* as resources primarily significant for their lack of disturbance by people. *Cultural resources* are described as resources that are primarily significant for their associations with human action and manipulation. It is important for interpreters to remember, however, that no cultural resource is divorced from the natural world — and no natural resource is free of culturally associated ideas, meanings, beliefs, and values ascribed to it by people.

Dividing resources into strictly *natural* and *cultural* categories is detrimental to a holistic interpretive exploration of what resources in parks mean, to whom, why, and how these meanings change or endure. Professional interpreters take care to reintegrate resource knowledge to best facilitate visitors' exploration of resources and the meanings they hold. To facilitate only a comprehension of the pieces, devoid of the

context of the greater whole, is to limit opportunities for people to explore deeper and more meaningful connections to shared heritage.

Resource Importance — Statements of Significance

Significance is usually rooted in enduring resource characteristics. The significance of places and things are embedded in their tangible and intangible characteristics: elements that are so attractive, interesting, and engaging that people choose to experience them time and again. At the same time, it's true that a cultural context always plays a role when societal values are described or acted upon. Accordingly, some aspects of the significance that society places on a site may evolve over time as a result of discoveries or other updates to knowledge about the place, events, people, and things, or if the values of society change in relation to the site's specific meanings, as represented by its resources. Nevertheless, such a place usually embodies a core importance that endures through time.

Describing Significance. The reasons for designating certain places as especially important to society can be gathered and described through public testimony or other initial studies or assessments of the resources' potential value to society. Thereafter, the characteristics of the resources are described for managerial and operational purposes.

The heritage resources of the park must be described in such a way that a common understanding (consensus) of the significance of these resources can be reached among those who have a stake in the resources of the place. This is crucial if responsible management of the resources is to occur. Almost all management actions, across all park functions, are derived from this common understanding and the mission to perpetuate the associated attributes of the resources.

Every organization that offers heritage interpretation describes, in some way, the importance of the places, events, people, and things that relate to their park. Significance descriptions can often be found in enabling legislation, a charter, mission statement, foundational statement, general management plan, or master plan. This description is most useful when it is more than just a resource list — when it includes relevant context that makes the items on such a list meaningful to the reader.

Such a description of resources is characteristically formatted as a set of *significance statements*. Significance statements, taken together as a whole, serve to describe the distinctiveness of the combined resources of the park, including natural, cultural, inspirational, scientific, historic, recreational, and other aspects. They include tangible characteristics and intangible meanings and ideas commonly ascribed to them. In most organizations, the mission of the organization and the set of significance statements combine to focus management actions and operations on the preservation and enjoyment of those attributes that most directly contribute to the importance of the place.

Workshop participants are usually presented with the current set of significance statements.

The planners, with the aid of a guiding handout, lead the group to review, edit, and add to the existing set of statements to improve their accuracy, clarity, completeness, and presentation.

The set of significance statements that results from this workshop is always stronger than the original, and more articulately and thoroughly describes the importance of park resources. There is a duality of usefulness connected to the work performed in this session:

- First, reviewing, considering, and improving the set of significance statements forms a common understanding of park resources among the workshop participants — from which everything else springs.

- Secondly, the participants are informed that the edited set of significance statements will be forwarded to park management for their consideration when next updating the park's official set of significance statements. Participants learn that although the workshop's set of statements do not automatically form a new, "final" set for the park — they definitely serve as an important recommendation for the consideration of park management. In our experience, the high quality of the workshop set is a direct reflection of involving stakeholders in such an improvement effort, and does in fact lead park management to adopt them in similar form as the new, current set of significant statements for all park documents that contain them.

Fundamentals of Interpretation

This session is composed of a fun and engaging group exercise that is relatively short in duration. Participants pass an object around the room as they respond to planners' prompts and each other's responses to them. The session is designed to help participants better understand what interpretation is, how it works, the power of *story*, who interpreters are, and what they do.

The planners approach this session as if none of the participants is familiar with interpretation. In so doing, the few that are truly in this category are brought "up to speed" without feeling as if they are being patronized, singled out, or "accommodated" in some way different from the other participants. This session is a little challenging for some participants in that each person is asked to answer a question that requires a bit of thought but, in general, the fun of this session defuses much of the pressure that participants might otherwise feel about "being put on the spot."

This session forms an essential bridge between the session on resource significance and the next session about overarching park stories — the set of primary interpretive themes that will be used to organize the park's services that thematically facilitate visitor connections with those resources. This session expressly targets the establishment of a common understanding among the participants about the foundational concepts that participants will immediately use when, in the next session, they'll be asked to generate theme ideas and draft primary interpretive themes.

Using Story to Facilitate Visitor Connections to Park Resources — Primary Interpretive Themes

Now that some of the interpretive groundwork has been laid, the application of that groundwork can begin. The set of significance statements represents what is important, special, and distinctive about the park's resources — described in a factual format. This set of significance statements needs to be translated into story language to enhance the interpretive opportunities of visitors.

Overarching Stories — Primary Interpretive Themes

Attaching meanings to places and things is a fundamental human trait. We ascribe special significance to places, events, people, and things that rejuvenate our spirits, challenge and strengthen our beliefs, and provoke contemplation and discussion of our past, present, and future. Such resources provide opportunities to explore our shared heritage and help us define our character as individuals, communities, and societies.

Story is the communications tool most effective for facilitating an exploration of resource meanings. Societies depend on the power of story to explore, clarify, and share ideas, meanings, beliefs, and values that collectively constitute culture. *Story* is at the heart of human interaction and, consequently, at the heart of heritage interpretation.

Parks develop a set of overarching stories to organize the largest-scale ideas and meanings related to the park's resources. These stories are called *primary interpretive themes*. Each is written as a story abstract — an encapsulation of the actual, complex, specific stories of the place.

When developing primary interpretive themes, the writers should take care to assemble the ideas, meanings, beliefs, and values that seem to best fit together as related groups of thought, anchored to the specific resources of the park. The set is developed to fully capture, and express in story format, the content of the park's entire set of significance statements. The theme set is complete when it provides opportunities for people to explore and relate to *all* of the significance statements.

The set is usually comprised of a handful of primary interpretive themes — commonly three to five. Primary interpretive themes should be few enough in number to maintain focus for the park's interpretation & education program (including its management, practical implementation, and tracking needs) while numerous enough to compellingly represent the full range of park significance.

Characteristics Common to All Themes. Characteristics that are common to both primary interpretive themes and subthemes (*see "Specific Stories — Interpretive Subthemes" below*) include:

- Each is based on the significance of park resources.
- Each is the essence of a story used to help visitors explore the multiple meanings of resources. Neither primary interpretive themes nor subthemes make up the actual stories themselves. Rather, themes are abstracts, encapsulations of the actual stories, the details of which form the content of the resulting interpretive services.

- Each connects resources to larger ideas, meanings, beliefs, and values.
- Each incorporates universal concepts: large ideas that mean something to everyone, though not necessarily the same thing to everyone.
- Each provides opportunities for people to explore the meanings of the place and its resources without telling people what resources *should* mean to them.
- Each is best stated as a single sentence that includes tangible and intangible elements. Single-sentence structure forces theme writers to focus their ideas. Structuring themes as complete sentences ensures a more coherent development of related ideas. Within the sentence structure itself, content often tends to progress from tangible resources to intangible resources to universal concepts, moving from specific to general (this is traditional story format).
- An interpretive theme is never merely stated as a topic. While topics can be useful in organizing a body of work, topics alone do not provide sufficient interpretive focus. Since topics are written in relatively few words — such as geology, Southwest history, wildlife, or architecture — their meanings are too general and ambiguous to be useful as stand-alone content guides to interpreters, supervisors, or managers.

Universal Concepts are Essential Elements of All Themes. Universal concepts are powerful: In just a word — love, family, war, time, honor, sacrifice — many different meanings are instantly thought of, felt, and experienced by visitors. Using universal concepts in both primary interpretive themes and subthemes is essential to effective interpretation, as this aids in the presentation of multiple perspectives and their relevance to visitors. Universal concepts enable a wide range of people with diverse life experiences to find personal paths of connection to the stories of the place and its extraordinary resources. People become engaged in the place, in the program, in the exhibit. They can relate the resources to important aspects of their own lives.

It should be noted that mechanically including universal concepts in an interpretive theme does not, in itself, guarantee that the theme will provide adequate guidance. Simply using words that convey universal concepts without appropriate context is too broad an approach to be useful. For instance, consider this interpretive theme:

- The swamp is teaming with life.

This interpretive theme isn't especially useful. Relying solely on the use of the word "life" as a universal concept does not provide adequate context to understand the idea the writer intends to explore. Here's a revised version:

- The swamp contains an unusually rich diversity of plants and animals interacting in one of nature's most vulnerable habitats, offering opportunities to consider the critical roles that water plays in the living systems upon which we all depend.

The revised statement clearly focuses on some specific ideas, while doing it in an inclusive way. It is both focused *and* serves as a useful umbrella under which multiple perspectives can be profitably explored. Although the word "life" is absent, the idea not only remains, but has taken understandable form. This theme statement provides a much clearer presentation of the author's thoughts.

Let's look at another statement, a rough draft of a primary interpretive theme:

- Residents sacrificed their homes and lands for the creation of a national park near a majority of the United States population.

The universal concept of sacrifice is very powerful, but is used in the statement without much explanatory detail or context. Such ambiguity may represent a partially-formed understanding of the park's underlying significance. It may also be shorthand for an in-depth understanding, but it's almost always best to be more specific in writing a theme upon which many different services will be founded. Specificity leads to clarity in theme writing. A more coherent expression of this idea occurs in this revised version:

- Established at the height of the Great Depression, and created through the displacement and disruption of many individuals and communities, Shenandoah National Park is an outstanding example of how people collectively struggle to balance the rights of individuals with the needs of society as a whole.

Although the universal concept of sacrifice is clearly represented in this version, the word "sacrifice" is not necessary. Instead, the concept is developed more fully to add detail and context, and to better connect it to the resources of the place. This creates a much richer opportunity for dialog about all of the ideas, meanings, beliefs, and values related to this universal concept, and the park resources that make this one of the best places in the nation to discuss these particular ideas.

Specific Stories — Interpretive Subthemes

The subject of subthemes is usually only addressed to the extent that workshop participants understand the relationships of the elements that connect park resources to opportunities to enjoy them. At this point in the workshop, any discussion about subthemes is inevitably a discussion about context for developing primary interpretive themes. Time constraints and consideration of the best use of stakeholders' time and attention are the reasons for this. It is much more useful to the process for workshop participants to concentrate on concepts for primary interpretive themes than on subthemes. Having said this, though, many of the theme ideas may directly lend themselves to expression as subthemes at some later date.

Structure

An especially important idea to convey is how the set of significance statements leads to the development of the set of primary interpretive themes. Each primary interpretive theme is expressed via an unlimited number of subthemes. And each subtheme forms the basis of an individual interpretive service. The linkages described here are useful to convey to the participants, as this understanding will aid them in concentrating on the development of primary interpretive themes.

Participants Draft Primary Interpretive Themes

After this information is presented to participants, the next step in the workshop is to actually develop the draft set of primary interpretive themes. Unlike the session on significance statements, participants are purposely *not* provided with a copy of the park's current set of primary interpretive themes. This ensures that participants will approach this task based on the set of resource significance statements generated earlier, and that they will arrive at their own set of overarching stories about park resources. This is very important in that it further bonds the group and confirms that the stakeholder group is truly charged with developing the set of primary interpretive themes rather than simply validating an existing set. This also removes any sense of approving or disapproving the existing set of themes and promotes creative and original thought.

Closeout and Evening Work

During the workshop session on primary interpretive themes, participants voice many important theme ideas about the place but often lack the time and experience that would enable them to finish synthesizing them into actual theme statements. So to close out the day, the planners ask the group's permission to continue working on the themes this evening in order to present a draft set to the group the next morning. The participants — who now grasp the magnitude of the effort needed to accomplish this — happily agree to this arrangement. This is the usual flow of events.

The stakeholders are thanked for donating their valuable time to the workshop, and encouraged to return tomorrow.

Adjourn and Check for Course Corrections

Planners adjourn participants. Afterwards, the planners and leader of the park's CIP core team discuss the day's events to ensure that the park is receiving the information it needs and that the process as a whole is on track to the park's satisfaction. Adjustments are made by the planners in response to park concerns and/or suggestions, as well as their own observations.

Evening Work for Planners

The two planners usually put in another 3 to 4 hours of work after dinner, synthesizing the theme ideas into draft primary interpretive themes, then writing them on flipchart sheets or printing them from a computer (if available and appropriate) as postings or handouts for the next morning.

Invitations to After-hours Activities

This evening is the only one in either workshop that is set aside as a specific time for the planners to do evening work. Other evenings are more available for after-hours activities. The same caveats that apply to pre-workshop invitations generally also apply to invitations offered during a workshop: Such invitations should only be accepted if the planners can ensure that they will start the next workshop day refreshed, energized, and focused.

DAY TWO

Primary Interpretive Themes Continue

The next morning, the planners present the participants' theme ideas from yesterday in the form of a synthesized set of draft primary interpretive themes. (The theme ideas also remain posted and visible.) Work on the themes continues from this point forward. Sometimes, the set is significantly altered. Sometimes, just their grammar is improved. The level of adjustment varies widely and is rather unpredictable. In general, participants like this process and find it to be productive. (Sometimes during this session, additional modifications are also suggested for the set of significance statements.)

The development of a set of well-written primary interpretive themes is one of the most important activities of this stakeholder group, and of this workshop. Professionally guided development of primary interpretive themes is critical to the continuation of the planning process, especially as concerns developing the future interpretation & education program in the second workshop. A great sense of accomplishment is felt by all at the close of this session.

Today's Activities

The planners distribute the day's agenda and a sign-in sheet for recording those who are present. Questions are answered and issues are addressed as needed.

Who Visits the Park?

This session is fun, short, and a nice relief from the intellectual heavy-lifting done by participants (and planners) in the previous session. Basically, the planners solicit an answer to the question, "Who visits the park?" They instruct the participants that they may answer in any way that suits them — such as by types of visitor activities, ages, origins, seasons, and interests. So, it's a bit of a free-for-all as they voice their ideas and the planners hurriedly keep up. Trends for each of the responses (trending higher or lower in the next five years, or seen as stable) are also indicated on the flipchart sheets. The park is also asked if they plan to make any special efforts to attract any of the groups listed, or any other groups who may *not* be currently visiting the park, but who the park wishes to attract over the next five years. These groups are identified accordingly.

Discussion continues with the question, "*Why* do people visit this place?" This culminates in the idea that *visitors are seeking something of personal value for themselves*. This could relate to natural, cultural, scientific, recreational, spiritual, inspirational, and other experiences and values, and always involves intangible characteristics ascribed to park resources.

This brief look at who visits the park and potential trends in visitation sets the stage for discussing the experiences people desire from their visits.

Desired Visitor Experiences

Statements of desired visitor experiences describe how the interpretation & education program facilitates physical, intellectual, inspirational, and emotional experiences for visitors. These statements are intended to represent *visitors'* desired experiences — not the desires of the *workshop participants* writing the statements. With regard to educational programs, these statements can also describe what educators, teachers, and students will experience when participating in the program, including preparation, follow-up, and evaluation.

The desired outcome of park operations is to manage visitor-resource interaction so that opportunities exist for the widest range of visitors to explore connections with park resources while ensuring that those resources remain unimpaired for the enjoyment of future generations. An understanding of desired visitor experiences helps the interpretation & education program facilitate the attainment of those goals.

Participants respond to the question, "What do visitors want to do, see, and experience during their park visit?" by writing several statements (each on legal-sized paper) from the perspectives of their constituencies and that of the general visitor. The statements are posted on the wall and read aloud by the planners.

Statements deemed by consensus to be essentially stating the same idea are lumped together, with the most clearly expressed statement remaining visible on top. If any single participant wishes them to remain separated — so that one could be ranked separately from the other — statements are left in separate locations.

Workshop participants then rank the statements using a nominal group process (via self-adhesive "dots") to indicate those statements they believe are most accurate for most visitors, and best represent the visitors' desired experiences.

The dots received by each statement are counted, producing a consensus ranking of the statements. This prioritization of the statements provides a sense of which ideas most need to be actively addressed as the future interpretation & education program is developed in the second workshop.

Stakeholder Issues and Suggestions for Improving the Interpretation & Education Program

Each workshop participant is provided with an opportunity to voice his or her expectations and desires in partnering with the park, and their organization's participation in, or ideas for, improving the park's interpretation & education program. Discussion of current issues, successes, and challenges leads to a greater depth of understanding between partners and can lead to innovations in operations and the relationships that underpin them. The planners move the discussion from one

end of the room to the other, providing each person with an opportunity to comment. This is often followed by an open forum for discussing ideas and concerns. The planners record the gist of all comments on flipchart sheets.

Next Steps in the Process

The planners present information that helps the stakeholders understand the sequence of steps that will follow the workshop to complete the park's CIP, and the opportunities that stakeholders will have later in the process to review drafts and continue their participation. They also answer any questions about the planning process that remain.

Closeout of the Day

At the end of the workshop day, closeout of the large stakeholder group includes reviewing any notations on the posted parking lot sheet that have not yet been addressed by the planners, and addressing them to the satisfaction of the participants.

The stakeholders are thanked for donating their valuable time to participate in this planning process.

Adjourn and Check for Course Corrections

Planners adjourn participants. Afterwards, the planners and leader of the park's CIP core team discuss the day's events to ensure that the park is receiving the information it needs and that the process as a whole is on track to the park's satisfaction. Adjustments are made by the planners in response to park concerns and/or suggestions, as well as their own observations.

DAY THREE

Today's Activities for the CIP Core Team

The last day of the first workshop is usually devoted to issues that are agency-specific or internal to park administration or operations. Participants are therefore fewer than in the first two days, and usually include just the CIP core team (about 6-12 participants).

The planners distribute the day's agenda and a sign-in sheet for recording those who are present. Questions are answered and issues are addressed as needed.

Audiences for the Interpretation & Education Program

A set of audiences must be defined so that the program's efforts can most effectively facilitate visitor enjoyment. As parks work through this process, two common types of categories usually emerge: *general public* and *participants in curriculum-based programs*. Additional audiences may also be identified. The set of audiences becomes the second major component (primary interpretive themes being the first)

needed for developing the future interpretation & education program in the second workshop.

For Whom are Services Planned?

When comprehensively planning an interpretation & education program, audiences are best defined by considering two central questions, the responses to which ultimately determine the set of audiences for which the park will plan interpretive and informational services.

1. On what bases do we interpret to some people differently than we do to others? Factors to consider include the life experiences of the individual or group, level of education, learning styles, language, cultural traditions, time available for interaction, etc.

2. At what point does a particular segment of the visiting public become so large, so important, or so distinct from general park visitors as to warrant interpretive or informational services targeted specifically to their needs? Such targeted services are, by definition, *less effective* for the general public. What criteria do we use to formulate answers? Consideration of this question includes a review of current and future visitor profiles and their categorization for strategic interpretive planning purposes.

The basis for categorizing audiences (for the interpretation & education program) lies in whether or not a particular audience requires communication in a way distinct from that of the general park audience. A subjective balance must be struck between communicating effectively with a greater number of specific audiences, and the limited resources available to the park's program.

The Mission of, and Management Goals for, the Interpretation & Education Program

This session is the one referenced in the initial meeting with the park manager the day before the beginning of the first workshop.

Discussion opens with the manager's response to the question, "What does management expect the interpretation & education program to accomplish for the park?" Discussion narrows to include how this planning process relates to desired outcomes and evaluation of interpretive and informational services, the park's Strategic Plan, the annual Servicewide Interpretive Report (SIR), divisional and individual work plans, the relationship of interpretation to the goals of the other park divisions, and related topics. The park's statement(s) of purpose (from the GMP or park Strategic Plan) are read aloud by the planners, and reviewed by the group as an additional guiding element in the development of the park's future interpretation & education program.

Issues and Influences Affecting the Interpretation & Education Program

The previous session naturally evolves into a discussion of issues and influences affecting the interpretation & education

program. Because no program exists in a vacuum, a discussion of the forces that have a bearing on the program provides context for development of the future interpretation & education program. Issues often include topics like long-range Servicewide initiatives, critical resource issues, issues related to staffing and funding, employee development, use of technologies, dynamics of neighboring communities, and concerns of stakeholders not voiced previously.

Actions for Improving Supportive Elements of the Program

Interpretation depends on a variety of "behind the scenes" supportive functions. It's useful to obtain a snapshot of each as it currently operates (existing conditions), and a sense of what might be improved to make the interpretation & education program more efficient and effective over the next five years. Improvement suggestions lead to action items in the LRIP Action List.

Resource-focused Research Used by Interpreters

Discussion includes research needs, access to and management of research information, common-language translations of technical material, and the role of resource-focused research in supporting the interpretation & education program.

Visitor-focused Research Used by Interpreters

Discussion includes research needs, access to and management of research information, and the role of visitor studies and sociological research in supporting the interpretation & education program.

Park and Interpretation Libraries

Library materials include books, magazines, periodicals, maps, and related materials not part of park archives. Discussion includes acquisition needs, access to and management of library resources, standard operating procedures, cataloging, storage concerns, and the role of library information in supporting the interpretation & education program.

Park and Interpretation Image Collections

Images used in interpretation include slides, prints, negatives, electronic image files, videotapes, DVDs, films, and related materials not part of park archives. Discussion includes acquisition needs, access to, and management of collections, electronic image generation, manipulation, storage, standard operating procedures, cataloging, and the role of image collections in supporting the interpretation & education program.

Interpretive Object Collection

Interpretive objects are items used in the performance of interpretive and informational services, such as props, replicas, equipment, or other materials that will degrade and be consumed by use over time. Discussion includes acquisition needs, access to and management of the collection, storage, standard operating procedures, cataloging, and the role of the object collection in supporting the interpretation & education program.

Museum Collection and Archives Used by Interpreters

The museum collection and park archives are composed of accessioned items for use only in a non-consumptive manner. The collection may include artifacts, rocks and fossils, journals, furniture, weapons, rare books, machinery, paintings, mounted animals, historic maps, transportation equipment — a wide range of objects. Artifacts from the collection are frequently used in exhibits if the exhibit can protect them from degradation; otherwise, replicas are used for public display. Discussion includes acquisition needs, access to and management of the collection and archives, storage, standard operating procedures, cataloging, and the role of the collection and archives in supporting the interpretation & education program.

CIP Component 3: Interpretive Database (ID)

At this point in the process, most of the needed foundational information has been gathered. Attention shifts to the ID component of the CIP. Although the ID was previously discussed with the interpretation manager during the pre-workshop period, this is a good time to present this information to the rest of the CIP core team. Discussion includes what the ID is, its relationship to the other two CIP components, its use and potential formats, and the status of its compilation.

Next Steps in the Process

Discussion of the ID widens to include the other two CIP components, and the remainder of the process to comprehensively plan the park's interpretation & education program. Depending on time and interest, specific attention may be paid to the program overview table and its relationship to individual service plans, both of which will be discussed in more detail in the second workshop. Planners preview the second workshop and the major subsequent steps that will result in a completed CIP. They answer any questions the group may have regarding the process or the resulting CIP. Example CIPs from other parks are usually provided to the group to foster an increased understanding of what will result from this process.

The planners then discuss what tasks need to be accomplished between the CIP workshops, who might do what, and when. Travel arrangements, meeting room logistics, schedules, and other miscellaneous details for the second workshop are discussed as needed.

Closeout of the Day and Workshop

At the end of the workshop day, closeout of the CIP core team includes reviewing any notations on the posted parking lot sheet that have not yet been addressed by the planners, and addressing them to the satisfaction of the participants.

The CIP core team members are thanked for dedicating their valuable time to participate in this planning process.

Adjourn and Check for Course Corrections

Planners adjourn participants. Afterwards, the planners and leader of the park's CIP core team discuss the day's events to ensure that the park is receiving the information it needs and that the process as a whole is on track to the park's satisfaction. Adjustments are made by the planners in response to park concerns and/or suggestions, as well as their own observations.

This concludes the first CIP workshop. Planners travel home. ••

Between CIP Workshops

Length of Interval
Between Workshops

The scheduling of both workshops, and the length of the interval between them, is influenced by the scheduled events and responsibilities of the park's interpretation & education program staff and the availability of stakeholders and planners.

In general, the interval between workshops should be no less than four weeks. This allows enough time to pass for the first workshop's content to be fully absorbed by all involved, as well as enough time to perform the work that needs to occur between workshops.

The interval should be no longer than about 12 weeks. If longer, too much of the first workshop's content fades, resulting in an increased percentage of the second workshop being spent reviewing the content of the first workshop — a situation that lessens the amount of time and attention available to be focused on new work.

Sequence of Activities

Planners Initiate Drafting the Park's Archive File

During this interval, the planners initiate the generation of an electronic Archive file. This file is used to record everything that occurs during the planning process, including information from both workshops. If the planners are working under time constraints during this interval, the planners only input that information from the first workshop that will be used directly in the second workshop. This includes the set of draft significance statements, set of draft primary interpretive

themes, set of audiences for the program, set of visitor experience considerations (the planners write this draft from the ranked statements for desired visitor experiences), and management goals for the interpretation & education program.

CIP Core Team Receives and Refines Statements

The planners then send a portion of the Archive file — usually the set of draft significance statements, set of draft primary interpretive themes, and set of draft audiences — to the park's interpretation manager. The planners send this information to the park as soon as possible so that the park can use the maximum amount of time between workshops to refine this information: editing, checking facts for accuracy, improving the clarity of the concepts that need to be conveyed through the themes, and any other concerns they feel need to be clarified. The CIP core team takes the lead in doing this, with assistance from the planners as requested. Stakeholders (including those that may not have attended the first workshop) may also be involved at this stage of the process, at the park's discretion.

Preparations for the Second CIP Workshop

The CIP core team sends the refined statements back to the planners before the second workshop, thereby giving the planners time to generate workshop handouts and a sense of the park's latest thinking. The planners will also add the edited statements to the Archive file.

During this period, both the park staff and planners will make logistics, travel, meeting room, and other miscellaneous arrangements and preparations for the second workshop. ••

Second CIP Workshop

Arrival Tasks

Planners Meet with Park Managers

Once again, it's a common courtesy to meet with the park superintendent and interpretation manager upon arriving in the park (or vicinity) the day before the workshop. However, since relationships have now been formed, it's less essential for the second workshop than it was for the first, at the park's discretion.

Planners Set Up the Meeting Room

The planners *always* visit the meeting room at this time to ensure its readiness for the workshop.

Planners Experience the Park

The planners also see as much of the park firsthand as time and conditions allow. This may include specific locations that the planners were made aware of during the first workshop — locations of specific resources or places involving certain significant issues. During the second workshop, planners need to possess a greater understanding of visitor movement through the park, locations of significant resources and conditions, opportunities for visitor interaction with resources — any characteristics of the park or its operations that may help them facilitate a discussion of the park's future interpretation & education program and its array of interpretive and informational services.

The Workshop Setting

How Many Participants?

The second workshop is composed of the CIP core team (park interpretive staff, park manager, cooperating association staff, and concessioners or others who provide interpretive or educational services to park visitors). The optimal number of participants is about 6-12 to assure diversity of perspectives and process manageability.

The second workshop is conducted by the same team of two interpretation planners.

What About Attire, Especially Uniforms?

Because of the intimate nature of this group, and the fact that most of the participants work together on a daily basis, the wearing of uniforms is not an issue.

Participant Attendance

Like the first workshop, the second workshop's sessions are designed to build on one another. It's a cumulative process rather than independently modular. In other words, if a participant walks in on the second day, it'll be difficult for that person to understand what's going on, and the planners may have to spend valuable time repeating information that was discussed earlier. We know it's difficult for some participants to get away from their normal duties for several full days in a row, but the park's interpretation manager should do what he or she can to entice participants to do exactly that. Without exception, a much better workshop results when participants are present for all three days.

Workshop Location

Like the first workshop, the location for the second workshop is usually in or near the park, and functions most effectively if participants are not interrupted by daily business.

Meeting Room

The meeting room contains tables and chairs, and a great deal of wall space — enough for about 25 flipchart sheets to be visible all at once. Room practicality is far more important to the success of the workshop than the quality of the room's ambiance or the views from its windows.

Tables and chairs are ideally arranged in a "U" shape, facing the wall that has the most space for hanging flipchart sheets. A flipchart easel with paper pad attached is centered in the space. The planners usually sit at a table adjoining one of the ends of the semicircle, facing into it.

Reliable, Simple Technologies

Many of the workshop sessions include generating new information as well as reviewing existing information. All workshop sessions are recorded on flipchart paper pads by the planners to enhance the visibility of the process's collaborative nature and to maintain a common focus on the work at hand. This also provides participants a real-time ground-truthing opportunity to ensure that what is being heard and recorded by the planners is what the participants are really intending to convey. Participants are encouraged to voice corrections.

DAY ONE

Welcome and Introductions

The workshop begins. This time, introductions are rather informal due to the familiarity of the CIP core team members with each other, and now with the planners, and the relatively small size of the group.

The Mission of, and Management Goals for, the Interpretation & Education Program (Review)

Following the brief and informal introductions, the planners begin this session. Plunging into this session only minutes into the workshop sets a serious "let's get some work done together" tone from which everyone benefits. This can be especially useful since some park staff don't often see each other in such a setting (because some portion of them are always involved in diverse duties and locations), and they might like to catch up with each other's lives and "goings on." Starting right away with a session that deals with the goals for the program that the management team has established appropriately harnesses everyone's attention and sets the pace and expectation for the workshop to be productive.

The park manager's response to the question asked in the first workshop, "What does management expect the interpretation & education program to accomplish for the park?" is discussed *(a handout made from the Archive file aids this discussion)*.

Elements of the park's General Management Plan that address visitor experience (in the broadest sense) and interpretation's role in park operations (providing enhanced opportunities for visitors to explore their own intellectual and emotional connections to the natural and cultural resources that comprise shared heritage) is revisited — and the fact that interpretation is a critical function of the park.

The park's statement(s) of purpose are also reviewed by the planners.

This session re-establishes the broad framework within which the future interpretation & education program will operate.

Overview of the Workshop

Comprehensive Interpretive Planning (Review)
The park's interpretation & education program provides interpretive and informational services with the express goal of providing opportunities for people to explore their own intellectual and emotional connections to the ideas and meanings ascribed to the resources of these places. Effective interpretation results from thoughtful, comprehensive planning — the methodical assessment of desired outcomes and how best to achieve them. Comprehensive interpretive planning results in a CIP, a blueprint for the interpretation & education program. The components of the CIP are reviewed to provide context for the workshop.

Workshop Overview

This workshop will develop the draft future interpretation & education program. Each participant will play an important role in shaping the interpretation & education program that will be conducted here over the next five years or so.

To establish more specific workshop context, the planners highlight what's been accomplished in the process to date and then look forward to what will be accomplished in this workshop.

Today's Activities and Facilitation Essentials

The planners then present information about the workshop structure: They distribute the day's agenda, comment sheets for those who may wish to communicate with the planners in writing, and a sign-in sheet for recording those who are present.

Meeting logistics (lunch and break schedule, restroom and telephone locations, and any similar concerns) are briefly discussed.

Last, a "Parking Lot" sheet is posted to record participant ideas or questions that are best addressed later in the workshop.

Set of Significance Statements (Finalize)

Continuity between the first and second workshops continues with a review of the current set of draft significance statements that were modified by the CIP core team between workshops *(a handout made from the Archive file)*. They are reviewed and, if necessary, modified by the group to ensure a common understanding of the significance of the place and its resources. At this point in the planning process, this session is usually very brief. As stated regarding the first workshop, this set of statements will be recommended for adoption by management as an improvement to the park's current set of significance statements.

Set of Primary Interpretive Themes (Finalize)

The group then reviews the draft set of primary interpretive themes as modified by the CIP core team between workshops *(a handout made from the Archive file)*. Discussion of this set often results in additional editorial comments and finalized wording.

The group also finalizes an order for the themes that most clearly promotes their being understood by readers and their use as organizational tools. This is not a prioritization exercise — as they all remain *primary* interpretive themes, central to the visitor's exploration of the meanings ascribed to the resources of the park — it's simply an ordering exercise. Ordering choices often include considerations such as chronology or ordering by larger concepts to smaller concepts (or the reverse). The group then assigns each theme a letter designation (theme A, theme B, etc.) as an abbreviation key to facilitate their use throughout this workshop, and later for operational uses.

Set of Audiences for the Program (Finalize)

The group then reviews the draft set of audiences for the program as modified by the CIP core team between workshops *(a handout made from the Archive file)*. Discussion of this set sometimes results in additional editorial comments and finalized wording. The group then assigns each audience category a number designation (audience 1, audience 2, etc.) as an abbreviation key to facilitate their use throughout this workshop, and later for operational uses. Like for the themes, these are identifying — rather than prioritizing — designations.

Set of Visitor Experience Considerations (Finalize)

The desired visitor experiences that were generated and ranked in the first workshop, and similar content found in the park's General Management Plan, were reviewed between workshops by the planners. During this period, the planners synthesized these statements into a more concise set of statements that serve as the core set of *visitor experience considerations* for the interpretive planning process *(a handout made from the Archive file)*. Discussion of this set sometimes results in additional editorial comments and finalized wording.

Visitor experience considerations are fewer in number, are more focused, and are more easily and usefully applied to the planning process than their source materials. They will assist in the development of the future interpretation & education program.

Operational Considerations (Finalize)

In addition to the above foundational information, a number of issues frequently need to be resolved in a holistic way and incorporated into the park's strategic approach to planning it's interpretation & education program. Often, the challenges to be resolved are intimately interrelated: Most options for addressing each one have fundamental ramifications regarding the others. Situations vary widely. Resolution of these issues can occur at any stage of the process from here forward, but issues that will significantly affect the development of the future interpretation & education program are best resolved before that program is drafted. Summarizing the most prominent of these issues in the LRIP can be useful in documenting their interconnection and evolution, prompting the development of successful strategies for addressing them.

Identifying Suitable Locations for Services

Workshop participants review a list of generic locations for interpretive and informational services so that the program's services can be designed to most effectively enhance the experiences of visitors.

Suitable locations for services are generally places in the park that offer exceptional access to significant tangible resources, or facility locations that are especially useful to the

park's program. Off-site locations often include places conducive to a positive remote experience with the resources of the park.

Reviewing the types of locations and applying them to this park's specific conditions comprise another major factor needed for developing the future interpretation & education program.

Identifying Suitable Types of Services

Participants review lists of generic interpretive and informational services as a starting place for the CIP core team to consider which types of services are particularly well-suited to enhancing the experiences of the audiences for which they are intended. This discussion also establishes a dialogue regarding the terms or labels of various types of services. This can sometimes vary, and a common understanding of terms among the group is desirable.

Service Delivery Methods

Personal services are those services that are conducted, performed, or presented by one or more interpreters.

Non-personal services are not personally presented, as in the case of exhibits, publications, films, etc. These services are often referred to as *media*.

Service Content Types

The types of *interpretive services* that are most suitable for inclusion in the park's interpretation & education program are those services that have been identified as potentially being the most successful in facilitating an exploration of the meanings ascribed to the place.

The types of *informational services* that are most suitable for inclusion in the program are those services that create an environment in which enjoyment and appreciation of heritage can be enhanced for the visitor.

Reviewing the types of interpretive and informational services and applying them to this park's primary interpretive themes and informational topics comprises another important task preceding the development of the future interpretation & education program.

Identifying Suitable Partnerships for the Program

Participants review a list of generic partners, assistance they can provide, and benefits to them for partnering with the park. Participants discuss and identify park partners that currently, or potentially, support and/or deliver interpretive and informational services, and describe their desired future roles.

Partners of the park's interpretation & education program support and/or deliver interpretive and/or informational services in concert with park staff. Partners include cooperating associations, friends groups, concessioners, educational institutions, other agencies, state entities — even other divisions within the park can be viewed as partners in accomplishing the mission of the program. Assistance from partners may range from equipment to staffing to special events assistance.

Reviewing the types of partners and applying them to this park's program helps identify the actual "work force" that will design, support, and implement the park's future interpretation & education program.

Future Interpretation & Education Program

Introducing the Program Overview Table

The future interpretation & education program *is* the long-range vision — the master blueprint — of the CIP. Located in the LRIP component of the CIP, it is displayed as a *program overview table* that graphically depicts how diverse audiences will be provided with a variety of interpretive and informational opportunities to facilitate their exploration of the meanings ascribed to the place, through the park's set of primary interpretive themes and the services that make them accessible to visitors. The program overview table outlines the future interpretation & education program that the park and its partners *intend to conduct*.

The program overview table enables the entire program to be viewed at a glance. This format enhances the visibility of programmatic gaps and redundancies. It helps all interpreters better understand the entire interpretive operation and how their individual efforts contribute to the whole. (It is often used in seasonal training for this reason.) The program overview table usually includes some interpretive and informational services that are currently conducted, and some interpretive and informational services that will be initiated and conducted at a later date. All services are labeled to indicate what fiscal year the park intends to initiate them.

The operational details that underpin the interpretive and informational services depicted on the program overview table are described in a set of *individual service plans* (ISPs). These are located in the ID component of the CIP.

Preparing to Develop the Future Interpretation & Education Program

As development of the program begins, the planners summarize the work accomplished to date that has brought the group to this stage of the process:

- *Tenets.* We've reviewed some important tenets of the interpretive profession.

- *Mission & Management.* We've reviewed the mission of the interpretation & education program, and the specific emphases this park's management team expects of it.

- *Significance.* A strong foundation has been built with stakeholders as they explored the significances ascribed to the resources of the park, and produced an improved set of significance statements.

- *Primary Themes.* A well-crafted set of primary interpretive themes has been developed to provide visitors with opportunities that facilitate an exploration of the meanings ascribed to this park's resources.

- *Audiences.* A useful set of audiences for the program has been identified, which will help guide the selection of services and locations.

- *Visitors.* Consideration of what visitors are seeking from their park experience led to the development of visitor experience considerations, which will also help guide the selection of services and locations.

- *Operations.* Complex operational considerations have been discussed so that a common approach exists for drafting the future interpretation & education program.

- *Locations.* We've discussed which locations for offering opportunities may be most suitable to successfully facilitate an exploration of the meanings of park resources.

- *Services.* We've discussed the variety of services that are available to successfully facilitate an exploration of the meanings of park resources.

- *Partners.* A discussion of current and potential interpretive partners has enhanced understanding of what types of support and/or interpretive services partners may provide in conjunction with the park, which will help guide the selection of interpretive services and locations.

Elements of the Program Overview Table

The program overview table includes: primary interpretive themes, audiences for whom the interpretive and informational opportunities will be tailored, and interpretive and informational services paired with the locations where they will be made available to visitors.

Primary interpretive themes and informational topics are listed along the vertical axis (left side of the table) as *row headings.*

Audience categories are placed along the horizontal axis (top header area of the table) as *column headings.*

Interpretive and informational services and their locations are placed in the interior cells of the table. Interpretive and informational opportunities can be facilitated by a wide range of services (personal and non-personal) at a wide range of locations. The combination of one service and one or more locations connects a primary interpretive theme or informational topic to an audience, describing a communications link between an audience and the meanings represented in the theme or topic.

Theme-audience or Topic-audience Combinations

Primary interpretive themes and informational topics convey information that is *critical* to the facilitation of visitor understanding and exploration of the meanings ascribed to park resources. Therefore, each theme or topic *must* be made accessible to each audience by at least one *service-location(s) pair.* The number of service-location(s) pairs for each combination differs. This does not mean that one audience is less important than another. It *does* mean that for various reasons, the CIP core team has decided (at least at this draft stage) that more service-location(s) pairs are necessary for one combination than for another. The outcome-driven nature of this approach to planning determines which interpretive and informational services are needed to best accomplish the stated outcomes, and ranks them via a justifiable decision-making process (described below).

Brainstorming Service-location(s) Pairs for
Each Theme-audience or Topic-audience Combination

After the planners convey these structural ideas to the workshop participants, the next step is to address each theme-audience or topic-audience combination individually. This begins with the brainstorming of service-location(s) pairs for the combination Theme A – Audience 1. The planners solicit ideas from the participants without analysis, judgment, or critical review. The participants will perform such a review later in the process — when they rank the brainstormed ideas. The brainstorming of service-location(s) pairs, and their subsequent ranking by the group, is the process used to methodically create the contents of the program overview table's interior cells.

Throughout this exercise, the planners continually prompt the participants with a single question:

- Over the next five years, what types of services, at what locations, will most effectively facilitate the understanding and exploration of Theme/Topic __ by Audience __?

This question focuses the participants on the effectiveness of each potential chain of theme-audience-service-location(s) or topic-audience-service-location(s). The distinct attributes of each theme or topic, audience, service, and location(s) must be considered — and *are* considered by virtue of this question — as participants voice these communication strategies. Attributes, to name only a few of each, include: *Theme or topic* complexity, associated resources, interrelationships with other themes or topics, information sequencing; *service* availability, visitor access, required proximity to a specific resource, maintenance, cost; *location* of specific resources, resource integrity, viewsheds, facilities, access, visitor flow, potential impacts; *audience* knowledge, values, languages, experiences, new or returning visitors, recreation- or curriculum-based visitation.

Informal Ranking Criteria for
Service-location(s) Pairs

The CIP core team is composed mostly of interpreters, and often represents anywhere from decades to hundreds of years of combined experience in the profession of interpretation. As participants brainstorm service-location(s) pairs, they draw heavily on this extensive experience. They use it to internally clarify, describe, and characterize multiple meanings in each primary interpretive theme, informational topic depth, specific audience, types of interpretive and informational services and how effectively they work under varying conditions, and the park's resources as they relate to this theme or topic.

Each participant weighs these considerations via an internal dialogue — using internal criteria — to make value-based decisions. These criteria often include considerations like the following.

- To what degree can this primary interpretive theme be made accessible to all ages, and how might that affect the weighing of various service-location(s) pairs?

- Does this specific service-location(s) pair have good potential for increasing visitor understanding and appreciation?

- How much initial cost, then ongoing maintenance costs, does this service-location(s) pair require, including staffing considerations?

- How well does this pair lend itself to presenting the thematic material from multiple points of view?

- Does this pair offer good opportunities for universal accessibility?

- How well does this pair offer opportunities for the theme to be presented within a hierarchy of sophistication, thereby serving a wider range of ages, learning styles, and preferences of presentation within this audience?

- How well does this pair provide ways for the story to relate to audiences from a range of educational and socioeconomic backgrounds? How universal are the "universal" elements of the theme?

- How well does this pair capitalize on locations rich in tangible resources? How will those resources be impacted?

- How many visitors could this service-location(s) pair reach, and how does this compare to other service-location(s) pairs?

- Does this pair effectively communicate with several audiences or only a single audience?

- How well does this service-location(s) pair fit into a school curriculum?

- How complex or simple are the logistics to access this pair?

- How well does this pair attract visitors to under-utilized locations, enabling overused locations to recover from use fatigue?

- Does this service-location(s) pair affect future staffing decisions? Are specialized skills required to maintain this pair?

- Who can most successfully provide this type of service (agency or partner such as the cooperating association, concessioner, others), and how will that impact operations?

As the brainstorming begins and participants start to voice service-location(s) pairs that they believe will be highly successful, they begin to construct internal shortcuts as their personal criteria evolve. The case-by-case consideration of criteria like those above — both of the ideas they voice themselves, and those ideas voiced by others in the group — establishes precedents that streamline future decision-making for each individual and, ultimately, for the group as a whole as they share these thoughts with each other through discussion and subsequent ranking of each theme-audience or topic-audience combination.

Using Helper Lists to Check the
Brainstormed Set of Service-location(s) Pairs

After a brainstormed list has been generated of the service-location(s) pairs that the participants believe will most successfully enable this audience to understand and explore this primary interpretive theme or informational topic,

helper lists are referenced. Helper lists help the process stay on track. They help the planners and participants by prompting ongoing consideration of the many factors involved in developing an effective interpretation & education program. They serve to ensure that nothing important has been accidentally overlooked. Some helper lists might be displayed on flipchart sheets hung on the wall (usually information generated during this second workshop), others might be workshop handouts. Helper lists usually include:

- The mission of, and management goals for, the interpretation & education program
- Set of visitor experience considerations
- Identifying suitable locations for services
- Identifying suitable types of services
- Identifying suitable partnerships for the program
- Operational considerations

Checking a brainstormed list of service-location(s) pairs against these helper lists can result in additional pairs being brainstormed, or other modifications or deletions being made to the brainstormed list. This is an important step in introducing and applying the helper lists, and completes the brainstorming phase in preparation for the next step — ranking the pairs.

Ranking the Brainstormed Set of Service-location(s) Pairs to Prioritize Them in the Order of Anticipated Effectiveness

Now that the brainstorming for Theme A – Audience 1 has been completed in the workshop, a consensus ranking process is initiated. The basis for the ranking is to select those service-location(s) pairs that are most likely to be successful for this combination. The central question is asked again:

- Over the next five years, what types of services, at what locations, will most effectively facilitate the understanding and exploration of Theme/Topic __ by Audience __?

Participants will once again use their internal criteria, and the dialogue among participants that has occurred as the brainstormed list was generated, to respond to this question. Participants rank the brainstormed list using a nominal group process. The planners distribute a limited number of self-adhesive ranking dots to each participant, usually about a third as many dots as service-location(s) pairs. All of the participants place their dots at the same time, each placing only one dot on each pair they believe best responds to the above question, until their allotted dots are exhausted.

After all of the participants have placed their dots on the brainstormed flipchart list, the dots received by each service-location(s) pair are counted. This finalizes a consensus ranking of the list. This prioritization provides a group-generated sense of which pairs are likely to be most effective, moderately effective, and least effective for this specific combination.

Following the ranking of the Theme A – Audience 1 combination, participants repeat the brainstorming and ranking steps for all of the other theme-audience or topic-audience combinations, one by one.

During this process, service-location(s) pairs are often brainstormed that have applicability to a combination that has already been addressed. These pairs are then copied back to each combination that the participants deem appropriate. These pairs that are added *subsequent* to the ranking of that combination's original pairs should still be considered when the interpretive manager and CIP core team refines this list later in the process — even though these subsequently-added pairs are unranked.

Closeout of the Day

At the end of the workshop day, closeout of the CIP core team includes reviewing any notations on the posted parking lot sheet that have not yet been addressed by the planners, and addressing them to the satisfaction of the participants.

The CIP core team members are thanked for donating their valuable time to participate in this planning process.

Adjourn and Check for Course Corrections

Planners adjourn participants. Afterwards, the planners and leader of the park's CIP core team discuss the day's events to ensure that the park is receiving the information it needs and that the process as a whole is on track to the park's satisfaction. Adjustments are made by the planners in response to park concerns and/or suggestions, as well as their own observations.

DAY TWO

Today's Activities

The planners distribute the day's agenda and a sign-in sheet for recording those who are present. Questions are answered and issues are addressed as needed.

Future Interpretation & Education Program (Continued)

Today's tasks usually involve only one thing: making additional progress on developing the program overview table of the park's future interpretation & education program.

Brainstorming and ranking theme-audience combinations continues. If time allows, the groups transitions from theme-audience combinations to the topic-audience combinations located in the lower portion of the program overview table.

Closeout of the Day

At the end of the workshop day, closeout of the CIP core team includes reviewing any notations on the posted parking lot sheet that have not yet been addressed by the planners, and addressing them to the satisfaction of the participants.

The CIP core team members are thanked for donating their valuable time to participate in this planning process.

Adjourn and Check for Course Corrections

Planners adjourn participants. Afterwards, the planners and leader of the park's CIP core team discuss the day's events to ensure that the park is receiving the information it needs and that the process as a whole is on track to the park's satisfaction. Adjustments are made by the planners in response to park concerns and/or suggestions, as well as their own observations.

DAY THREE

Today's Activities

The planners distribute the day's agenda and a sign-in sheet for recording those who are present. Questions are answered and issues are addressed as needed.

Future Interpretation & Education Program (Concluded)

Today's primary task is to complete the program overview table of the park's future interpretation & education program. In an extreme situation, all of the remaining tasks could be accomplished by phone and email if necessary. However, it's very important that the group complete the program overview table during the workshop. The expertise of the planners, the momentum of the group, the kinds of information they're easily accessing at this time — all work together in a way that would not occur if the CIP core team had to finish this task themselves at some other time.

Brainstorming and ranking theme-audience combinations continues — and transitions into addressing *topic*-audience combinations.

Next Steps in Developing the Future Program

At this point in the workshop, the remaining sessions are mostly instructional in nature. The hardest work has been accomplished. Each of the following subjects is addressed to provide guidance as the process moves forward. The CIP core team will then actually accomplish what is mentioned in these last sessions, in the months that follow the conclusion of this workshop.

Guidelines for Refinement of the Draft Program Overview Table

At this point in the process, the program overview table has been thoroughly brainstormed, producing the first rough draft of it. It is not yet complete or finalized. The CIP core team discusses how, as a follow-on activity, the future interpretation & education program has to be looked at on a holistic level. Criteria like those cited above — as well as budgeting and staffing realities — are useful in critiquing the entire program once the initial draft program overview table is completed following this workshop. Such a critique is a necessary next step and can highlight gaps or overextended

attention to a particular audience or theme. The desired outcome is a well-balanced, value-based interpretation & education program that accomplishes the mission of interpretation at the park, and that can actually be accomplished with resources that are, or will be, available. This refinement work is usually accomplished in the following few weeks by the park's interpretation manager, with ongoing input from the CIP core team.

Indicating Service Initiation Dates on the Program Overview Table

As part of the refinement process described above, the draft program overview table should also be reviewed from the perspective of *when* the park intends to bring each of the service-location(s) pairs on line. When will each be initiated? The anticipated year that each service will initially be made available to visitors should be indicated on the program overview table. When creating the draft files for the park, the planners will provide placeholder dates that the park will replace with actual dates.

Individual Service Plans and Service-group Planning

As the interpretation manager and CIP core team refine the future interpretation & education program, the concurrent development of individual service plans can begin. *Individual service plans* (ISPs) are the operational backbone of the interpretation & education program, providing logistical and other details that the interpreters performing the work must know to successfully do their jobs. Each chain of theme/topic-audience-service-location(s) on the program overview table is represented on an ISP, described in detail.

Individual service plans should contain only the type and depth of information deemed useful by the manager. The function of ISPs is to record the information that will help the interpretation manager and park staff make informed operational decisions, articulate the reasons for those decisions, understand the nature of each service, conduct each service, and streamline annual reporting. This detailed information is also useful for assessing the many elements of the interpretation & education program as they are developed and evaluated over time.

In some cases, an ISP might represent a single service. In other cases, an ISP might represent a group of services. A single ISP might document a wide range of complex information, presented by a variety of individuals, all communicating the same primary interpretive theme to the same audience. For instance, if the service is an interpretive talk, many different interpreters might present these talks over a given year. The content of their talks ties into the same primary interpretive theme, but each talk is distinct. The titles of each talk might be recorded on the ISP to provide a shorthand reference to the thematic content being presented to the visitor. Some parks request talk outlines from individual interpreters, which may then be referenced in the associated ISPs but contained in a talk notebook that is also referenced in the CIP's ID component. Such a resource can be very valuable in training. Or an ISP might be much simpler and more narrowly focused than this example. In the end, ISPs simply make the machinery of the interpretation & education

program work, and work together, more efficiently and effectively.

Service-group Planning with ISPs

It can be useful to group multiple ISPs that describe the same type of service. Individual service plans for wayside exhibits are an excellent example of what is to be gained by thinking of them as a service group. Waysides are usually designed several at a time (by site within the park, or the entire park at once) and funding is procured for the *group* of exhibits, in response to a funding proposal that groups them as a single project. The park's ISPs for wayside exhibits identify the primary interpretive themes or informational topics made accessible by the waysides, may identify the subthemes for each panel or subgroup of waysides, which audiences they are intended to serve, and their locations.

Taken together, all of the ISPs for the park's wayside exhibits form the nucleus of a conceptual wayside exhibit plan. With the addition of appropriate information and formatting, this information can evolve into a more complete wayside exhibit plan. Such media plans are often referenced in the ID component of the CIP.

Focus on the First Year's ISPs

Although individual service plans provide an opportunity to detail all aspects of the park's interpretation & education program — including those services that don't yet exist but are slated for future development — care should be exercised in the expenditure of staff time and effort. For example, generating a detailed ISP for a specific exhibit for which there is not yet any funding may not be the best use of staff time. However, at least the first year's ISPs need to be generated for the CIP so that the first AIP is accurate and useful. Any existing interpretive and informational services that were not mentioned during the development of the program overview table — either through inadvertent omission or simply because they were not valued as being one of the best ways to facilitate the exploration of a particular primary interpretive theme or informational topic by a specific audience — should be identified and appropriate consideration given to rehabilitation, discontinuance, or removal of the service.

ISPs and Ongoing Evaluation

The park's interpretation & education program is dynamic, not static. Changes regarding audiences, funding, resources, technology, and others, continually occur. To maintain the relevance and usefulness of the ISPs, they should be re-evaluated as significant new information becomes available. Ongoing evaluation should occur as a routine practice. Specific information should be gathered about each service-location(s) pair, as time and funding allow, so that course corrections can be based on reliable information.

Role of the Cooperating Association in the Park's Interpretation & Education Program

At this point in the second workshop, participants discuss a specific partner — the park's cooperating association — and its contributions to the park's interpretation & education program. Discussion centers on how the cooperating association, in conjunction with park staff, decides what

products and services to sell or provide to the public in support of the park's interpretation & education program, subject to approval by the park superintendent. These decisions should be made on the same basis as the development of the future interpretation & education program: with primary interpretive themes (and informational topics) and audiences determining strategies for communication through sales items. A useful tool for making these decisions, the *Scope of Sales Statement*, is similar to the program overview table and ISPs described above. The Scope of Sales Statement is discussed in detail; its development is also included in the CIP scheduling process that will end this workshop.

CIP Component 2: Annual Implementation Plan (AIP)

Discussion now turns to the planning steps that will occur following the completion of the LRIP component of the CIP and ISPs (for the first year) — namely the creation of the first Annual Implementation Plan (AIP).

Developing an AIP from the LRIP

The creation of an AIP is accomplished in the following manner.

- *One.* Complete the Long-Range Interpretive Plan (CIP Component 1).

- *Two.* Open the LRIP electronic file (Microsoft Word®); then save it under a new name (such as "AIP-2005.doc").

- *Three.* Customize the new file to create the upcoming year's AIP (Annual Implementation Plan, CIP Component 2).

Customization of the new file includes the following steps.

Delete

- Delete the service-location(s) pairs on the overview of the *future interpretation & education program* that are not relevant to the coming year, thereby turning it into the *annual interpretation & education program* (program overview table) for the coming year.

- Delete the tasks on the *LRIP Action List* that are not relevant to the coming year, thereby turning it into the *AIP Action List* for the coming year.

Add

- Add the *annual operating budget* based on the *annual interpretation & education program* — interpretive and informational services that the park intends to provide in the coming year, including staffing and training considerations.

- Add an evaluation of the current year's *annual interpretation & education program*, and compare it to the *annual interpretation & education program* for the coming year.

Modify

- Modify the overview table of the *annual interpretation & education program* to account for new or changed management emphases, changes in staffing, training, funding, etc. Revise the program as actual budget information is generated during the year.

- Modify the amount of detail in the *AIP Action List*, as needed, including adding deadlines, identifying lead staff for each task, partners involved, special recruiting efforts, etc. The CIP core team should ensure that these actions dovetail with other work-planning efforts that direct and monitor the work performed by the staff of this program.

- Modify the *issues and influences* section to update changes in issues, or issues that management specifically needs to emphasize in the coming year.

- Modify the ISPs in the ID component of the CIP, accounting for all of the above as appropriate.

Advantages of this Process

- This approach provides an appropriate opportunity for the long-range aspects of the CIP to be re-examined annually.

- It ensures that the long–range vision is still the driving force behind the annual interpretation & education program, which progressively implements that long-range vision (the future interpretation & education program).

- It reduces the time necessary to create an AIP because the bulk of the work has already been accomplished via the development and maintenance of the LRIP, much of which carries over to the AIP with little change.

Modifying the AIP Throughout the Year, then Making the Next One

Throughout the year, changing circumstances will influence the actual interpretation & education program conducted by the park and its partners. As this occurs, the AIP should be modified (updated) to reflect these changes, to the extent deemed useful by the park's interpretation manager. Those changing circumstances that will influence the interpretation & education program not only in the current year, but in subsequent years as well, should also prompt relevant updating of the LRIP. By virtue of this feedback method, the LRIP will remain a relevant and useful foundation for developing each year's AIP. Judgment should be exercised so that the LRIP continues to preserve the vision of the future interpretation & education program, while remaining relevant to current circumstances.

Subsequent AIPs are not based on the prior year's AIP; *they are always based on the up-to-date LRIP*. Using the LRIP as the master file *each year* for forming the coming year's AIP keeps the annual interpretation & education program firmly grounded in the consensus vision founded with stakeholders.

Developing the AIP's Program Overview Table

A Streamlined Process

Creating the overview table of the Annual Interpretation & Education Program in an AIP is as simple as duplicating the program overview table in the LRIP and stripping out all of the services that are not yet relevant to the operational year in question. This keeps the LRIP and each AIP intricately connected, better ensuring the accomplishment of the desired future program.

Describing the LRIP Action List and Developing the AIP Action List

When considering the initiation dates of services, it is especially important to address the service-location(s) pairs which do not yet exist — interpretive talks not currently being presented, lesson plans not yet written, no existing waysides in that location — because services usually require more work to initiate than to adjust. They also require the development of realistic funding strategies to accommodate these modifications to the program.

The strategic *LRIP Action List* describes the major actions that are necessary to fully and successfully implement the *future* interpretation & education program.

The tactical *AIP Action List* is a stepped-down, year-specific version of the LRIP Action List. It describes the major tasks that are necessary to fully and successfully implement the *annual* interpretation & education program. It is more focused and detailed than the strategic version, and influences work plans of individual staff members.

Connecting Individual Efforts to the Operational Details in the CIP

The CIP describes the park's future interpretation & education program at the strategic level *and* the tactical level. These two levels provide direction and guidance — a framework — upon which an individual interpreter's duties are founded. However, every aspect of every duty is not specified in detail in either of these two levels, nor should it be. This level of detail can be considered a third level in the hierarchy: specific preparations (project work) by individual interpreters and general duties.

Each project has it own unique tasks, materials, costs, and schedules that need to be taken into account by the individual interpreter. Likewise, each interpreter has assigned duties that may or may not vary in some degree from those of other interpreters. Both kinds of specific details change rapidly and frequently. They are very much part of specific, individual planning efforts, which should dovetail with and be guided by the park's comprehensive interpretive planning, but are not part of the CIP *per se*.

Regarding individual interpretation programs, such as specific interpretive talks, ISPs focus the staff's efforts on making thematic interpretation available to specific audiences by providing specific services at specific locations. Since primary interpretive themes are critical to visitors'

understanding and exploration of the resource's meanings, but there are myriad subthemes that could be used to facilitate this exploration, the ISPs for interpretive talks usually only specify the *primary* interpretive theme. They usually don't detail subthemes or specific talk outlines to be used by interpreters. Specific talk titles, objectives, outlines, and program content are usually not recorded or referenced in ISPs. These things are usually specific to the interpreters giving the talks and the resource conditions at that time, and are generally planned by the individuals conducting the service. (The exception may be visitor use assistants or others whose jobs are to present interpretive talks based on outlines or scripts prepared by others. In this case, those outlines or scripts may indeed be referenced in the ISP.)

Some of the information associated with these interpretive talks, however, still needs to be recorded. Log sheets still need to be completed. Schedules still need to be made. Outlines and scripts may need to be written (benefiting future interpreters). This operational information is necessary for statistical analysis, performance reviews, and supervision. The park folds this information into the CIP in a way suited to that park's situation. For example, one of the procedures a park might want to initiate is to require interpreters to make notations on log sheets regarding which *primary interpretive theme* their talk addressed (through their talk's subtheme), and their categorization of the *audience* for each episode of conducting an interpretive talk or other service.

Something many parks already do is maintain a notebook of interpretive talk outlines. Such a notebook can reproduce the primary interpretive theme, subtheme, talk title, presenters, goals, and objectives of individual talks, as well as information like specific logistical considerations or support materials. Some parks generate several such notebooks (one for talks, another for illustrated programs, another for guided walks, etc.). The notebooks can be organized by primary theme or informational topic, audience, or other category via tabbed subsections.

Such resources are tremendously valuable for new interpreters that come to the park and often need ideas in a hurry to meet presentation responsibilities and schedules. They can also be a source of prepared or "canned" presentations if the park employs park guides, volunteers, or others whose developmental level or responsibilities may include presenting such programs, but not developing them. These types of resources are referenced in the ID component of the CIP.

Revision Cycles of a CIP

The CIP extends about five years forward from the time of initial planning. During this period, minor updates to the plan will be made to accommodate changing circumstances at the park. Minor updates may be made periodically or on an as-needed basis.

The CIP should undergo a major revision when it becomes obvious that the upcoming AIP will diverge so widely from the LRIP that a major review of the LRIP's future interpretation & education program is required to reestablish a consensus vision. Although there is no way to predict this cycle — the cycle of major course corrections to the CIP, with stakeholder participation — we recommend the park align the stakeholder review of the CIP with other major park planning efforts, if possible. The review of a park's Strategic Plan and implementation plans occurs every five years, offering just such an opportunity. The difference between the initial start dates of these plans and the CIP will, of course, have some bearing on the feasibility of this suggestion.

Next Steps in the Process

Developing the Schedule for Completing the CIP

The planners discuss what subsequent tasks need to be accomplished to complete the CIP, and answer any questions the team may have regarding the process or the resulting CIP. Example CIPs from other parks are usually reviewed again, now that the core team has brainstormed their own program overview table and can better understand how all of the elements of the process will contribute to their park's CIP.

At this point, the scheduling of remaining tasks to complete the CIP is considered, and tentative dates and responsibilities are established and recorded by all participants.

Closeout of the Day and Workshop

At the end of the workshop day, closeout of the CIP core team includes reviewing any notations on the posted parking lot sheet that have not yet been addressed by the planners, and addressing them to the satisfaction of the participants.

The CIP core team members are thanked for donating their valuable time to participate in this planning process.

Adjourn and Check for Course Corrections

Planners adjourn participants. Afterwards, the planners and leader of the park's CIP core team discuss the day's events to ensure that the park has received the information it needs and that the process as a whole is on track to the park's satisfaction. Adjustments are made by the planners in response to park concerns and/or suggestions, as well as their own observations.

This concludes the second CIP workshop. Planners travel home. All of the follow up work between the planners and the CIP core team will now occur via telephone, electronic mail, and traditional mail. ••

After the CIP Workshops

Usually within no more than several weeks after the second workshop's conclusion, the planners accomplish the following tasks.

- **Draft Archive File.** The planners transcribe the remainder of the information generated during the first workshop (if they haven't done this yet), and all of the information generated during the second workshop, into the *draft Archive file*.

- **Draft LRIP File.** The planners then create the *first draft LRIP* by customizing the planners' master file template for LRIPs, copying appropriate excerpts of the Archive file into this template file.

- **Draft ID File.** The planners create the *first draft ID* (if they haven't done this yet) by customizing the planners' master file template for IDs.

These three files (or two files if the ID file was sent earlier in the process) are then sent to the park via electronic mail. Files are written in Microsoft Word® (a format that the park staff themselves use for word processing) to facilitate ease of updating and other manipulation, such as producing a graphically enhanced version of the LRIP for fundraising or other purposes.

The format of the CIP facilitates ongoing, minor updates. Care should be taken not to overcomplicate it or include in the design any elements that would serve as hindrances to keeping it relevant to current park operations. This does not preclude duplicating the LRIP and modifying it (in whole or in part) at any time for a *secondary* use, such as a document designed for a fundraising campaign or other initiative, complete with photographs, multiple colors, special binding, or whatever else is necessary to serve the intended purpose.

Roles During CIP Completion

The planners' continuing role is to serve as editors and sounding boards during completion of the CIP.

The CIP core team's primary task is to continue development of the LRIP. Once the LRIP is drafted, all planning participants should be given an opportunity to comment, at the park's discretion. Reviews of drafts often include stakeholders that were not present in the workshops. Comments are incorporated and the LRIP is completed. The ID is also completed during this period.

Developing the first AIP from the LRIP occurs next. All three CIP components are now complete.

The park manager approves the park's first CIP and subsequent versions.

Actual implementation of the CIP occurs when the first AIP is put into use.

The CIP must be kept current to retain its relevance to operations. The park decides when to re-evaluate the CIP, and to what extent. They review the LRIP at least annually, as the basis for each AIP. Updating and strengthening the CIP in response to changing conditions and evaluations of the interpretation & education program is straightforward and direct, and offers an opportunity to reinvigorate the program and staff. ••

The Work of Interpreters

This approach to interpretive planning — rooted in a holistic view of the profession, comprehensive in nature, inclusive of stakeholders and multiple points of view — leads to increased understanding and appreciation of the place, better protection of park resources, more effective partnerships, solutions to management problems. To the greatest extent possible, it ensures that the interpretation & education program offers interpretive and informational services that provide opportunities for people to explore their own intellectual and emotional connections to the meanings ascribed to the resources of parks — connections that often last a lifetime.

The work of interpreters has become an increasingly challenging endeavor. Establishing clear communication and fostering active civic engagement is more complex than ever before. In this publication, we've attempted to explore interpretive planning theory and practice from a variety of perspectives to help interpreters and managers better accomplish the mission of their park's interpretation & education program.

The role of the heritage interpreter can be seen as akin to a sacred trust — guiding people to more deeply and thoughtfully explore the world, enhancing a sense of personal enrichment, and creating opportunities for more meaningful participation in society. Quality of life is inextricably tied to a sense of place in this world — and sense of place is intimately tied to personal and shared experience of heritage.

By fostering personal connections to heritage resources, the interpreter also facilitates the sense of stewardship necessary to guarantee that the integrity of those resources will be protected and maintained unimpaired to enrich the lives of generations to come. For those of us in the craft, there is great satisfaction in providing the public service that enhances understanding, appreciation, protection, and perpetuation of the resources we love. By helping others to search out their own place in the great tapestry of life, we can better find our own.

As learner, teacher, guide, caretaker, and public servant, the interpreter occupies a unique and valuable niche in modern society. Like the bard, sage, muse, and court jester of elder days, the interpreter uses storytelling to provoke thoughtful introspection and enhance enjoyment while carefully respecting individual perspective and independence.

That can often be a stern test of character. The degree to which most interpreters are emotionally and intellectually invested in the heritage resources they interpret can lead to impatience, overzealousness, and arrogance vis-à-vis the visiting public. It's all too easy for the interpreter to conclude that he or she knows best. We must constantly be aware of our own weaknesses and biases — and of the fact that people invariable decide for themselves what heritage resources mean. We must trust that an honest, professional, diverse, and sound presentation of ideas and perspectives will lead visitors to find value in heritage — and that once heritage is valued, it will be cherished and protected.

As daunting and humbling as it may be to take on the responsibility to help others discover meaning, the work of the interpreter is always thoughtful, challenging, and meaningful.

Do good planning — and have fun with it. ••

CIP Kit

Comprehensive Map of Planning Materials

MATERIALS Used in a Comprehensive Interpretive Planning Process	TYPE OF TOOL					
	Planners' Form	Planners' Guide	Planners' Letter	Generic Handout	Archive Handout	Template; Example
Materials Used in Initiating the CIP Planning Process						
Comprehensive Interpretive Plan *Scope of Work*	●					
Project Initiation Checklist	●					
Stakeholder Invitation Letter			●			
Materials Used in Conducting the First CIP Workshop						
Note: Some of the materials used in the First CIP Workshop will be used again in the Second CIP Workshop. In these cases, a grey-shaded row indicates a tool that first appears earlier within the sequential staging of materials inside CIP Guide — earlier within this "Comprehensive Map of Planning Materials."						
Planners' Guide for the First Workshop		●				
Day 1 — **Mission of a Park's Interpretation & Education Program**				●		
Today's Agenda (Day 1)				●		
SIDES 1 & 2 / **Are You Really Here at the Workshop?**				●●*		
Do You Know Something We Don't Know?				●		
SIDE 1 / **Developing the Set of Significance Statements**				●		
SIDE 2 / **The Set of Significance Statements /** CASE STUDY				●		
Current Statements of Significance				●		
Tenets of an Effective Program and its Services				●		
SIDE 1 / **Developing Interpretive and Informational Services**				●		
SIDE 2 / **Overview of the Future Interpretation & Education Program /** CASE STUDY				●		
Developing the Set of Primary Interpretive Themes				●		
SIDE 1 / **Developing a Primary Interpretive Theme from a Set of Significance Statements /** CASE STUDY / *Note: 33 additional examples are located in the appendix.*				●		
SIDE 2 / **Developing Subthemes & Interpretive Services from a Primary Interpretive Theme /** CASE STUDY				●		
Day 2 — **Today's Agenda (Day 2)**				●		
SIDES 1 & 2 / Are You Really Here at the Workshop?				●●		
Developing the Set of Significance Statements				●		
Developing the Set of Primary Interpretive Themes				●		
Developing Statements of Desired Visitor Experiences				●		
Day 3 — **Today's Agenda (Day 3)**				●		
SIDES 1 & 2 / Are You Really Here at the Workshop?				●●		
Developing the Set of Audiences for the Program				●		
SIDE 1 / **A CIP's Three Components and their Elements**				●		
SIDE 2 / **Comprehensive Interpretive Planning Process Details**				●		
SHEET 1 / SIDE 1 / **Relationship of the Program Overview to an ISP /** CASE STUDY				●		
SHEET 1 / SIDE 2 / **Individual Service Plan — Interpretive Talks /** CASE STUDY				●		
SHEET 2 / SIDE 1 / **Individual Service Plan — Wayside Exhibit /** CASE STUDY				●		
SHEET 2 / SIDE 2 / **Individual Service Plan — Translated Park Brochure /** CASE STUDY				●		
Archive of the Comprehensive Interpretive Planning Process / CASE STUDY						●**
Long-Range Interpretive Plan (CIP Component 1) / CASE STUDY						●
Annual Implementation Plan (CIP Component 2) / CASE STUDY						●
Interpretive Database (CIP Component 3) / CASE STUDY						●
Materials Used Between CIP Workshops						
Archive of the Comprehensive Interpretive Planning Process						●
Foundational Information to be Edited Between Workshops						●
Interpretive Database (CIP Component 3)						●
Email Transmission Memo: Foundational Information and ID			●			
Materials Used in Conducting the Second CIP Workshop						
Planners' Guide for the Second Workshop		●				
Day 1 — **The Mission of, and Management Goals for, the Interpretation & Education Program**					●	
SIDE 1 / A CIP's Three Components and their Elements				●		
SIDE 2 / Comprehensive Interpretive Planning Process Details				●		
SIDE 1 / Developing Interpretive and Informational Services				●		

Comprehensive Map of Planning Materials

MATERIALS Used in a Comprehensive Interpretive Planning Process	Planners' Form	Planners' Guide	Planners' Letter	Generic Handout	Archive Handout	Template; Example
SIDE 2 / Overview of the Future Interpretation & Education Program / CASE STUDY				○		
SHEET 1 / SIDE 1 / Relationship of the Program Overview to an ISP / CASE STUDY				●		
SHEET 1 / SIDE 2 / Individual Service Plan — Interpretive Talks / CASE STUDY				○		
SHEET 2 / SIDE 1 / Individual Service Plan — Wayside Exhibit / CASE STUDY				●		
SHEET 2 / SIDE 2 / Individual Service Plan — Translated Park Brochure / CASE STUDY				○		
Today's Agenda (Day 1)				●		
Are You Really Here at the Workshop?				●		
Do You Know Something We Don't Know?				●		
Developing the Set of Significance Statements				●		
Set of Significance Statements (*finalize*)					●	
Developing the Set of Primary Interpretive Themes				●		
Set of Primary Interpretive Themes (*finalize*)					●	
Developing the Set of Audiences for the Program				●		
Tenets of an Effective Program and its Services				●		
Set of Audiences for the Program (*finalize*)					●	
Developing Desired Visitor Experiences				●		
Set of Visitor Experience Considerations (*finalize*)					●	
Operational Considerations (*finalize*)					●	
SIDE 1 / **Identifying Suitable Locations for Services**				●		
SIDE 2 / **Identifying Suitable Types of Services**				●		
Identifying Suitable Partnerships for the Program				●		
SIDE 2 ONLY / Overview of the Future Interpretation & Education Program / CASE STUDY				●		
Informal Ranking Criteria for Service-Location Pairs				●		
Day 2 **Today's Agenda (Day 2)**				●		
Are You Really Here at the Workshop?				●		
Day 3 **Today's Agenda (Day 3)**				●		
Are You Really Here at the Workshop?				●		
SIDE 2 ONLY / Overview of the Future Interpretation & Education Program / CASE STUDY				●		
SHEET 1 / SIDE 1 / Relationship of the Program Overview to an ISP / CASE STUDY				●		
SHEET 1 / SIDE 2 / Individual Service Plan — Interpretive Talks / CASE STUDY				○		
SHEET 2 / SIDE 1 / Individual Service Plan — Wayside Exhibit / CASE STUDY				●		
SHEET 2 / SIDE 2 / Individual Service Plan — Translated Park Brochure / CASE STUDY				○		
SIDES 1-3 / **Role of the Cooperating Association in the Park's Interpretation & Education Program**				●		
SHEET 1 / SIDE 1 / **Developing an AIP from the LRIP**				●		
SHEET 1 / SIDE 2 / **Developing the AIP's Program Overview**				○		
SHEET 2 / SIDE 1 / **Developing the AIP Action List**				●		
SHEET 2 / SIDE 2 / **Revision Cycles of the CIP**				○		
Archive of the Comprehensive Interpretive Planning Process / CASE STUDY						●
Long-Range Interpretive Plan (CIP Component 1) / CASE STUDY						●
Annual Implementation Plan (CIP Component 2) / CASE STUDY						●
Interpretive Database (CIP Component 3) / CASE STUDY						●
SIDE 1 / A CIP's Three Components and their Elements				●		
SIDE 2 / Comprehensive Interpretive Planning Process Details				○		
Developing the Schedule for Completing the CIP				●		
Materials Used After the CIP Workshops						
Email Transmission Memo: Archive File and Draft LRIP			●			
Long-Range Interpretive Plan (CIP Component 1)						●

* *If you have the ability to print two-sided workshop materials, please note that a black dot indicates side one and a grey dot indicates side two.*

** *These items are either stand-alone templates (Microsoft Word® XP electronic files) or case-study examples. Please write or call us to receive these files. See inside back cover for contact information.*

Materials Used in Initiating the CIP Planning Process

The materials in this section are used to negotiate and initiate the comprehensive interpretive planning process, and to set up the first CIP workshop. ••

Comprehensive Interpretive Plan
Scope of Work

National Park Service
U.S. Department of the Interior

Intermountain Region
Office of Interpretation and Education

{parkname}

Introduction and Purpose

{parkname} has requested assistance from the interpretive planners of the Office of Interpretation and Education, Intermountain Region (IMDE), to conduct a comprehensive interpretive planning process with the park. This project has been approved by the IMDE through its annual prioritization process for work requests.

National Park Service policy states that each park shall have a *Comprehensive Interpretive Plan* (CIP) that includes a long-range vision of the interpretation & education program, an annual component to implement the vision, and a reference database. Completion of all three components is critical to ensuring that interpretive resources are coordinated and focused on achieving management's vision for the park. The three principle components of the CIP are:

- Long-Range Interpretive Plan (LRIP)
- Annual Implementation Plan (AIP)
- Interpretive Database (ID)

This Scope of Work identifies how the process will develop the park's CIP. This document has been developed collaboratively by the park staff and planners, and outlines what will be done, who will do it, when it will be accomplished, and what it will cost.

Process Structure and Participants

The process consists of pre-workshop preparations, two interpretive planning workshops that accomplish the majority of the CIP development work, and post-workshop refinement and completion of the CIP.

Pre-workshop Preparations. Meeting arrangements are made, stakeholders are invited, and information is exchanged between the park and planners.

The First Workshop Builds the Foundation of the CIP. The first workshop is three days long and conducted in or near the park. Stakeholder participation is critical to the success of the first workshop. Their participation provides numerous, diverse subject-matter experts, and fosters an understanding of each other's views, the park's mission, the role of interpretation in that vision, and the specific mission of the interpretation & education program. The term "stakeholders" refers to those individuals and groups that have a significant stake in how the park's interpretation & education program is

managed. These interested parties often include cooperating associations, friends groups, concessioners that provide interpretive or educational services to park visitors, chambers of commerce, affiliated cultures, non-governmental conservation and historical organizations, schools and universities, museums, other agencies (federal, state, local), and other park partners. "Stakeholders" also includes park management, subject-matter experts from all divisions of the park staff, park concessions specialists, media specialists, interpretive planners, and others. The optimal number of participants is 15-30 to assure diversity of perspectives and process manageability.

The preceding list of potential stakeholders is provided as a guideline; the park staff develops the list and makes the appropriate arrangements for stakeholder participation, with input from the planners. Invitations for attendance are generally issued by the superintendent; an invitation template is available from the planners.

Stakeholders not on the CIP core team only attend the first two days of the first workshop. The CIP core team attends the workshop all three days. It is composed of park interpretive staff, park manager, cooperating association staff, and concessioners or others who provide interpretive or educational services to park visitors.

The Second Workshop Develops the Future Interpretation & Education Program. The second workshop will also be three days long and conducted in or near the park. The second workshop includes only the CIP core team. The optimal number of participants is about 6-12 to assure diversity of perspectives and process manageability. This workshop applies the information generated in the first workshop, developing the draft future interpretation & education program.

Post-workshop Tasks. The planners prepare draft documents following the second workshop, transmit them to the park, then continue to assist the core planning team with the remaining tasks necessary to complete the CIP.

Roles and Responsibilities

Near-term Collaboration. The planners work collaboratively with the park staff to arrive at a common expectation of the process, set up and conduct the two planning workshops, and generate the initial follow-up work. Usually within several weeks of the second workshop's conclusion, the planners create three electronic files:

- The planners transcribe the workshop-generated information into a *draft Archive file*. This file is a detailed archive of the planning process — including multiple versions of some material — and serves as a permanent record of the full range of ideas generated during the planning activity.
- The planners create the *first draft LRIP* by customizing the planners' master file template for LRIPs (copying appropriate excerpts of the archive file into this file).
- The planners create the *first draft ID* by customizing the planners' master file template for IDs.

These documents are delivered in a word-processing format that is useful to the park, usually Microsoft Word XP® unless specified otherwise.

Long-term Collaboration. The planners' continuing role is to serve as editors and sounding boards during completion of the CIP. The CIP core team's primary task is to continue the decision-making that constructs the final LRIP. Once the LRIP is fully drafted, all planning participants should be given an opportunity to comment, at the park's discretion. Review of drafts often includes stakeholders that were not present in the workshops. Comments are incorporated and the LRIP is completed. The ID is also completed during this period.

Park staff develop the first and subsequent AIPs from the LRIP. The AIP describes the interpretive services to be provided, and actions to be accomplished, in the coming year, driving the individual work plans of the park's interpretive staff.

The park manager is the approving authority for the park's first CIP and subsequent versions. Implementation of the CIP occurs when the first AIP is put into use.

The CIP should be no more complex than needed to make justifiable decisions and clearly articulate their rationale. It must be kept current to retain its relevance to operations. The park decides on what periodic basis they are going to re-evaluate the CIP, and to what extent. They review the LRIP at least annually, as the basis for each AIP.

Funding

The usual funding arrangement is a division of costs between the IMDE and park:

First Workshop. Two IMDE planners will conduct the interpretive planning workshop. The IMDE funds the planners' salaries. The park funds the travel costs of the planners and costs regarding the meeting room, related logistical costs, and all other miscellaneous costs associated with the first workshop.

Second Workshop. The same planners conduct this interpretive planning workshop. The IMDE funds the planners' salaries *and* their travel costs. The park funds only those costs regarding the meeting room, related logistical costs, and all other miscellaneous costs associated with the second workshop.

Approval

{parkname}

_____   _____
{Superintendent}   Date

_____   _____
{Chief / Interpretive Manager}   Date
{Division of Interpretation}

{Office of Interpretation and Education (IMDE-OIE) Intermountain Region, NPS}

_____   _____
{Chief}   Date

••

Project Initiation Checklist

Park: _____ Contact name: _____ Contact title: _____

Telephone: _____ FAX number: _____

Documents Needed by the Park's Interpretive Staff

__ *(Sent all three files on: _____):*
- **Project Initiation Checklist** file (send blank form to park *before* calling them about it's content).
- *CIP Guide* file.
- **Scope of Work** template file.

Documents Needed by the Planners

__ Park folder
__ Other publications for general orientation of the planners / visitors
__ *General Management Plan* (GMP)
__ Enabling legislation *(often a part of the GMP, or a stand-alone photocopy)*
__ *Strategic Plan* (5-Year, GPRA) *(electronically if possible)*
__ Organizational chart of the park's interpretation staff

Initial Considerations for the Park and Workshop Setup Specifications

__ **CIP Process.** Briefly discuss process and ask what customization may be needed.
__ **Who should be invited?** Discuss stakeholder possibilities *(uniforms are discouraged as potentially divisive)*.
__ **Where?** Suggest the workshop be held away from the park (to maintain focus of participants).
__ **Room size.** Room should accommodate anticipated size of group (____ people), with tables.
__ **Walls.** Room needs to be able to accommodate posting about 20 flipchart sheets.
__ **Flipcharts.** Need two (2) sturdy easels, with paper pads, and tape/pins to hang sheets.
__ **Table tents, paper pads, pens.** Can the park provide these? (We'll provide markers with a pleasant smell.)
__ **First CIP Workshop:** *Day 1* / Date _____ / Start (8:00) _____ / End (5:00) _____
　　　　　　　　　　　　　　Day 2 / Date _____ / Start (8:00) _____ / End (4:30) _____
　　　　　　　　　　　　　　Day 3 / Date _____ / Start (8:00) _____ / End (4:30) _____
__ **Second CIP Workshop:** *Day 1* / Date _____ / Start (8:00) _____ / End (4:30) _____
　　　　　　　　　　　　　　　Day 2 / Date _____ / Start (8:00) _____ / End (4:30) _____
　　　　　　　　　　　　　　　Day 3 / Date _____ / Start (8:00) _____ / End (4:00) _____

Travel Considerations for the Planners

__ **Park account for first workshop?** Account #_____.
　　　(discuss travel authorization process; IMDE planners make their own arrangements/documents).

__ **Transportation recommendations?** Fly? Drive (rental, GOV)? Both? Particulars:
　　　_____

__ **Lodging recommendations?** Particulars:
　　　_____

Stakeholder Invitation Letter

{Park letterhead}

{Date}

{Name & address}

Dear {Name}:

The National Park Service is preparing to develop a *Comprehensive Interpretive Plan* for {parkname}. The plan will describe what the park's interpretation & education program intends to accomplish over the next five years or so. It will serve as a long-range blueprint for the program.

This long-range plan requires the participation of a variety of stakeholders and cannot be accomplished solely by park staff. This effort needs to involve our neighbors, supporters, partners, and friends who know and use the park. We are inviting local agencies, organizations, and individuals to participate in a two-day workshop that will lay the foundation for this plan. We will be discussing the significance of the park's resources, how best to facilitate visitor exploration of those significances, and visitor expectations of the interpretation & education program.

We invite you to join us as a workshop participant to help lay the groundwork for developing this plan. The workshop is scheduled for {Date} and {Date} from 8:00 a.m. to 5:00 p.m. The meetings will take place in the {Name} Room of the {Hotel name} located at {Location}. Refreshments {and lunch?} will be provided to participants both days. Please contact Chief Interpreter {Name} at {telephone} or {e-mail address} prior to {Date} to confirm your participation, or to answer any questions. If you cannot attend, you may designate another person to attend in your place.

We realize that you are busy and that this workshop will require a commitment of time on your part. Your participation is critical to making this planning process meaningful. We are confident that you will enjoy the satisfaction of being part of the team that develops the plan that will guide the interpretation & education program at {parkname} for years to come. We hope you will agree to join us so that, together, we might better serve the public and provide improved interpretive and informational services.

Sincerely,

{Name}
Superintendent

••

Materials Used in Conducting the First CIP Workshop

The materials in this section are used to conduct the first workshop of the comprehensive interpretive planning process.

The key tool is the *Planners' Guide for the First CIP Workshop* that begins on the following page. We suggest that planners prepare to conduct the first CIP workshop in the following ways:

- Customize the *Planners' Guide* by adding any project-specific or park-specific information that you feel is needed. (There is usually very little additional information needed.)

- Print a hard copy of the *Planners' Guide*.

- Update the table of *Contents* to account for any shift in paging due to your customization of the *Planners' Guide*.

- Print the *Contents* as a temporary reference.

- Thumb through the *Planners' Guide* page by page. Every time you come to a handout in the planners' guide, simply locate that handout by name on the *Contents* and print that page (or those pages) in the quantity needed. Referencing or printing the *Comprehensive Map of Planning Materials* will also assist you in printing workshop handouts.

- The *Current Statements of Significance* handout will need to be generated differently because it is not generic — it's park specific. Depending on what the park provides the planners, you'll need to either type the statements into the provided, pre-formatted handout page or copy the statements from an electronic file and paste them into the handout.

When all the handouts have been printed and you've assembled them in the order of their use, all that's left is to run through the *Supplies and Materials* checklist on the first page of your *Planners' Guide*, pack, and travel. ••

Planners' Guide for the First CIP Workshop

{parkname}

{Richard Kohen & Kim Sikoryak}, Interpretation Planners, {National Park Service)

Schedule in Brief

	MONDAY, {w1date1}	Scheduled travel day and meeting.
8:00 a.m. – 5:00 p.m.	**TUESDAY**, {w1date2}	Scheduled workshop day.
8:00 a.m. – 4:30 p.m.	**WEDNESDAY**, {w1date3}	Scheduled workshop day.
8:00 a.m. – 4:30 p.m.	**THURSDAY**, {w1date4}	Scheduled workshop day (and travel home?).
	FRIDAY, {w1date5}	Potential travel home.

Supplies and Materials

Park provides: (2) <u>flipchart easels w/paper pads</u>, <u>tape</u>, <u>table tents</u>, <u>writing paper and pens</u>.

Planners provide (pack and travel with):
- ☒ This *Planners' Guide for the First CIP Workshop*.
- ☐ <u>Complete package of planner's handouts and support materials</u> and <u>personal notes</u>.
- ☐ Various <u>park planning and background documents</u>.
- ☐ (3 boxes) <u>markers</u>.
- ☐ (2 packages) <u>ranking dots</u> for use in ranking desired visitor experiences.
- ☐ Workshop <u>handouts</u>: multiples for the large group (____ +3+2 = ____)
  and the core planning team (____ +2+2 = ____).

MONDAY, {w1date1}

Today's Schedule for the Planners

Travel. / Lunch or snack? / Drive to park?

3:00 p.m. Meet with Superintendent and Chief of Interpretation at _____
- ☐ Ask the superintendent to open the meeting on the first day, then introduce the chief who will briefly introduce us to the group.
- ☐ (If appropriate to this park,) Ask superintendent if their are useful visitor experience or interpretive sections in the General Management Plan or Strategic Plan.
- ☐ Inform the superintendent that on Thursday morning, we'll ask him/her, "What does park management expect the park's interpretation & education program to accomplish for the park?"
- ☐ Discuss particularly sensitive issues and personalities that may impact the workshop.
- ☐ Discuss Scope of Work; sign if completed.

Before 5:00 p.m. Review and set up workshop meeting room at _____ (*see illustration below*).

Before 5:00 p.m. Experience the park and/or visitor center, as appropriate and as time allows.

Evening activities
- ☐ <u>Hands-on-object.</u> Obtain a commercially-manufactured and labeled water bottle (full) or similar object that has many easily-identified tangible characteristics and intangible meanings. It will be used in tomorrow's interpretive foundation session (preceding primary interpretive themes) as a tangible object.
- ☐ Purchase water, food, and snacks for the planners.

Typical Room Arrangement

Set up tables and chairs in a "U"-shape, with a table for the planners angled into one of the two ends of the semicircle. The primary flipchart should be placed against the wall which the semicircle faces, centered in that space. The second flipchart should be set in a corner, off to the side, until needed.

Every planning job varies since room dimensions and the possibility of space oddities — like support columns distributed throughout a space — create challenges to setting up a room in the most useful organization possible.

> *Note. Always arrange the room on Monday if possible (discuss this with the park staff ahead of time); having to arrange it the morning of the workshop is needlessly stressful and counterproductive.*

The arrangement illustrated below provides seating for 29 participants plus two planners. This is the recommended, approximate maximum number of participants for this workshop.

Long wall with plenty of room for hanging flipchart paper sheets.

Flipchart

Planners

TUESDAY, {w1date2}
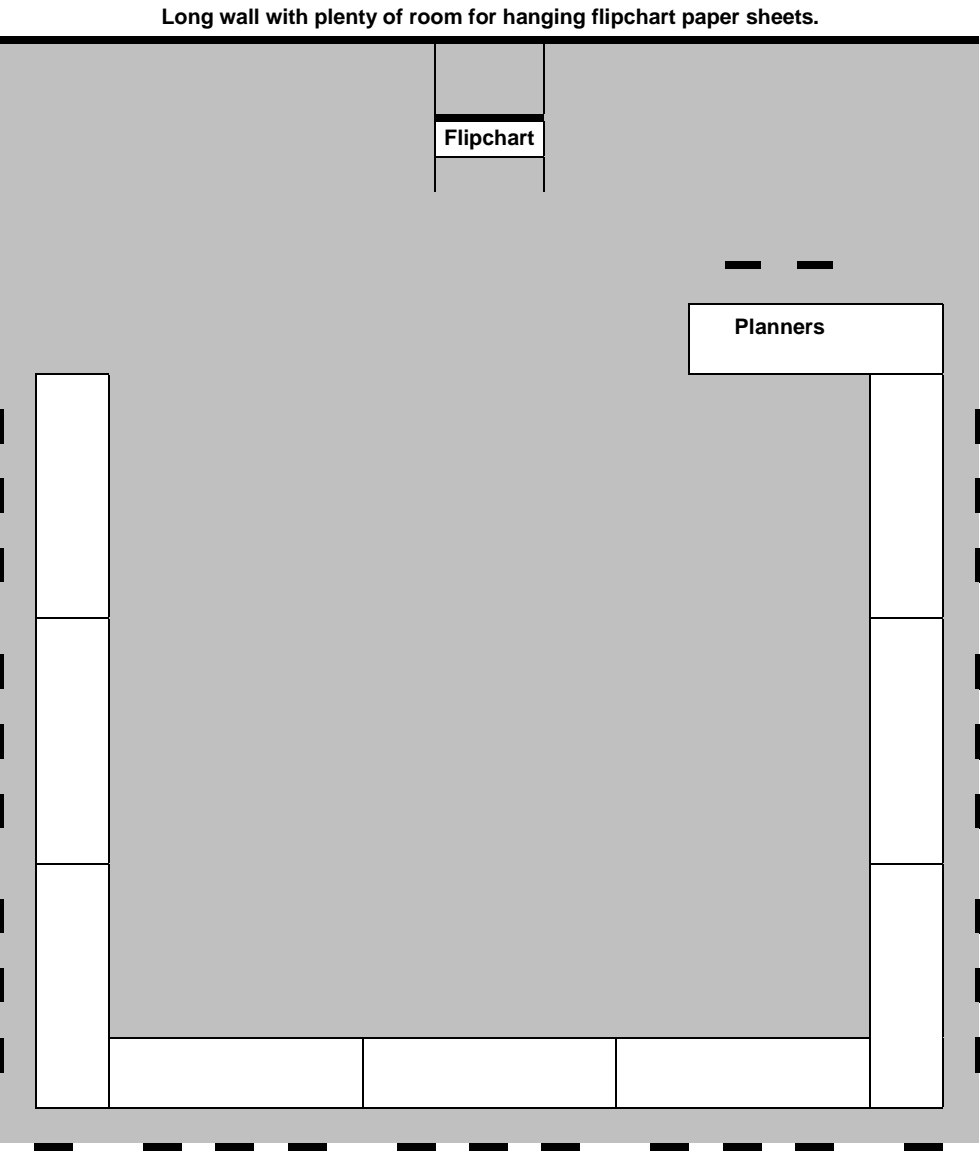
Pre-workshop Preparation

*<u>FLIPCHART:</u> **Introductory Questions.** Before starting the session, write the following three questions, but keep them concealed until needed:*

- *Who are you?*
- *What organization or interest do you represent?*
- *Why is this place special or important to you (personally)?*

Welcome and Introductions

*The park **superintendent** usually opens the meeting with a few brief remarks welcoming the participants, then introduces the chief of interpretation.*

*The **chief** usually has a few brief remarks regarding the importance of the CIP, then introduces the planners by name.*

*<u>FLIPCHART:</u> **Introductory Questions.** The **first planner** stands, reveals the three questions on the flipchart, and personally answers them.*

Who are you?

What organization or interest do you represent?

Why is this place special or important to you (personally)?

*The **first planner** then directs the questions to the stakeholder at the nearest end of the u-shaped room arrangement.*

Then each stakeholder responds in kind, going around the room.

*This ends when the **second planner** responds. The tone should be conversational, friendly, warm, and welcoming. Nothing said is recorded since this session is intended to offer a chance for participants to get to know each other. The second planner then has the floor, and uses it to provide an overview of the workshop (below).*

Overview of the Workshop

This is a significant place to the American people — both collectively and, as we've just heard, individually.

This place was added to the National Park System because of this collective significance (via an act of the President, or of Congress).

The National Park System protects and interprets America's significant places.

The mission of the National Park Service — the agency that manages the System — is

"...to conserve the scenery and the natural and historic objects and the wild life therein, and to provide for the enjoyment of the same in such manner and by such means as will leave them

unimpaired for the enjoyment of future generations...." (from the Organic Act establishing the NPS, 1916.)

Or put another way, "The National Park Service preserves unimpaired the natural and cultural resources and values of the [N]ational [P]ark [S]ystem for the enjoyment, education, and inspiration of this and future generations. The [National] Park Service cooperates with partners to extend the benefits of natural and cultural resource conservation and outdoor recreation throughout this country and the world." (from the NPS Strategic Plan, 2000.)

Interpretation is an important part of that enjoyment, education, and inspiration.

Handout: **Mission of a Park's Interpretation & Education Program**

Distribute. Participants self read. Verbally reinforce key ideas. Answer questions.

These are the guiding principles underpinning interpretation & education programs at parks in the National Park System.

Achieving these outcomes in an effective, coordinated manner only results from thoughtful, comprehensive planning.

Each of you has a key role in shaping the opportunities for exploration provided to visitors by {parkname}'s interpretation & education program during the next 5 years or so.

FLIPCHART: COMPREHENSIVE INTERPRETIVE PLAN (CIP). *Diagram the CIP:*

Comprehensive Interpretive Plan ("CIP" is one of the few acronyms we'll use)
- *Long-Range Interpretive Plan*
- *Annual Implementation Plan(s)*
- *Interpretive Database*

The CIP is composed of three components:
- a long-range (5 years) component
- a short-range (annual) component
- a reference database of supportive materials

The Comprehensive Interpretive Plan (CIP) is the basis for virtually all programmatic *decisions* regarding interpretation & education in the park.

The CIP addresses both *long-range and annual* planning needs.

The CIP addresses both *personal and non-personal* services, regardless of provider.

The CIP addresses both *interpretive and informational* services, regardless of provider.

The CIP involves *stakeholders* in establishing the foundation and vision for the interpretation & education program. The process involves all of you, and others.

The CIP is *designed to be updated* as needed while staying true to the stakeholders' vision for the program. That's how it remains relevant to operations.

The CIP combines long-range planning with daily operational planning. All three of its components are designed to be fully *integrated* and work together as a useful, adaptive plan that maintains its functionality over time.

The Different Roles of Stakeholders and Planners

This workshop focuses on the long-range component of the park's Comprehensive Interpretive Plan. Today and tomorrow, we will brainstorm and gather ideas regarding the most definitive stories of {parkname}.

All of you possess knowledge about the park's significant resources and have a stake in the park's interpretation & education program; your role is to generate ideas and represent your constituencies' perspectives.

The CIP core team of the park's interpretive staff will actually complete and implement the CIP — and ultimately the chief of interpretation and the park superintendent are charged with the responsibility and accountability for the operation of the park's interpretation & education program. They cannot, however, carry out this task responsibly without your continuing involvement in the process.

We will guide the planning process — that's our role; we will keep the workshop visionary and not get too specific because we are after ideas, not final products or language. We'll keep the process on a course that will be inclusive and yet drive towards the kinds of information necessary to create an effective plan.

Help us ensure that this CIP is no more complex than need be, that it is accurate, and that it is constructed in such a way that it really does provide a reliable foundation on which to base decisions regarding the interpretation & education program.

Any questions?

Lasts about 10 minutes

Today's Activities and Facilitation Essentials

*Handout: **Today's Agenda (Day One)***

Distribute. Participants self read. Verbally reinforce key ideas. Answer questions.

*Handout (sides 1-2): **Are You Really Here at the Workshop?***

Distribute 2-sided handout. (Side 2: continuation of table on side 1.) Ask the workshop participants to "sign in" so that the planners and CIP core team can contact them if questions arise. Note that this information will also be useful in recording a record "for posterity" of those who participated in the workshop.

*Handout: **Do You Know Something We Don't Know?***

Distribute. Inform the participants that any sheets received will be addressed by end-of-day tomorrow, as appropriate (some comments may be confidential).

Logistics and Workshop Administration

Present meeting logistics information: food, restroom locations, phone, and any similar concerns.

***FLIPCHART: RULES OF THE ROAD.** Write the title. Record guidelines suggested by participants. Post. Ask participants for rules of the road (such as "one conversation at a time," "no bad ideas," "controversy is okay.")*

***FLIPCHART: PARKING LOT.** Write the title. Describe intended use of this sheet. Post.*

The parking lot is intended to capture ideas that are better addressed later in the workshop. We don't want to lose your ideas, so we'll park them here until they can best be addressed. Our promise to you: By the end of the workshop, we'll review any ideas left on the sheet to make sure that everything gets addressed.

Questions?

Break

Importance of Park Resources

This morning, we heard that

- the power of this place, the significances of this place make it special and important to people, both individually and collectively;

- the significances of this place are what drew people here in the past, what draws them here today, and what will draw future generations;

- the significances of this place are what caused it to be added to the National Park System, the collection of America's most significant places;

- the significances of this place drive the development of interpretive services.

The power of this place — its significance to people — drives how we in the National Park Service manage it.

—

The task at hand is for this group to arrive at a set of statements that capture the essence of this place, the power of this place. To do this as a group, it's helpful to approach the task from a *common or shared understanding* of what we're going to do. Please read this handout then we'll discuss the task.

Handout (side 1): **_Developing the Set of Significance Statements_**

Distribute 2-sided handout (side 2: The Set of Significance Statements / Case Study).

Participants self read. Verbally reinforce key ideas. Answer questions.

Significance statements are factual, but go beyond just data and provide context that makes the data meaningful.

FLIPCHART: *SIGNIFICANCE. Write the title. Write beneath the title, "Facts in context."*

Handout (side 2): **_The Set of Significance Statements_** */ Case Study*

Participants self read. Verbally reinforce key ideas. Answer questions.

Improve Existing Statements and Craft New Statements as Appropriate

Planners' notes. *The planners' packet should include photocopies of the park's enabling and subsequent legislation for themselves. Verbally read relevant extracts from the legislation associated with the park. Point out that this type of material is usually very general — on purpose. Explain.*

Is there any language in the *legislation* that adds to our understanding of the park's significance?

(FLIPCHART: SIGNIFICANCE.) *Record participant responses to this question.*

Handout: **_Current Statements of Significance_**

Distribute. Participants self read. Use this handout to compare the group's ideas — as expressed this morning in the introductions — with the park's existing statements.

We need to discuss several aspects of this set of significance statements:

- *Completeness:* Are all of the concepts — that you think need to be in these statements — really in them?

- *Improvements:* Do you wish to propose additions, subtractions, or language changes to promote accuracy, clarity, and completeness?

(FLIPCHART: SIGNIFICANCE.) Record participant responses to this question.

Test the modified significance statements for quality, using the criteria on the handout.

End this session. *Ask the group to decide the preferred order for listing the significance statements — if appropriate. The goal of such ordering is clarity, not priority.*

Questions?

The lunch break usually occurs just before or after the "Fundamentals of Interpretation" session (below) The lunch break lasts about 1 hour and 15 minutes; a break lasts about 15 minutes

Break

Note. *At this point in the workshop, one of the planners will sometimes edit and refine the set of significance statements while the other conducts the "Fundamentals of Interpretation" session (below). Sometimes, one or both planners accomplishes this task during the lunch break. The goal of doing this work is to present the participants with a more cohesive and refined set of significance statements before the interpretive themes session slated to begin in the afternoon. Remember that the participants will be divided into two groups for most of the interpretive themes session, so both groups need to be able to see the refined set of significance statements during that session. In other words, a set of newly written flipchart sheets only works if both groups can see it. If they stage into two separate rooms, the planners will need to arrange for the revised significances to accompany both small groups to separate locations. A hand-written or computer-generated version of the set of significances can be very useful if a printer or photocopier is available, generating one copy for each participant. And don't forget to eat lunch!*

(FLIPCHART: SIGNIFICANCE.) During break, post all sheets.

Assemble both flipcharts in the center of the presentation area.

LEFT FLIPCHART: TANGIBLES.
*Do not write the title. Instead, write "**See, Hear, Smell, Taste, Touch**" across the top of the sheet, but leave room above them for a title to be added later in the session.*

RIGHT FLIPCHART: INTANGIBLES.
*Do not write the title. Instead, write "**Ideas, Meanings, Beliefs, Values**" across the top of the sheet, but leave room above them for a title to be added later in the session. **Leave this sheet concealed.***

Lasts about 30-45 minutes

Fundamentals of Interpretation

Hands-on-object: Commercially labeled water bottle or similar object — obtained upon arrival on site. *Make ready the object.*

LEFT FLIPCHART: TANGIBLES. *Reveal the flipchart sheet.*

> We're going to start this object around the room. Please pass it to the next person after you answer this question:
>
> - Can you name a *physical characteristic* that you can ascribe to this object?

(LEFT FLIPCHART: TANGIBLES.) Record participant responses to this question. Responses will likely include words like "clear," "heavy," "sloshy," "ridged," "writing on it," etc. Once enough people have done this (5-7) so that everyone else understands, move on to the next step in the presentation sequence.

(Hands-on-object — Commercially labeled water bottle or similar object.) Retrieve the object from the person who last answered.

RIGHT FLIPCHART: INTANGIBLES. *Reveal the flipchart sheet.*

> Now we're going to ask another question:
>
> - Can you name an *idea, meaning, belief, or value* that you might ascribe to this object?

(RIGHT FLIPCHART: INTANGIBLES.) Reveal the flipchart sheet. Record participant responses to this question. Responses will likely include words like "purity," "life-giving," "marketing," "recycling," "power," "portable," etc. Once enough people have done this (5-7) so that everyone else understands, move on to the next step in the presentation sequence.

> What's a good title for these terms?

(LEFT FLIPCHART: TANGIBLES.) Add the title "Tangibles" above the previously-written description words.

> And if those are *tangibles*, then these must be....

(RIGHT FLIPCHART: INTANGIBLES.) Add the title "Intangibles" above the previously-written description words.

> What do interpreters do?

Make sure to allow time for participant reflection and a variety of responses. Then conclude by asserting the following:

> They tell stories.
> Humans communicate through story.
> *You* communicate through story.

Other examples — use as many (or few) as needed to promote understanding:
- *You told stories this morning when introducing yourselves.*
- *You told stories during lunch.*
- *How do we teach children about the world? Through story.*
- *Remember returning to school, "What did you do on summer vacation?" Stories.*
- *Monday morning at work, "How was your weekend?" Stories.*
- *Talk with spouses when you get home, "How was your day?" Stories.*
- *How do you celebrate holidays — with family? Stories.*
- *How many of you watch television? You watch stories.*
- *Read newspapers? Listen to radio? Songs? Go to movies? Stories.*

(LEFT FLIPCHART: TANGIBLES.) Flip the "Tangibles" sheet over the back of the easel.

*LEFT FLIPCHART: STORY TANGIBLES. Write "**stepmother, pumpkin, mice, glass slippers, prince**" or similar set.*

What story do these represent?

Not much time will pass before participants answer "Cinderella."

Are these words a story?

Not much time will pass before participants answer "no."

What's missing?

Intangibles are missing. Discuss how tangible elements alone do not make a story. Intangible elements are a necessary ingredient in storytelling. Intangibles are the morals of stories, the reasons for telling stories, the memorable parts of stories.

(RIGHT FLIPCHART: INTANGIBLES.) Flip the "Intangibles" sheet over the back of the easel.

RIGHT FLIPCHART: STORY INTANGIBLES. *Marker at the ready to record quick, multiple responses, ask the following question.*

What's the meaning of the Cinderella story?

(RIGHT FLIPCHART: STORY INTANGIBLES.) Record participant responses to this question. Responses will likely include "never give up hope," "good wins over evil," "patience is rewarded," "friends help you overcome adversity," "good things happen to good people," etc.

After writing down a variety of responses, ask the following question.

Which answer is the *right* answer?

One of the participants will usually respond correctly, but if not, then the planner will answer as follows.

They all are.

Each of these is *right* if it has meaning for the story listener, the audience member, the park visitor, the person who ascribes this meaning to the story.

Interpretation takes place *in* the visitor.

Discuss and explore the notions of personal sovereignty and multiple points of view.

An effective story connects tangibles to the ideas, meanings, beliefs, and values that define human experience — intangibles, especially *universal* intangibles.

Universal concepts are ideas to which we can all relate, although the meanings we independently assign to them may vary greatly. For instance, family, adversity, love, responsibility, life, learning, birth, happiness, freedom, nature, and morality are all examples of universal concepts.

Discuss universal concepts to the extent useful for this particular group of stakeholders. Sometimes highlighting the universals that appear on the Cinderella intangibles flipchart can be useful. Move on as soon as it appears that a common understanding has been reached.

The parts of stories that have the greatest value are intangibles, especially intangibles that connect with a wide range of people (universal concepts).

That's true in parks as well.

Interpreters tell stories by connecting the park's tangible resources to intangible ideas and meanings using interpretive themes.

—

Why do people tell stories to each other?

Make sure to allow time for participant reflection and a variety of responses. Responses might include to "learn," "teach," "entertain," "persuade," "as a metaphor for greater truth (like Aesop's fables)," "for tradition," "to perpetuate a system of meanings and values (society, civilization)," and "to re-live an event." "Children ask for the same stories over and over." "Some visitors want the same information each visit and will tell the interpreter that any new information is wrong just because it's different."

Then conclude by asserting the following:

We use stories to connect to, explore, clarify, and share the meanings, ideas, and values that collectively constitute our culture and our world.

(Handout Review): Mission of a Park's Interpretation & Education Program

Verbally reiterate the mission of interpretation as stated in the handout.

People are driven to explore meanings through *story*.

Handout: **Tenets of an Effective Program and its Services**

Distribute as concluding reinforcement of this session's content. Participants self read. Briefly discuss.

Lasts about 15 minutes

Break

During the break, revise the flipchart arrangement.

<u>(LEFT FLIPCHART: TANGIBLES.)</u>	<u>(RIGHT FLIPCHART: INTANGIBLES.)</u>
Post the used sheets. Keep this flipchart in place (but center it).	*Post the used sheets. Remove this flipchart to the side, keep it for later use.*

Significance Revisited

*Handouts (if printed/photocopied over lunch) / **or** / Posted flipchart sheets:*
[revised draft set of Significance Statements].

*Distribute handout / **or** / refer to posted sheets. Participants self read. Briefly discuss.*

Achieve consensus on edited significance statements, as appropriate. If closure proves difficult, remind the group that ideas — not final wording — are what the process needs at this point.

Using Story to Facilitate Visitor Connections to Park Resources (Primary Interpretive Themes)

Introduce Interpretive and Informational Services

*Handout (side 1): **Developing Interpretive and Informational Services***

Distribute 2-sided handout (side 2: Overview of the Future Interpretation & Education Program / Case Study).

Participants self read. Verbally reinforce key ideas. Answer questions.

Introduce the Future Interpretation & Education Program

*Handout (side 2): **Overview of the Future Interpretation & Education Program / Case Study***

Participants self read.. Verbally reinforce key ideas. Answer questions.

> Everything we're going to work on together during these two days moves us toward developing the future interpretation & education program.
>
> This is an overview of a park program....

Describe the components of the program overview.

Introduce Primary Interpretive Themes

> For the remainder of today, we're going to concentrate on primary interpretive themes.
>
> These broad statements express the significances of the park's resources using story (the way that people explore meanings with one another).
>
> They facilitate visitor connections of tangibles (the significances of the park's resources) to the important ideas, meanings, beliefs, and values that define human experience (intangibles) — especially *universal* intangibles.
>
> —
>
> To write interpretive themes as a group, it's helpful to approach the task from a *common or shared understanding* of what we're going to do. Please read this handout, then we'll get started.

*Handout: **Developing the Set of Primary Interpretive Themes***

Distribute. Participants self read. Verbally reinforce key ideas. Answer questions.

*Referring to the handout, revisit **universal concepts**.*

*Handout (side 1): **Developing a Primary Interpretive Theme from a Set of Significance Statements** / Case Study*

Distribute 2-sided handout (side 2: Developing Subthemes & Interpretive Services from a Primary Interpretive Theme / Case Study).

Participants self read. Verbally reinforce key ideas. Answer questions.

Describe interpretive subthemes — the level of themes usually used in individual services.

> The **set** of primary interpretive themes communicates the **set** of significance statements.

Discuss several of the significance and theme examples on the handout.

*Handout (side 2): **Developing Subthemes & Interpretive Services from a Primary Interpretive Theme** / Case Study*

***Note.** Only refer to this side of the handout if useful to provide context for understanding the role of primary interpretive themes. Participants self read. Verbally reinforce key ideas. Answer questions.*

> In this workshop, we'll concentrate on ***primary*** interpretive themes.

Write a Draft Set of Primary Interpretive Themes

***Note.** Never begin with existing themes. Always start new — as if the park does not have a current set of primary interpretive themes. This ensures a valuable double-check on existing themes by avoiding seeking validation of current themes. Indications of overlap will be very useful and telling, and in fact, all of the current primary interpretive themes may ultimately be validated by this "blind" process.*

*The large participant group splits into **two** small groups to jot down theme ideas and work towards drafting primary interpretive theme statements, based on the significance statements.*

Each small group is led by a planner.

Each small group must have access to the revised significances.

Emphasize ideas over final wording — final language will be written later.

***FLIPCHART (for each group): THEME IDEAS.** Write the title. Record participant ideas moving from words and phrases to complete sentences that include tangibles, intangibles, and universal concepts. Specificity is especially useful.*

When Approximately 30 Minutes Remain in the Workday...

Reassemble the original (large) participant group.

Theme ideas and draft themes are presented by each small group.

The large group discusses the material to the extent possible (this may be brief due to participant exhaustion and the waning of the workday).

The planners ask the group the following question.

Would it be okay with all of you if we [the planners] continued to synthesize the significance statements and draft themes tonight? The goal would be to draft a set of primary interpretive theme statements as a starting place for all of us tomorrow.

Note. No one has ever turned down this offer.

Day One is Adjourned

Thank you for all of your hard work today. We look forward to continuing this tomorrow. We'll start at the same time tomorrow, same place.

Have a great evening!

ADJOURN.

*Debrief with the Chief. How did it go today? Anything unexpected happen? Best parts of day? Worst parts of day? Getting what you need? Any course corrections the planners need to make? **Remind the Chief that the planners will need about 150 sheets of <u>LEGAL-SIZE PAPER (14" x 8-$\frac{1}{2}$")</u> tomorrow morning for the desired visitor experiences session.***

If working off site tonight, the planners need to take the following with them: flipchart easel or paper pad, draft significance statements, theme ideas and draft primary interpretive themes, markers, tape.

Dinner.

After dinner. The evening work for the planners is an intense and critical activity to move the group forward in tomorrow's workshop. In addition to the planners, others infrequently participate in this evening activity, including the Chief of Interpretation or interpretive planning trainees if any are involved in the workshop.

Planners work on synthesizing theme ideas. This evening session usually runs 3-4 hours long. Additionally, the planners debrief with each other and strategize how best to conduct the workshop tomorrow.

WEDNESDAY, {w1date3}

Begin at about 8:00 a.m. — Lasts about 2 hours

Statements of Significance and Primary Interpretive Themes (continued)

Statements of Significance (continued from yesterday)

> *Note: <u>CAUTION!</u> Only revisit the draft set of significance statements if some further consensus on them is necessary before doing more work on the draft set of primary interpretive themes; otherwise, go directly to the theme section below.*
>
> *(Handout Review): <u>Developing the Set of Significance Statements</u>*
>
> *As needed, refer participants to various sections of this handout from yesterday.*
>
> *Review and edit the statements as appropriate to ensure that necessary concepts are represented.*
>
> *Test the draft set of significance statements for quality — using the handout.*
>
> *Achieve consensus on the statements, and on their preferred order.*

__FLIPCHART:__ SIGNIFICANCE (Revisions). Record participant responses.

__Primary Interpretive Themes (continued from yesterday)__

__(Handout Review): Developing the Set of Primary Interpretive Themes__

As needed, refer participants to various sections of this handout from yesterday.

Read the set of draft primary interpretive themes.

Discuss and edit the set of primary interpretive themes by asking:

> We need to discuss several aspects of this draft set of primary interpretive themes:
>
> - *Concept relationships:* Are the tangibles, intangibles, and universal concepts connected together in ways that make sense?
>
> - *Grounded in resources:* Does this draft set of themes accurately and adequately represent the entire set of significance statements?
>
> - *Completeness:* Are all of the concepts that you think need to be in these statements really in them?
>
> - *Improvements:* Do you wish to propose additions, subtractions, or language changes to promote accuracy, clarity, and completeness?
>
> Let's word-smith only to better articulate the concepts (further refinement, if needed, will occur at a later date).

__FLIPCHART:__ PRIMARY INTERPRETIVE THEMES (Revisions). Record participant responses.

Test draft set of primary interpretive themes for quality — using the handout.

Achieve consensus on the statements, and on their preferred order.

Lasts about 15 minutes

Break

During the break, tear strips of masking tape and position for ease of use (or — make ready pre-cut tape dispensers).

Remove flipchart sheets from the walls, clearing space for the desired visitor experience session sheets (below).

__LEGAL-SIZE PAPER (14" x 8-$\frac{1}{2}$").__ Ensure that the paper and ample markers (one per person) are available for the desired visitor experience session (below).

__FLIPCHART:__ WHO VISITS {parkname}? Write the title on flipchart to prepare for the "who visits this place" session below.

Lasts about 5 minutes

Today's Activities

> Now that we've finished with old business from yesterday, we're going to leave significance statements and themes behind us and focus on visitors.
>
> Here's today's agenda.

Handout: __Today's Agenda (Day Two)__

Distribute. Participants self read. Verbally reinforce key ideas. Answer questions.

*Handout (sides 1-2): **<u>Are You Really Here at the Workshop?</u>***

Distribute 2-sided handout. Ask the workshop participants to "sign in" so that the planners and CIP core team can contact them if questions arise. Note that this information will also be useful as a record "for posterity" of those who participated in the workshop.

If you were here yesterday, and signed in yesterday, we just need your name today (not the rest of the information).

Questions?

Who Visits {parkname}?

We're going to shift gears a little bit now and briefly discuss who visits the site today, and what the future trends in visitation might be.

This is a necessary precursor to the next thing we'll do today: discuss the variety of ways that visitors want to experience the park.

As you'll remember from the "Tenets" handout from yesterday, it's useful to think of visitors as "people who experience the park" — a much more inclusive definition than "those who enter the park only by crossing a physical threshold or boundary."

So, who visits this park? You can categorize your answer in any way you want. You can approach this question by demographics, activities, interests, affiliations, group type. It's totally open-ended because we want each of you to address this question in a way that makes sense to you.

If any recent research is available — from the park staff, the chamber of commerce, state tourism board, or other sources — let's hear what that has to say.

Who visits this park?

<u>FLIPCHART:</u> WHO VISITS {parkname}? Record participant responses to this question. Post sheets as each is filled so that previous suggestions can be seen.

*As the flow of responses begin to wane, suggest that the discussion should also include **underrepresented groups**, and groups the park wants to make a special effort to attract. Mark each of the responses with a symbol (*) and note the meaning of the symbol on the bottom of one of the sheets.*

*Indicating all of the sheets, prompt the participants to indicate if any of the visitor groups are expected to 1) **increase** (mark with an UP arrow) or 2) **decrease** (mark with a down arrow).*

This list is evidence that there are many ways to answer the question.

However, you'll also note a common denominator:

- All of these visitors are seeking something of value for themselves. It's the visitor who defines what that value is for himself or herself.

Desired Visitor Experiences

What do you think visitors want to be able to do, see, and experience at the park, including through technologies enabling remote experiences?

To answer this as a group, it's helpful to approach the task from a common or shared understanding of what we're going to do. Please read this handout then we'll get started.

*Handout: **Developing Statements of Desired Visitor Experiences***

Distribute. Participants self read. Verbally reinforce key ideas. Answer questions.

FLIPCHART: DESIRED VISITOR EXPERIENCES. *While participants are reading the handout, write the title. Beneath the title, write "do, see, experience" and "intellectually, emotionally, physically, inspirationally" beneath that. These are just reminder words and can be written large enough to fill the entire flipchart sheet.*

(Handout Review): Developing Desired Visitor Experiences

Verbally reinforce key ideas. Answer questions.

Verbally highlight examples, reinforcing that complete thoughts are most useful (Please don't write single words like "fishing").

Verbally highlight the portions of the handout that describe how desired visitor experiences will ultimately be used in park interpretive planning.

Individuals Write Desired Visitor Experiences

LEGAL-SIZE PAPER (14" x 8-$\frac{1}{2}$"). *Distribute 2 sheets of paper to each person. and 1 marker to each person (allowing participants to select a color/scent of their liking).*

Here are the instructions for the next step:

- The statements need to fall within the guidelines of the handout.

- The statements should express complete thoughts, as previously discussed.

- You may only write only one statement per sheet.

- Statements should be written on the longitudinal axis (landscape format).

- Statements are going to be posted — so the size and legibility of your writing needs to facilitate that.

- When you're done with each sheet, please toss them into the middle of the floor in front of you, or raise your hand, or place them on the leading edge of the table — just so we see you're done and we'll pick them up and post them.

- After you've finished writing both statements, please feel free to take a short (5 minute) break while we finish posting all of them.

Ask participants to write statements of desired visitor experiences on the blank sheets.

Questions? Commence writing.

(FLIPCHART: DESIRED VISITOR EXPERIENCES.) While participants are writing, this flipchart is moved off to the side of the posting area.

Planners post the sheets in such a way as to facilitate their reading and, later, ranking by the participants. This usually means about one inch separating each sheet (this spacing helps the planners un-tape and re-tape them as the sheets are repositioned during subsequent phases of this session).

Ranking the Statements (Phase One)

Welcome back. Here's a preview of the next major steps:

- In a moment, we'll read through all of the posted statements.

- After that, you'll rank the statements (as individuals) to express the relative merit of these ideas based on what you think visitors most want to do, see, and experience.

Now, after we read through them, but before you rank them, we'll ask you to do one more thing. While we're reading the sheets, we need you to start thinking about this:

- *Consolidation of similar ideas:* If any two sheets express the same thought, we'll ask you to identify them and we'll ask you if those sheets should be lumped together as a single idea for the purposes of ranking.

   That's because if two or more sheets say relatively the same thing, then being asked to rank one over the other dilutes the usefulness of the information being gathered.

   We'll ask, "**Does anyone want these ideas to remain separate?**" If even one person expresses that the might want to rank one above the other, then we'll leave the statements as is.

Questions?

Both planners take turns reading the statements aloud. They read through the entire set.

Are there any major ideas that were just missed, or that need to be represented here that no one wrote?

If any suggested additions are made, a planner or the suggester writes the statement and it is posted with the others. At most, only 2-3 ideas should probably be entertained.

Are any of the statements so similar that you'd like to lump them? Which ones?

Does anyone want these two to remain separate?

These questions are repeated for each suggested lumping. As indicated by participants, the planners lump some of the statements, physically repositioning one statement over another on the wall. Each time, the planners ask the participants which statement they want to be remain visible (on top).

Note. *Identifying key concepts of some statements may also be useful (since several statements usually convey multiple ideas, overlapping other statements). The planners use a contrasting-color marker to underline key words or phrases as needed, and as acceptable to the participants, to clarify what content ranking will be based on.*

(The lunch break often occurs at this point. If too early for lunch, continue the session.) Lasts about 30 minutes

Ranking the Statements (Phase Two)

<u>**SELF-ADHESIVE DOTS (used for ranking).**</u> *The planners use scissors to cut dot sheets into quantities-per-participant that approximate 25%-35% of the statements visible on the wall.*

What would visitors want the core interpretive planning group — the group of folks who will continue this process and then implement the plan — to keep in mind as the core team determines what kinds of interpretive services will most effectively enable visitors to explore the park's significances?

You're going to have an opportunity to respond to this question by ranking the posted statements.

*(SELF-ADHESIVE DOTS (used for ranking).) Distribute ranking dots to each
participant — usually about 3-8 dots depending upon the number of statements to be
ranked.*

Each participant receives the same number of self-adhesive dots.

Note. *Discrimination between types of participants, groups, or individuals defeats the
consensus power of the exercise — and should not be allowed: No different-sized dots
for some participants; no one person or group receiving a distinct color from others.*

> Instructions: On any particular statement, you may place as many dots as you like (all, many, few, none) depending on
>
> - how *strongly* you feel about the statement and
>
> - how many other statements you'd also like to mark (how *widely* you'd like to cast your ranking dots).
>
> Questions? Rank 'em!

*When participants are finished, planners tally the results in a corner of each sheet
using a contrasting-color marker.*

> As you can see, the group of statements usually breaks into three sections:
> - Statements receiving the most dots
> - Statements receiving some dots
> - Statements receiving no dots
>
> The statements, and their relative rankings, are an indication of how you, at this time (much like a focus group), thought these should be ranked.
>
> Although not a scientific sampling, this information will be very helpful to the core CIP group when it addresses what services should be provided, in what locations, using what techniques.
>
> Any surprises? Questions?

Lasts about 1-2 hours (highly variable)

Stakeholder Issues and Suggestions for Improving the Interpretation & Education Program

*__FLIPCHART: STAKEHOLDER ISSUES AND SUGGESTIONS.__ Return the flipchart to
the center. Write the title.*

> No program operates in a vacuum. The park depends on internal staff and stakeholders such as yourselves to provide input, feedback, and energy into making the interpretation & education program successful.
>
> We'd like to go around the room and begin by asking those who aren't officially part of the park's staff,
>
> - What concerns or suggestions for improvement do you have for the interpretation & education program of this park?

*(FLIPCHART: STAKEHOLDER ISSUES AND SUGGESTIONS.) Record participant
responses, with attribution by name and organization.*

> And now, the same question for park staff. If you're like most parks we've worked at, you don't often get a chance to get together in such a complete group.
>
> - What concerns or suggestions for improvement do you have?

(FLIPCHART: STAKEHOLDER ISSUES AND SUGGESTIONS.) Record participant responses, with attribution by name and organization.

Cross discussion will also occur during this session. When this wanes, move on.

Next Steps in the Process

Discuss the tentative schedule for the park's CIP and drafts.

Discuss the continued participation of external stakeholders in the process.

Questions?

(POSTED: PARKING LOT.) Address any items remaining on the parking lot or any written notes received by the planners (as appropriate).

Day Two is Adjourned with Closing Words for External Stakeholders

Thank you for all of your hard work these two days.

CIP core team, we'll start at the same time tomorrow, same place.

Safe travel everyone!

ADJOURN.

Debrief with the Chief. *How did it go today? Anything unexpected happen? Best parts of day? Worst parts of day? Getting what you need? Any course corrections the planners need to make?*

The planners remove the desired visitor experience statements from the wall in order of their rank, stapling grouped sheets together, and stacking all sheets in ranked order (this facilitates subsequent data entry in rank order).

*The planners assess (for retention) all of the flipchart sheets produced during the two days. They ask the Chief if "theme ideas" should be retained. **Note: Place the "Who Visits {parkname}" sheets aside for use in tomorrow morning's audience session; do not pack them.***

The planners neatly stack all of the sheets to be retained in the order that the sessions were conducted (this facilitates subsequent data entry in chronological order for the Archive file), fold them, and pack them. The planners recycle (if possible) or discard unwanted sheets.

Dinner. *During dinner, the planners debrief with each other and strategize how best to conduct the workshop tomorrow.*

THURSDAY, {w1date4}

Pre-workshop Preparation

Note: *If traveling home at end of day, check out of hotel this morning!*

(POSTED: WHO VISITS {parkname}?) Post these sheets before the workshop for reference during the audience session (below).

Today's Activities for the CIP core team

Good morning. Here's today's agenda.

*Handout: **Today's Agenda (Day Three)***

Distribute. Participants self read. Verbally reinforce key ideas. Answer questions.

*Handout (sides 1-2): **Are You Really Here at the Workshop?***

Distribute 2-sided handout. Ask the workshop participants to "sign in."

If you've already provided us with a completed row of information, we just need your name today (not the rest of the information).

Questions?

Audiences for the Interpretation & Education Program

*Handout: **Developing the Set of Audiences for the Program***

Distribute. Participants self read. Verbally reinforce key ideas. Answer questions.

*Verbally highlight the idea that **visitors** are more than just those that set foot within park boundaries — "visitors are people who experience the park's interpretation & education program."*

As interpreters, we take all of these audience characteristics into account when we develop communication strategies.

Here's an example of the kind of audience-based customization you do all the time:

- You receive a phone call alerting you that a busload of visitors are on their way to the park, and that they'd like the park to prepare a program for them. Thanks very much.

- Then you receive a follow-up call: The "people" are <u>professors</u>.

- You receive another follow-up call: They are <u>history</u> professors.

- You receive another follow-up call: They are <u>American history</u> professors.

- You receive another follow-up call: They are American history professors <u>teaching masters students</u>. (and so on it goes…)

This kind of on-the-fly customization — done by individuals for individual performances of personal services — is something you do all the time.

However, this is *not* the scale that we're dealing with in a CIP.

For the CIP, the same principles apply but we need to look at audiences *strategically*.

What we need to discuss is the strategic definition of, description of, and interaction with audiences for interpretive planning purposes, as stated in the page you just read.

Verbally highlight audience examples from the handout.

Additional considerations related to the identification of interpretive audiences are stated on one of the handouts we've already looked at.

Turn to page 45 and you'll see tenets of effective interpretation.:

(Handout Review): *Tenets of an Effective Program and its Services*

Briefly review, suggesting that the park needs to consider these tenets on an ongoing basis.

The program overview page is another good reference as we discuss interpretive audiences, since it shows exactly how we'll use them when we design the future interpretation & education program in the next workshop.

(Handout Review / side 2): *Overview of the Future Interpretation & Education Program / Case Study*

Briefly review.

We'll also refer to yesterday's "Who Visits {parkname}" sheets.

(POSTED: WHO VISITS {parkname}?) Motion toward these posted sheets.

So, here's the big question:

- What audiences do we need to identify in the planning process to ensure that we effectively enable visitors to explore the park's significances — through the interpretive and informational opportunities provided by the interpretation & education program?

FLIPCHART: STRATEGIC INTERPRETIVE AUDIENCES. *Write the title. Record participant responses. Discuss each as needed and test against the ideas for strategic audiences in* CIP Guide*.*

Now that we have a draft list, let's double-check it to ensure that all of the audiences identified by the "Who Visits {parkname}" exercise are accounted for in these strategic interpretive-audience categories.

Are they?

Achieve consensus then offer the group a break.

Lasts about 15 minutes

Break

During the break:

FLIPCHART: MANAGEMENT GOALS. *Flip the paper sheet over the top of the flipchart, revealing the next clean sheet. Write the title.*

(POSTED: WHO VISITS {parkname}?) Remove these sheets from the wall and neatly stack them for subsequent packing and transport.

Lasts about 30 minutes

The Mission of, and Management Goals for, the Interpretation & Education Program

In this session, we'll discuss the interpretation & education program from the perspective of park management and other major sideboards for the planning process.

Planners' Notes. *The planners' packet should include the park's mission statement and/or purpose statement from the park's strategic plan or General Management Plan.*

A planner reads the statement(s) aloud.

These statements express the legislated intent for the park, and emphases of the park's management team.

Then ask the park manager(s) to respond to the following question (of which the manager was already made aware on Monday or before — it's best not to surprise the manager):

What does park management expect the park's interpretation & education program to accomplish for the park?

<u>FLIPCHART: MANAGEMENT GOALS.</u> *Record the manager's responses, often in a bullet-list format.*

The planners should verbally review any other park-management-level material that will provide useful sideboards and guidelines to the interpretive planning effort. These may include portions from the park's general management plan, park Strategic Plan (especially Long-Term Goal IIb1), or similar documents.

Lasts about 2 hours

Issues and Influences Affecting the Interpretation & Education Program

This next session is really just an expanded follow-on session to the management sideboards we just discussed.

Because issues outside of interpretation's control affect the ability of the interpretive operation to achieve its mission, these types of issues need to be taken into consideration as we strategically plan the interpretation & education program.

What kinds of issues are appropriate to discuss at this park, in this context?

<u>FLIPCHART: ISSUES AND INFLUENCES.</u> *Flip the paper sheet over the top of the flipchart, revealing the next clean sheet. Write the title. Record participant responses. Cite example issues from other parks as needed and appropriate.*

Are any of these topics *operational concerns* in the sense that they need to be addressed at this time because they significantly impact the overall concept of what the interpretation & education program at this park should be, or how it should operate?

Are there operational concerns (that haven't been voiced yet) that are of sufficient magnitude that you need to include them here?

(<u>FLIPCHART: ISSUES AND INFLUENCES.</u>) Flag as "operational concerns" while recording participant responses. Cite example issues from other parks as needed and appropriate.

We'd also like to flag any of these issues that require identifiable actions on the part of interpretation. Are there any items you'd like the planners to copy over into the LRIP Action List?

(<u>FLIPCHART: ISSUES AND INFLUENCES.</u>) If yes, mark appropriate text as action items. Cite examples as needed and appropriate.

The lunch break often occurs at this time; it lasts about 1 hour and 15 minutes

Lunch Break

Lasts about 2 hours and 45 minutes

Actions for Improving Supportive Elements of the Program

A number of other park functions directly and indirectly support the interpretation & education program.

We're going to discuss each of these topics with two things in mind:

- We're going to ask about some baseline information to indicate in the plan how this support activity currently functions (a "snapshot"); and

- We're going to ask you about what actions need to be taken to improve the situation. These actions will not only show up in this section of the LRIP, but also in the LRIP Action List — your five-year "to do" list.

Questions?

Resource-focused Research Used by Interpreters

This topic includes research needs, access to, and management of research information, common-language translations of technical materials, and the role of resource-focused research in supporting the interpretation & education program.

Discussion should include acquisition needs, access to, and management of research resources, standard operating procedures, and the role of research information in supporting the interpretation & education program.

How does this function work now, and how might it work better in the future as regards supporting the interpretive operation?

FLIPCHART: RESOURCE-FOCUSED RESEARCH. *Flip the paper sheet over the top of the flipchart, revealing the next clean sheet. Write the title. Record participant responses.*

Of the items listed, which are the most important? Which items need to be copied to the LRIP Action List?

The planners make appropriate notations (arrows, asterisks, bullets, etc.) on the flipchart sheet(s).

Visitor-focused Research Used by Interpreters

This topic includes research needs, access to, and management of research information, and the role of visitor studies and sociological research in supporting the interpretation & education program.

Discussion should include acquisition needs, access to, and management of research resources, standard operating procedures, and the role of research information in supporting the interpretation & education program.

How does this function work now, and how might it work better in the future as regards supporting the interpretive operation?

FLIPCHART: VISITOR-FOCUSED RESEARCH. *Flip the paper sheet over the top of the flipchart, revealing the next clean sheet. Write the title. Record participant responses.*

Of the items listed, which are the most important? Which items need to be copied to the LRIP Action List?

The planners make appropriate notations (arrows, asterisks, bullets, etc.) on the flipchart sheet(s).

Park and Interpretation Libraries

Library materials include books, magazines, periodicals, maps, and related materials not part of park archives.

Discussion should include acquisition needs, access to, and management of library resources, standard operating procedures, cataloging, storage concerns, and the role of library information in supporting the interpretation & education program.

How does this function work now, and how might it work better in the future as regards supporting the interpretive operation?

FLIPCHART: LIBRARIES. *Flip the paper sheet over the top of the flipchart, revealing the next clean sheet. Write the title. Record participant responses.*

Of the items listed, which are the most important? Which items need to be copied to the LRIP Action List?

The planners make appropriate notations (arrows, asterisks, bullets, etc.) on the flipchart sheet(s).

Park and Interpretation Image Collections

Images used in interpretation include slides, prints, negatives, electronic image files, videotapes, DVDs, films, and related materials not part of park archives.

Discussion should include acquisition needs, access to, and management of collections, electronic image generation, manipulation, storage, standard operating procedures, cataloging, and the role of image collections in supporting the interpretation & education program.

How does this function work now, and how might it work better in the future as regards supporting the interpretive operation?

FLIPCHART: IMAGE COLLECTIONS. *Flip the paper sheet over the top of the flipchart, revealing the next clean sheet. Write the title. Record participant responses.*

Of the items listed, which are the most important? Which items need to be copied to the LRIP Action List?

The planners make appropriate notations (arrows, asterisks, bullets, etc.) on the flipchart sheet(s).

Interpretive Object Collection

Interpretive objects are items used in the performance of interpretive services, such as props, replicas, equipment, or other materials that will degrade and be consumed by use over time.

Discussion should include acquisition needs, access to, and management of the collection, storage, standard operating procedures, cataloging, and the role of the object collection in supporting the interpretation & education program.

How does this function work now, and how might it work better in the future as regards supporting the interpretive operation?

*FLIPCHART: INTERPRETIVE OBJECT COLLECTION. Flip the paper sheet over the
top of the flipchart, revealing the next clean sheet. Write the title. Record participant
responses.*

> Of the items listed, which are the most important? Which items need to be copied to the LRIP
> Action List?

*The planners make appropriate notations (arrows, asterisks, bullets, etc.) on the
flipchart sheet(s).*

Museum Collection and Archives Used by Interpreters

> The museum collection and park archives are composed of accessioned items for use only in
> a non-consumptive manner. The collection may include artifacts, rocks and fossils, journals,
> furniture, weapons, rare books, machinery, paintings, mounted animals, historic maps,
> transportation equipment — a wide range of objects. Artifacts from the collection are
> frequently used in exhibits if the exhibit can protect them from degradation; otherwise,
> replicas are used for public display.
>
> Discussion should include acquisition needs, access to, and management of the collection and
> archives, storage, standard operating procedures, cataloging, and the role of the collection and
> archives in supporting the interpretation & education program.
>
> How does this function work now, and how might it work better in the future as regards
> supporting the interpretive operation?

*FLIPCHART: MUSEUM COLLECTION & ARCHIVES. Flip the paper sheet over the
top of the flipchart, revealing the next clean sheet. Write the title. Record participant
responses.*

> Of the items listed, which are the most important? Which items need to be copied to the LRIP
> Action List?

*The planners make appropriate notations (arrows, asterisks, bullets, etc.) on the
flipchart sheet(s).*

Lasts about 15 minutes

CIP Component 3: Interpretive Database (ID)

*Handout (side 1): **The CIP's Three Components and their Elements***

*Distribute 2-sided handout (side 2: Comprehensive Interpretive Planning Process
Details).*

*Participants self read <u>SIDE 1</u>. Indicate the current location in the planning process and
highlight potential ID components.*

*Discuss the ID and the status of its completion. (The ID is assembled independently of
the other two components; work on it can begin at anytime during the process.)*

An ID template file is available if the park staff wishes to use it.

*Handout (side 2): **Comprehensive Interpretive Planning Process Details***

*Participants self read. Indicate the current location in the planning process and
highlight the future components.*

> We'll return to the ID again in just a few minutes, when we provide you with an example
> from another park.

Next Steps in the Process

In the second workshop, everything we've worked on up to that point will be used to develop {parkname}'s future interpretation & education program — the interpretation & education program that you determine needs to be here 5 years from now.

(Handout Review / side 2): Overview of the Future Interpretation & Education Program / Case Study

Briefly review. Describe the components of the program overview.

Introduce Individual Service Plans

Stapled multipage handout (sides 1-4):
    ***Relationship of the Program Overview to an ISP** / Case Study*
    ***Individual Service Plan — Interpretive Talks** / Case Study*
    ***Individual Service Plan — Wayside Exhibit** / Case Study*
    ***Individual Service Plan — Translated Park Brochure** / Case Study*

Distribute the stapled handout. Planners lead participants through SIDES 1-4 while verbally reinforcing key ideas. Answer questions.

Planners describe the purpose, nature, and use of ISPs.

***Note.** The following 4 handouts can be produced from the set of any park that has a completed CIP on file with us. Planners need only produce 1-3 examples of each of these. They'll be left with the park and the participants can share them and review them in depth at a later time.*

*Stapled multipage handout: **Archive File from {Park X}** / Case Study*

Planners briefly describe the Archive file: its purpose, nature, and use.

*Stapled multipage handout: **Long-Range Interpretive Plan (LRIP) from {Park X}** / Case Study*

Planners briefly describe this component of a CIP: its purpose, nature, and use.

*Stapled multipage handout: **Annual Implementation Plan (AIP) from {Park X}** / Case Study*

Planners briefly describe this component of a CIP: its purpose, nature, and use.

*Stapled multipage handout: **Interpretive database (ID) from {Park X}** / Case Study*

Planners briefly describe this component of a CIP: its purpose, nature, and use.

The planners explain that the park will receive two deliverables from the planners following the second workshop: 1) an Archive file of the planning process and 2) a draft LRIP. Both will look very similar to the examples from {Park X}.

(POSTED: PARKING LOT.) Address any items remaining on the parking lot or any written notes received by the planners (as appropriate).

Discuss the follow-through to be accomplished by the park between workshops. Assign the Chief the task of editing and strengthening the draft primary interpretive themes before the second workshop.

Ask the Chief if he/she uses Microsoft Word XP®. If so, that's the format we'll use for the foundational information between workshops; if not, the planners will use the MS Word® format needed by the park.

Lasts about 5 minutes

Day Three is Adjourned with Closing Words for the CIP core team

Thank you for all of your hard work this week.

ADJOURN.

Debrief with the Chief. *How did it go today? Anything unexpected happen? Best parts of day? Worst parts of day? Getting what you need? Any course corrections the planners need to make?*

The planners remove all of today's used sheets from the flipchart and neatly stack all of the sheets, retaining the order that the sessions were conducted (this facilitates subsequent data entry in chronological order for the Archive file). They fold them and pack them. Planners also pack markers and other miscellaneous supplies that need to return with them.

Travel and/or dinner. *During dinner, the planners debrief with each other and strategize how best to continue the project.*

FRIDAY, {w1date5}

Note. *If traveling home today, check out of hotel this morning. Travel. **END TRIP.** ••*

Mission of a Park's Interpretation & Education Program

What are Heritage Resources?

her•i•tage \ **2 a** : something transmitted by or acquired from a predecessor : INHERITANCE, LEGACY **b** : TRADITION **3** : BIRTHRIGHT

"You mean they took off from *that track*?" Steven asked, pointing.

"That's *weird*," said his five-year-old sister, Laura.

"Uh-huh. Planes at that time didn't have landing gear with wheels — and there were no airports, no runways. That long rail *was* the runway," Dad explained to wide eyes.

"I want to see the picture again," Laura said. Dad kneeled down and unfolded the brochure.

"It looks like a kite with propellers," Steven described. "It says they flew 852 feet in 59 seconds."

Dad glanced over at Mom. She was still taking in the scene, watching the birds chase breakfast insects across the warm sand. The morning's breeze remained steady. The sun was bright. Who'd have thought that Wright Brothers National Memorial was such a cool place? This was definitely going to be a great summer vacation. And it had just begun.

People, places, events, and things can move us. They awaken the imagination and speak to our wonderment. They stir us and quiet us, affecting us spiritually, emotionally, intellectually, and physically. They play a part in some of the most powerful and profound experiences of our lives.

As individuals, we assign power and honor, importance and significance to certain people, places, events, and things that are meaningful to us. As a society, we do the same. The people, places, events, and things with which we have some common connection, that possess significance to us communally — these are heritage resources.

Their greatest value is calculated not in dollars, but in importance: Heritage resources are among the best touchstones for exploring our personal and national identity and character. They rejuvenate our spirits, challenge and strengthen our beliefs, and provoke contemplation and discussion of our past, present, and future. They move us to become better stewards of each other and the world around us.

Organizations that interpret natural and cultural heritage provide a network of opportunities to explore self, society, and the world in which we live. They offer opportunities at local, state, regional, and national levels of importance. Parks, monuments, historic sites, forests, preserves, nature centers, zoological gardens, aquaria, museums, and other places that interpret heritage resources do so because the resources they manage are inherently valuable to society.

Heritage preservation encompasses the activities that ensure perpetual access to these important resources, from generation to generation. Remembrances of people, places, events, and things are preserved as continuing links to our collective past. And natural systems and processes, plants, animals, and landscapes are also preserved as critical components of the world in which we live. Society assigns value to the assurance that substantially similar opportunities to experience heritage resources as we do today will be available for our descendants. The overarching reason for heritage preservation is to provide opportunities for people to enrich their lives and broaden their experience — to enjoy a more fulfilling existence.

The interpretation & education program provides enhanced opportunities for visitors to explore their own intellectual and emotional connections to the natural and cultural resources that comprise shared heritage.

Interpretive Services

Interpretive services rely on the format of *story* to provide opportunities for people to connect to heritage resources. In this way, a park's interpretive services enhance visitor enjoyment and appreciation of heritage.

Informational Services

Informational services create an environment in which enjoyment and appreciation of heritage can be enhanced for the visitor. These services include information regarding visitor orientation and safety, resource preservation, and public relations.

{parkname}

First Comprehensive Interpretive Planning Workshop

SCHEDULE FOR DAY ONE

8:00	Morning Sessions Begin
11:45	Lunch Break
1:00	Afternoon Sessions Begin
5:00	Adjourn

SUBJECTS ADDRESSED TODAY

Welcome and Introductions

Overview of the Workshop

Today's Activities and Facilitation Essentials

Importance of Park Resources —
Statements of Significance

Fundamentals of Interpretation

Using Story to Facilitate Visitor Connections to
Park Resources — *Primary Interpretive Themes*

Are You Really Here at the Workshop?

{parkname}

First CIP workshop. Please sign in. Thank you.

Name	Title	Organization	Telephone number	Email address

Name	Title	Organization	Telephone number	Email address

W1 __ D1 __ D2 __ D3

Do You Know Something We Don't Know?

Do you have ideas for a better interpretation & education program at {parkname}? Would you like to pass them on? Please do so below; you are welcome to use more than one sheet.

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Developing the Set of Significance Statements

Resource Importance

Significance is usually rooted in enduring resource characteristics. The significance of places and things is embedded in their tangible and intangible characteristics: elements that are so attractive, interesting, and engaging that people choose to experience them time and again. At the same time, it's true that a cultural context always plays a role when societal values are described or acted upon. Accordingly, some aspects of the significance that society places on a site may evolve over time as a result of discoveries or other updates to knowledge about the place, events, people, and things, or if the values of society change in relation to the site's specific meanings, as represented by its resources. Nevertheless, such a place usually embodies a core importance that endures through time.

Describing Significance

The heritage resources of the park must be described in such a way that a common understanding (consensus) of the significance of these resources can be reached among those who have a stake in the resources of the place. This is crucial if responsible management of the resources is to occur. Almost all management actions, across all park functions, are derived from this common understanding and the mission to perpetuate the associated attributes of the resources.

Every organization that offers heritage interpretation describes, in some way, the importance of the places, events, people, and things that relate to their park. Significance descriptions can often be found in enabling legislation, a charter, mission statement, foundational statement, general management plan, or master plan. This description is most useful when it is more than just a resource list — when it includes relevant context that makes the items on such a list meaningful to the reader.

Such a description of resources is characteristically formatted as a set of *significance statements*. Significance statements, taken together as a whole, serve to describe the distinctiveness of the combined resources of the park, including natural, cultural, inspirational, scientific, historic, recreational, and other aspects. They include tangible and intangible characteristics and the context in which these characteristics are embedded. In most organizations, the mission of the organization and the set of significance statements combine to focus management actions and operations on the preservation and enjoyment of those attributes that most directly contribute to the importance of the place.

Questions to Assure Quality

- Do the statements *clearly describe* the importance of resources (using enough detail, but not too much detail)? Are they understandable?

- Do the statements go beyond just a listing of significant resources and *include context* that makes the facts meaningful?

- Do the statements reflect current scholarly inquiry and interpretation, including changes that might have occurred since the park's establishment?

- Do the statements describe why the park's resources are important within a local, state, regional, national, or global context?

To establish whether an area possesses "national significance," *Criteria for Parklands* (1993) asks these questions:

- Is the area an outstanding example of a particular type of resource?

- Does it possess exceptional value or quality in illustrating or interpreting the natural or cultural themes of our nation's heritage?

- Does it offer superlative opportunities for recreation, public use and enjoyment, or scientific study?

- Does it retain a high degree of integrity as a true, accurate, and relatively unspoiled example of the resource?

Minimal.

Example of a minimally useful statement of significance.

Mauna Loa is the largest mountain in the world.

Better.

The revised statement is much more useful.

Mauna Loa — measured from its base deep beneath the surface of the sea to its peak — contains more material by volume than any other mountain on Earth.

The Set of Significance Statements

Tangible and Intangible Heritage Resources of Hawai'i Volcanoes National Park

Set of Significance Statements

- Hawai'i Volcanoes National Park features Mauna Loa and Kilauea, two of the most active volcanoes in the world.

- Mauna Loa — measured from its base deep beneath the surface of the sea to its peak — contains more material by volume than any other mountain on Earth.

- The unusually high degree of approachability to the park's active volcanism affords opportunities for fundamental and detailed research not duplicated (or even approached) in any other park in the world, offering relatively safe experiences with lava flows, fountains, and other products of active volcanism.

- The long history and collaborative nature of the research performed by the USGS Hawai'i Volcano Observatory and others at Hawai'i Volcanoes National Park have made Mauna Loa and Kilauea among the most studied and best understood volcanoes in the world.

- Hawai'i Volcanoes National Park provides critical living space in a wide variety of ecological zones for the highly endemic native biota, much of which is threatened or endangered, requiring active management of native and non-native species.

- The diversity and importance of the cultural resources in Hawai'i Volcanoes National Park — and the protection of natural features and processes afforded by national park status — combine to make Hawai'i Volcanoes critically important to the perpetuation of traditional native Hawaiian religion and culture.

- Hawai'i Volcanoes National Park encompasses the largest expanse of Hawaiian natural environment managed as wilderness, with the associated wilderness values of natural sounds, lack of mechanization and development, natural darkness, and opportunities for solitude.

- The park's resources are so rare, valuable, and inspirational to all the people of the world that the United Nations has declared the park an International Biosphere Reserve and a World Heritage Site.

- Hawai'i Volcanoes National Park protects the most extensive tract of protected montane tropical rain forest in the National Park Service.

- The structural complexity and isolation of the Hawaiian Islands and their active volcanic setting makes them a world-class living laboratory of biogeography and evolution. The protected status of Hawai'i Volcanoes National Park lands offers important opportunities for this work to continue.

This information is extracted from the park's Long-Range Interpretive Plan: First Draft *(National Park Service, Hawai'i Volcanoes National Park, August 1999), pp. 2-3.*

Current Statements of Significance

{parkname}

Statements from the park's *{plan name, date}*

- {Text...}

Previous statements from *{management documents, date}*

- {Text...}

Tenets of an Effective Program and its Services

Visitor Tenets

For the purpose of planning the park's interpretation & education program, the term *visitors* refers to everyone that is influenced by the program — whether they are visiting the park in person or experiencing it through remote means such as via the Internet, a brochure, an article, a film, or a curriculum.

Visitors pursue park experiences to find something of value for themselves.

Visitors' Rights

The park's interpreters promote, protect, and respect the rights of all visitors. This is critical to the achievement of the mission. All visitors have the right:

To have their privacy and independence respected.

To retain and express their own values.

To be treated with courtesy and consideration.

To receive accurate and balanced information.

Program Tenets

Tenets that are Especially Appropriate for the Park's Interpretation & Education Program as a Whole:

Hierarchy of Sophistication

The park's program treats subject matter in a range of ways — from simple-and-basic to complex-and-advanced — to best meet the varied interests of visitors.

Range of Interpretive Services

The park's program includes a range of personal and non-personal services to best meet the varied learning styles of visitors, offering a variety of experiences.

Service Tenets

Tenets that are Especially Appropriate for Individual Interpretive Services or Informational Services:

Universal Design

Individual park services are designed to be as universally accessible as possible to best meet the varied physical and cognitive needs of all visitors.

Multiple Points of View

The interpretive and informational services of the park's interpretation & education program treat subject matter from a variety of perspectives to aid in accuracy and relevance to visitors with diverse interests, backgrounds, levels of knowledge and experience, and other salient characteristics.

Questions to Assure Quality

- Are all of these tenets being implemented consistently and appropriately *for all visitors*?

- Are all of these tenets being implemented consistently and appropriately *across all aspects of the park's interpretation & education program*?

- Are all of these tenets being implemented consistently and appropriately *in each of the program's individual interpretive services and informational services*?

Developing Interpretive and Informational Services

Component Relationships for Interpretive Services

— Context in which the park and its programs are planned and managed —

Park Resources

Resource Importance
(Statements of Significance)

Overarching Stories
(Primary Interpretive Themes)

Specific Stories
(Interpretive Subthemes)

Interpretive Service Design

Interpretive Service Presentation

Enhanced Visitor Enjoyment via Interpretive Opportunities
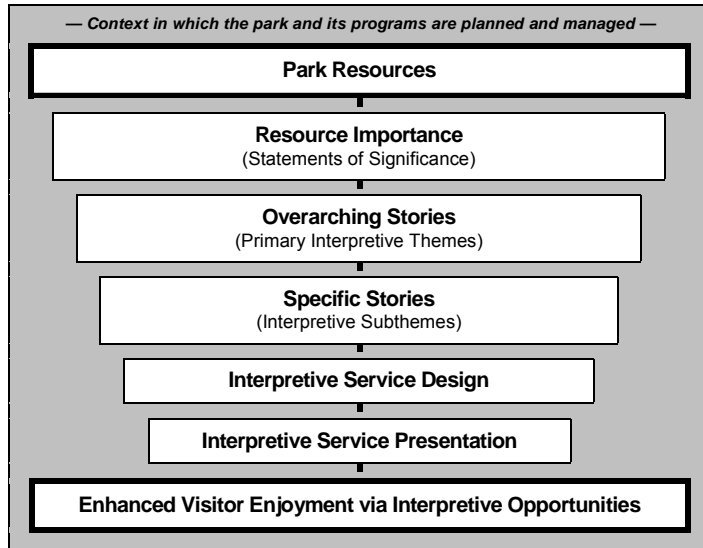
Component Relationships for Informational Services

— Context in which the park and its programs are planned and managed —

Park Resources

Resource Importance
(Statements of Significance)

Management Decisions and Operational Issues, Topics, and Data

| **Orientation Information** | **Visitor Safety Information** | **Resource Preservation Information** | **Public Relations Information** |

Service Content Idea

Informational Service Design

Informational Service Presentation

Enhanced Visitor Enjoyment via Informational Opportunities

How Interpretive Services are Actually Developed

Development Sequence for Interpretive Services

- Comprehensive Interpretive Plan
- Work is Assigned to an Interpreter
- Interpreter Reviews Individual Service Plan
- Interpreter Generates Idea and Investigates Links
- Interpreter Writes Subtheme
- Interpreter Selects Methods
- Interpreter Cohesively Organizes Links & Methods
- Interpreter Conducts Research
- Interpreter Refines and Finalizes Content
- Interpreter Provides Service
- Enhanced Visitor Enjoyment via Interpretive Opportunities

Development Sequence for Informational Services

- Comprehensive Interpretive Plan
- Work is Assigned to an Interpreter
- Interpreter Reviews Individual Service Plan
- Interpreter Conducts Research
- Interpreter Cohesively Organizes Information
- Interpreter Refines and Finalizes Content
- Interpreter Provides Service
- Enhanced Visitor Enjoyment via Informational Opportunities

Overview of the Future Interpretation & Education Program

PRIMARY INTERPRETIVE THEMES *and* INFORMATIONAL TOPICS	AUDIENCES		
	1. General Audience.	**2. Organized Educational Groups.** *Grades K-3, 4-6, 7-12, college.*	**3. Non-English Speaking Audiences.** *Japanese, Chinese, Korean, German, Spanish, French, ethnic Hawaiian.*
Theme A. The approachable, active volcanoes of Hawai'i Volcanoes National Park allow first-hand discovery and connection with one of the most fundamental forces of our world — in both its creative and destructive roles.	e6 **Interpretive talks** [FY2002] at Jaggar, KVC, VH, eruption sites, satellite broadcast. e6 **Guided hikes** [FY2003] at Summit area, Chain of Craters Road, lava tubes... e6 **Wayside exhibits** [FY2004] at Parkwide (to be specified in the Wayside Exhibit Plan). e5 **Site bulletin (Dynamic Volcanism)** [FY2002] at KVC, ECS, Jaggar, via mail. e5 **Park brochure** [FY2002] at Entry, KVC, via mail, Jaggar, ECS, Ed Ctr, for sale by partners... e5 **Informal contacts (includes roving)** [FY2002] at KVC desk, special events off-site... e5 **Illustrated talks** [FY2002] at KVC, KMC. e4 **Website** [FY2002] at Internet... e2 **CA sales items (publications)** [FY2002] at CA sales outlets. e2 **Nature trail brochure** [FY2002] at Pu'u Hulu Hulu. e0 **Junior Ranger program** [FY2002] at KVC....	e7 **Guided hikes** [FY2002] at Summit area, Chain of Craters Road, lava tubes. e6 **Curriculum (includes *Teachers' Guide*)** [FY2003] at Ed Ctr, AEC, CA sales. e5 **Interpretive talks** [FY2002] at Jaggar, KVC, VH, eruption sites, satellite broadcast. e4 **Travel trunks** [FY2004] at Schools. e4 **Films/videos** [FY2005] at KVC, Jaggar, VH, CA sales. e4 **Exhibits** [FY2002] at Ed Ctr, AEC. e3 **Website** [FY2002] at Internet, outside KVC, Jaggar. e3 **CA sales items (publications)** [FY2002] at CA sales outlets. e3 **Cultural presentation for Hawaiians** [FY2002] at Parkwide. e2 **Interpretive demonstrations** [FY2002] at Jaggar, VH, KVC, eruption sites. e2 **Illustrated Talks** [FY2002] at KVC, KMC...	e5 **Translations of videos** [FY2002] at KVC, CA sales. e4 **Translation of site bulletin (Dynamic Volcanism)** [FY2002] at KVC, ECS, Jaggar, via mail. e4 **Translation of park brochure** [FY2002] at Entry, KVC, via mail, Jaggar, ECS, KMC, VH, AEC, Ed Ctr, for sale by partners. e3 **Website with pages in other languages** [FY2002] at Internet, outside KVC, Jaggar. e1 **CA sales items (publications)** [FY2002] at CA sales outlets. e1 **Informal contacts via other languages (includes roving)** [FY2002] at KVC desk, Jaggar, eruption sites, trails, overlooks, special events off-site. e0 **Interpretive talk or hike in Hawaiian** [FY2002] at Parkwide.
Theme B. The journeys...	e7 **Cultural Festival** [FY2002] at KMC, coastal areas, off site ...	e6 **Interpretive talks** [FY2002] at Jaggar, KVC, VH, eruption ...	e7 **Translation of site bulletin (Hawaiian Culture)** [FY2002] at ...
Theme C. In Hawai'i,...	e8 **Guided hikes** [FY2002] at Parkwide (includ...	e7 **Service projects** [FY2002] at Parkwide ...	e7 **Translation of site bulletin (Diminishing Biota)** [FY2002] at ...
Theme D. Kilauea, the...	e7 **Interpretive talks** [FY2002] at Jaggar, KVC, VH, eruption ...	e7 **Guided hikes** [FY2002] at Summit area, Chain of Craters Road, ...	e8 **CA sales items (publications)** [FY2002] at CA sales outlets.
Theme E. Hawai'i...	e7 **Guided hikes** [FY2002] at Summit area, Chain of Craters Road, ...	e7 **Guided hikes** [FY2002] at Summit area, Chain of Craters Road, ...	e7 **Translation of site bulletin (Spectacular Wilderness)** ...
Orientation Information *and* **Visitor Safety Information**	e8 **Informal contacts (includes roving)** [FY2002] at KVC desk, ... e7 **Park brochure** [FY2002] at Entry... e6 **Site bulletin (Safety)** [FY2002] at... e6 **Bulletin boards** [FY2002] at... *Note: All personal services include incidental orientation and visitor safety information.*	--- **Informal contacts (includes roving)** [FY2002] at KVC desk... --- **Website** [FY2002] at Internet... --- **Site bulletin (Safety and the NPS), for education groups** [FY2002] at Entry, KVC,... *Note: All personal services include incidental...*	--- **Website with pages in other languages** [FY2002] at Internet... --- **CA sales items (publications)** [FY2002] at CA sales outlets. --- **Translation of park brochure** [FY2002] at... *Note: All personal services include incidental...*
National Park System *and* **National Park Service Mission**	e8 **Films/videos** [FY2005] at KVC... e7 **CA sales items (pubs)** [FY2002] ... e7 **Park brochure** [FY2002] at... e5 **Media tours & press relations** [FY2002] at Parkwide, off site.... *Note: All personal services include incidental System and Service mission information.*	--- **Informal contacts (includes roving)** [FY2002] at KVC desk... --- **Website** [FY2002] at Internet... --- **CA sales items (publications)** [FY2002] at... --- **Portable exhibit** [FY2003] at... *Note: All personal services include incidental...*	--- **Website with pages in other languages** [FY2002] at Internet... --- **CA sales items (publications)** [FY2002] at CA sales outlets... *Note: All personal services include incidental...*

The interior cells of this program overview table contain five kinds of information:

"e#" ranking indicators	The "e-numbers" represent the relative ranking of each service-location(s) pair, based on the anticipated effectiveness of this service. Service-location(s) pairs prefaced by three dashes "---" were added to the list after the ranking of the theme/topic-audience combination was completed, or the list was so short that the park decided not to rank the services.
Bold text	Indicates a type of interpretive or informational service.
FY2002	The superscript number indicates the first fiscal year that the service will be made available to visitors.
"at Place"	Text following "at" describes the location(s) where the service is, or will be, offered.
Abbreviations	**CA**: Cooperating Association; **KVC**: Kilauea Visitor Center; **ECS**: Eruption Contact Station; **AEC**: 'Ainahou Education Center; **KMC**: Kilauea Military Camp; **VH**: Volcano House; **Ed Ctr**: Park Education Center (formerly the park manager's residence).

This information is adapted from the park's Long-Range Interpretive Plan: First Draft *(National Park Service, Hawai'i Volcanoes National Park, August 1999), pp. 22-28.*

Developing the Set of Primary Interpretive Themes

Meaning and Story

Attaching meanings to places and things is a fundamental human trait. We ascribe special significance to places, events, people, and things that rejuvenate our spirits, challenge and strengthen our beliefs, and provoke contemplation and discussion of our past, present, and future. Such resources provide opportunities to explore our shared heritage and help us define our character as individuals, communities, and societies.

Story is the communication tool most effective for facilitating an exploration of resource meanings. Societies depend on the power of story to explore, clarify, and share ideas, meanings, beliefs, and values that collectively constitute culture. Story is at the heart of human interaction and, consequently, at the heart of heritage interpretation.

Describing Overarching Stories

Parks develop a set of overarching stories to organize the largest-scale ideas and meanings related to the park's resources. These stories are called *primary interpretive themes*. The set of themes is developed to fully capture, and express in story format, the content of the park's entire set of significance statements. The set is complete when it provides opportunities for people to explore and relate to *all* of the significance statements.

The set is usually comprised of a handful of primary interpretive themes (commonly three to five).

Characteristics of All Themes

Characteristics of primary interpretive themes include:

- Each is based on the significance of park resources.
- Each is the essence of a story used to help visitors explore the multiple meanings of resources. Primary interpretive themes do not make up the actual stories themselves. Rather, themes are abstracts, encapsulations of the actual stories, the details of which form the content of the resulting interpretive services.
- Each connects resources to larger ideas, meanings, beliefs, and values.
- Each incorporates universal concepts: large ideas that mean something to everyone, though not necessarily the same thing to everyone.
- Each provides opportunities for people to explore the meanings of the place and its resources without telling people what resources *should* mean to them.
- Each is best stated as a single sentence that includes tangible and intangible elements. Single-sentence structure forces theme writers to focus their ideas. Within the sentence structure itself, content often tends to progress from tangible resources to intangible resources to universal concepts, moving from specific to general (this is traditional story format).
- An interpretive theme is never merely stated as a topic. While topics can be useful in organizing a body of work, topics alone do not provide sufficient interpretive focus.

Questions to Assure Quality

- Is each primary interpretive theme grounded in the park's statements of significance?
- Does the set of primary interpretive themes convey the *complete set* of significance statements?
- Does each theme do more than just *restate* one or more significance; does it include tangibles, intangibles, and universal concepts?
- Do the statements reflect current scholarly inquiry and interpretation, including changes that might have occurred since the park's establishment?
- Is each primary interpretive theme *critical* to accomplishing the interpretive mission?
- Is each primary interpretive theme a complete, understandable sentence?

Inside a Primary Interpretive Theme

Example: The approachable, active volcanoes of Hawai'i Volcanoes National Park allow first-hand discovery of and connection with one of the most fundamental forces of our world — in both its creative and destructive roles.

Tangibles	Intangibles	Universal Concepts
volcanoes	approachable	The creative and destructive aspects of fundamental forces
Hawai'i Volcanoes National Park	active	
our world	allow	
	first-hand	
	discovery	
	connection	
	fundamental forces	
	creative and destructive roles	

Developing a Primary Interpretive Theme from a Set of Significance Statements

Tangible and Intangible Heritage Resources of Hawai'i Volcanoes National Park

Set of Significance Statements

Hawai'i Volcanoes National Park features Mauna Loa and Kilauea, two of the most active volcanoes in the world.

Mauna Loa — measured from its base deep beneath the surface of the sea to its peak — contains more material by volume than any other mountain on Earth.

The unusually high degree of approachability to the park's active volcanism affords opportunities for fundamental and detailed research not duplicated (or even approached) in any other park in the world, offering relatively safe experiences with lava flows, fountains, and other products of active volcanism.

The long history and collaborative nature of the research performed by the USGS Hawai'i Volcano Observatory and others at Hawai'i Volcanoes National Park have made Mauna Loa and Kilauea among the most studied and best understood volcanoes in the world.

Hawai'i Volcanoes National Park provides critical living space in a wide variety of ecological zones for the highly endemic native biota, much of which is threatened or endangered, requiring active management of native and non-native species.

The diversity and importance of the cultural resources in Hawai'i Volcanoes National Park — and the protection of natural features and processes afforded by national park status — combine to make Hawai'i Volcanoes critically important to the perpetuation of traditional native Hawaiian religion and culture.

Hawai'i Volcanoes National Park encompasses the largest expanse of Hawaiian natural environment managed as wilderness, with the associated wilderness values of natural sounds, lack of mechanization and development, natural darkness, and opportunities for solitude.

The park's resources are so rare, valuable, and inspirational to all the people of the world that the United Nations has declared the park an International Biosphere Reserve and a World Heritage Site.

Hawai'i Volcanoes National Park protects the most extensive tract of protected montane tropical rain forest in the National Park Service.

The structural complexity and isolation of the Hawaiian Islands and their active volcanic setting makes them a world-class living laboratory of biogeography and evolution. The protected status of Hawai'i Volcanoes National Park lands offers important opportunities for this work to continue.

Set of Primary Interpretive Themes

A The approachable, active volcanoes of Hawai'i Volcanoes National Park allow first-hand discovery of and connection with one of the most fundamental forces of our world — in both its creative and destructive roles.

B The journeys of the Hawaiian people, who continue to inhabit these rich and diverse lands, include cultural clashes, adaptations, and assimilations that provide enduring lessons about human resourcefulness, interdependence, and respect for the life of the land.

C In Hawai'i, active volcanism created an isolated home for a few immigrant species that gave rise to a rich yet fragile endemic biota; due to the accelerating change brought about by human actions, much of that unique heritage continues to be lost to extinction, challenging all of us to learn from the past and work together to preserve the remaining native plants and animals.

D Kilauea, the home of Pele, is sacred to many Native Hawaiians: it is a place of birth and the well-spring of many spirits and forces; the active volcanism, the features of the terrain, and the plants and animals that live there are all important to Native Hawaiian sense of identity, unity, and continuity.

E Hawai'i Volcanoes National Park provides an opportunity for people to experience the values of Hawai'i's diverse wilderness; the park's designation as a World Heritage Site and International Biosphere Reserve attests to its importance as a benchmark for monitoring environmental change.

This information is adapted from the park's Long-Range Interpretive Plan: First Draft *(National Park Service, Hawai'i Volcanoes National Park, August 1999), pp. 2-5.*

Developing Subthemes & Interpretive Services from a Primary Interpretive Theme

Tangible and Intangible Heritage Resources of Hawai'i Volcanoes National Park

Set of Significance Statements

Hawai'i Volcanoes National Park features Mauna Loa and Kilauea, two of the most active volcanoes in the world.	Mauna Loa — measured from its base deep beneath the surface of the sea to its peak — contains more material by volume than any other mountain on Earth.	The unusually high degree of approachability to the park's active volcanism affords opportunities for fundamental and detailed research not duplicated (or even approached) in any other park in the world, offering relatively safe experiences with lava flows, fountains, and other products of active volcanism.	The long history and collaborative nature of the research performed by the USGS Hawai'i Volcano Observatory and others at Hawai'i Volcanoes National Park have made Mauna Loa and Kilauea among the most studied and best understood volcanoes in the world.	Hawai'i Volcanoes National Park provides critical living space in a wide variety of ecological zones for the highly endemic native biota, much of which is threatened or endangered, requiring active management of native and non-native species.	The diversity and importance of the cultural resources in Hawai'i Volcanoes National Park — and the protection of natural features and processes afforded by national park status — combine to make Hawai'i Volcanoes critically important to the perpetuation of traditional native Hawaiian religion and culture.	Hawai'i Volcanoes National Park encompasses the largest expanse of Hawaiian natural environment managed as wilderness, with the associated wilderness values of natural sounds, lack of mechanization and development, natural darkness, and opportunities for solitude.	The park's resources are so rare, valuable, and inspirational to all the people of the world that the United Nations has declared the park an International Biosphere Reserve and a World Heritage Site.	Hawai'i Volcanoes National Park protects the most extensive tract of protected montane tropical rain forest in the National Park Service.	The structural complexity and isolation of the Hawaiian Islands and their active volcanic setting makes them a world-class living laboratory of biogeography and evolution. The protected status of Hawai'i Volcanoes National Park lands offers important opportunities for this work to continue.

Set of Primary Interpretive Themes

A The approachable, active volcanoes of Hawai'i Volcanoes National Park allow first-hand discovery of and connection with one of the most fundamental forces of our world — in both its creative and destructive roles.

B The journeys of the Hawaiian people, who continue to inhabit these rich and diverse lands, include cultural clashes, adaptations, and assimilations that provide enduring lessons about human resourcefulness, interdependence, and respect for the life of the land.

C In Hawai'i, active volcanism created an isolated home for a few immigrant species that gave rise to a rich yet fragile endemic biota; due to the accelerating change brought about by human actions, much of that unique heritage continues to be lost to extinction, challenging all of us to learn from the past and work together to preserve the remaining native plants and animals.

D Kilauea, the home of Pele, is sacred to many Native Hawaiians: it is a place of birth and the well-spring of many spirits and forces; the active volcanism, the features of the terrain, and the plants and animals that live there are all important to Native Hawaiian sense of identity, unity, and continuity.

E Hawai'i Volcanoes National Park provides an opportunity for people to experience the values of Hawai'i's diverse wilderness; the park's designation as a World Heritage Site and International Biosphere Reserve attests to its importance as a benchmark for monitoring environmental change.

Subtheme	Subtheme	Subtheme	Subtheme
The unusually high approachability to the park's active volcanism not only affords opportunities for personal exploration, but for fundamental and detailed research that benefits us all.	Landforms created by the volcanic activity of Kilauea and Mauna Loa sensationally demonstrate the role of volcanism in shaping and reshaping Earth's surface, and deepens our understanding of other planetary bodies.	Earthquakes, tsunamis, ash and debris fallout from eruptions — consequences of volcanic activity — have at times been disastrous for humans, but have also provided opportunities for people to thrive.	A civilization-enriching aspect of science is developing and testing new ideas: Mauna Loa and Kilauea exemplify the theory that volcanic activity above a fixed hot spot in the Earth's interior built the Hawaiian Islands, a relatively new idea.
Interpretive Service	**Interpretive Service**	**Interpretive Service**	**Interpretive Service**
A subtheme like this might best lend itself to an *interactive computer station* that graphically demonstrates how fundamental volcanic research benefits other scientific inquiries with which visitors are familiar, such as studies into dynamic global change like plate tectonics or climate patterns like the El Niño / La Niña effect.	A subtheme like this might best lend itself to an *illustrated program* that shows varying landscapes of Earth, and then shows landscapes of other planets and moons (as mapped and photographed by NASA). Inspiring music might accompany the imagery, followed by an interpreter-led discussion about geomorphological similarities and differences in these landscapes.	A subtheme like this might best lend itself to a *guided hike* across the flank of Kilauea, on a trail that passes places of agricultural significance to Native Hawaiians. The interpreter might draw visitors' attention to plant species that thrive in this environment, then discuss the connections of Hawaiians to these species — and how volcanic activity has created an environment more conducive to their success.	A subtheme like this might best lend itself to a scheduled *interpretive talk*. Starting with the idea that the Hawaiian Islands are probably the best example on Earth of hot-spot volcanism, the interpreter might expand into procedures of scientific inquiry (hypotheses, testing, improved hypotheses), and end by asking about the range of impacts science has had on societies.

Based on the Draft CIP of Hawai'i Volcanoes National Park, 1999.

Today's Agenda

{parkname}

First Comprehensive Interpretive Planning Workshop

SCHEDULE FOR DAY TWO

8:00	Morning Sessions Begin
11:45	Lunch Break
1:00	Afternoon Sessions Begin
4:30	Adjourn

SUBJECTS ADDRESSED TODAY

Statements of Significance and Primary
Interpretive Themes *(continued)*

Today's Activities

Who Visits {parkname}?

Desired Visitor Experiences

Stakeholder Issues and Suggestions for Improving
the Interpretation & Education Program

Next Steps in the Process

Developing Statements of Desired Visitor Experiences

What Do Visitors Want to Experience from their Park Visit?

Statements of desired visitor experiences describe how the park's interpretation & education program facilitates physical, intellectual, inspirational, and emotional experiences for visitors. These statements describe the experiences visitors would like to have when visiting the park (either in person or remotely).

With regard to visitors who experience the park via curriculum-based educational programs, these statements can also describe what educators, teachers, and students desire to experience from their park visit. These desired experiences are frequently derived from specific educational objectives due to the inherent needs of this subset of visitors.

How Does this Knowledge Inform the Planning Process?

The desired outcome of park operations is to manage visitor-resource interactions so that opportunities exist for the widest range of visitors to explore personal connections with park resources while ensuring that those resources remain unimpaired for the enjoyment of future generations.

In interpretive planning, *visitor experience considerations* are synthesized from statements of desired visitor experiences gathered through the general management planning process, specific park visitor studies, and the statements generated in the first comprehensive interpretive planning workshop (this session). Visitor experience considerations guide the interpretation & education program in developing interpretive and informational services that facilitate the connections visitors want to make with the resources of the park. Specifically, *visitor experience considerations* will be useful in determining what services might be most appropriate, why, where, and to what extent.

Questions to Assure Quality

Statements of desired visitor experiences must meet certain criteria to be useful in the planning process:

- The statements are written to emphasize expected outcomes or conditions.

- The statements are written in present tense.

- The statements are written in complete sentences.

The statements are subsequently ranked by workshop participants to indicate relative value to the interpretive planning process — What do the workshop participants think visitors would want to tell the core planning team as they develop the future interpretation & education program?

Example Statements

Based on the Draft CIP of Hawai'i Volcanoes National Park, 1999.

- Visitors want to experience the sights, sounds, and intimate feeling of the rainforest.
- Visitors want to be awed by the power of Kilauea and Mauna Loa.
- Visitors want to experience an active volcano and stand tow-to-toe with 2000-degree, flowing red lava.
- Visitors want to see the sunlight shining on the pahoehoe lava when it looks like fresh brownies — all shiny and folded.
- Visitors want to learn about, appreciate, and respect Hawaiians' special relationship with Pele and the volcano.
- Visitors want to be able to choose from a wide variety of interpretive programs and media.
- Visitors want to experience a cultural hands-on activity such as making a whistle from leaves.
- Visitors want to feel welcome and be able to select how to experience the park (ranger-guided walk or talk, night sky program, solitude, reading, hiking, etc.).
- Visitors want park rangers to be kind, patient, naturally warm, and friendly.
- Visitors want an opportunity to venture into the island's wilderness.
- Visitors want to have the opportunity to learn about natural processes that produced diverse flora and fauna.
- Visitors want to experience the sounds of nature (without helicopter noise or compressors).
- Visitors want to see and hear native Hawaiian birds in their natural environments.
- Visitors want an opportunity to escape everyday concerns and enjoy solitude.
- Visitors want to hear an interpreter talk about the history of Kilauea caldera.
- Visitors want to take home media of value (free or other).

{parkname}

First Comprehensive Interpretive Planning Workshop

SCHEDULE FOR DAY THREE

8:00	Morning Sessions Begin
11:45	Lunch Break
1:00	Afternoon Sessions Begin
4:30	Adjourn

SUBJECTS ADDRESSED TODAY

Today's Activities for the CIP Core Team

Audiences for the Interpretation & Education Program

The Mission of, and Management Goals for,
the Interpretation & Education Program

Issues and Influences Affecting the
Interpretation & Education Program

Actions for Improving Supportive Elements
of the Program —
   Resource-focused Research Used by Interpreters
   Visitor-focused Research Used by Interpreters
   Park and Interpretation Libraries
   Interpretive Image Collection
   Interpretive Object Collection
   Museum Collection and Archives Used by Interpreters

CIP Component 3: Interpretive Database (ID)

Next Steps in the Process

Developing the Set of Audiences for the Program

For Whom are Services Planned?

A set of audiences must be defined so that the park's interpretive and informational services can most effectively enhance the experiences of visitors. When comprehensively planning an interpretation & education program, audiences are best defined by considering two central questions, the responses to which ultimately determine the set of audiences for which the park will plan interpretive and informational services.

1. On what bases do we interpret to some people differently than we do to others?

Factors to consider include the life experiences of the individual or group, level of education, learning styles, language, cultural traditions, time available for interaction, and others.

2. At what point does a particular segment of the visiting public become so large, so important, or so distinct from general park visitors as to warrant interpretive or informational services targeted specifically to their needs?

Such targeted services are, by definition, *less effective* for the general public. What criteria do we use to formulate answers? Consideration of this question includes a review of current and future visitor profiles and their categorization for strategic interpretive planning purposes.

The basis for categorizing audiences (for the interpretation & education program) lies in whether or not a particular audience requires communication in a way distinct from that of the general park audience. A subjective balance must be struck between communicating effectively with a greater number of specific audiences, and the limited resources available to the park's program.

For What Planning Component are these Audiences to be Used?

The set of audiences comprises the second major component (primary interpretive themes being the first) needed for developing the future interpretation & education program.

Questions to Assure Quality

Interpretive audience categories are usually written as brief titles followed by explanatory notes that provide additional, detailed information. These notes serve to avoid misunderstandings.

- Is the set complete? Does it appropriately account for all of the visitor categories that were generated in the "Who Visits this Park" workshop exercise?

- Is the set manageable enough to enable planning, tracking, and providing of services without overdue burden?

Example Audience Sets
Based on CIPs from a variety of parks.

Typical Audience Sets

Typical sets include categories for the general park visitor and for visitors whose basis for visiting is the achievement of curriculum-driven educational objectives:

- **General audience** (includes affiliated cultures).
  Curriculum-based groups (includes grades preschool through 12, college, Elderhostel, and scouts).

- **General audience.**
  Organized educational groups (includes grades K-3, 4-6, 7-12, college, and organized groups with specific accessibility challenges).

- **General audience** (includes families, river guides).
  Students / school groups (special emphasis on grades 4-8; includes home schoolers).

Less-Common, Additional Categories

Sometimes, parks also need to subdivide the general park audience further. These additional categories meet a variety of park-specific needs:

+ **Non-English speaking visitors** (includes, in order of numbers visiting the park: Japanese, Chinese, Korean, German, Spanish, French, ethnic Hawaiian).

+ **Park neighbors / local residents / regional residents** (includes residents in close proximity to the park — Hayden, Craig, Maybell, Newton, Frisco, and Dalmont).

+ **Others who interpret the park** (includes bus tour operators, drivers, and directors; cruise ship operators; lodging providers; etc.).

A CIP's Three Components and their Elements

CIP Component 1 **Long-Range Interpretive Plan** **LRIP**	CIP Component 2 **Annual Implementation Plan** **AIP**	CIP Component 3 **Interpretive Database** **ID**

Introduction (to the CIP as a whole, and the LRIP component specifically).

Introduction (to the CIP's AIP component).

Introduction (to the CIP's ID component).

Foundational Information

The Mission of, and Management Goals for, the Interpretation & Education Program.

Set of Significance Statements.

Set of Primary Interpretive Themes.

Set of Audiences for the Program.

Visitor Experience Considerations.

Issues and Influences Affecting the Program.

Actions for Improving Supportive Elements of the Program:

Resource-focused Research Used by Interpreters.

Visitor-focused Research Used by Interpreters.

Park and Interpretation Libraries.

Interpretive Image Collection.

Interpretive Object Collection.

Museum Collection and Archives Used by Interpreters.

Operational Considerations.

Partners for the Program.

Foundational Information

The Mission of, and Management Goals for, the Interpretation & Education Program.

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Interpretive Object Collection.

Museum Collection and Archives Used by Interpreters.

Operational Considerations.

Partners for the Program.

Potential Materials to Reference

Annual funding proposals

Basic park reading list

Cooperating association-park *Scope of Sales Statement*

Education reports

Grant applications

Interpretive cyclic maintenance database

Interpretive talk outlines

Media evaluations

Operations evaluations

Other interpretive plans:
Audiovisual Plan
Education Plan
Exhibit Plan
Publications Plan
Wayside Exhibit Plan, etc.

Other plans affecting interpretation:
Ethnographic Overview
General Management Plan
Park Strategic Plan
Historic Furnishings Report
Historic Resources Study
Position Management Plan
Resource Management Plan
Transportation Plan, etc.

Research reports

Servicewide Interpretive Report (SIR)

Servicewide Media Inventory (MIDS)

Standard operating procedures (SOPs) for library use, interpretive images use, interpretive collection (props) use, etc.

Visitor survey data

Volunteers-in-Parks (VIP) Report

Future Interpretation & Education Program — Program Overview Table.

Annual Interpretation & Education Program — Program Overview Table.

Individual Service Plans. *ISPs are located in the ID section for convenience.*

LRIP Action List (actions necessary over life of plan to implement the Future Interpretation & Education Program).

AIP Action List (actions necessary this year to implement the Annual Interpretation & Education Program).

They provide detailed descriptions of the services comprising the Future Interpretation & Education Program (in the LRIP) and the Annual Interpretation & Education Program (in the AIP).

Analysis of the Previous Year's Interpretation & Education Program.

TEMPORARY
Schedule for Completing the CIP.

Annual Budgeting, Staffing, and Training Information.

ISPs become more complete over time as each service is initiated, then updated.

Comprehensive Interpretive Planning Process Details

1	2	3	4	5	6
Scope of Work and **Workshop Preparation** *Usually 2 – 12 Months*	**First CIP Workshop** *Usually 3 Days*	**Between Workshops** *Usually 4 - 12 Weeks*	**Second CIP Workshop** *Usually 3 Days*	**Completing the CIP** *Usually 4 – 20 Months*	**CIP Approval and Implementation** *Usually at Fiscal Year*
PARTICIPANTS **Park** (management, interpretive manager) — **Planners**	*PARTICIPANTS* **Park** (management, all park functions, CIP core team) **Stakeholders** (includes partners) **Planners**	*PARTICIPANTS* **Park** (CIP core team) **Stakeholders** (included in reviews as needed) **Planners**	*PARTICIPANTS* **Park** (CIP core team) **Partners** (who provide interpretive services) **Planners**	*PARTICIPANTS* **Park** (CIP core team) **Stakeholders** (included in reviews as needed) **Planners**	*PARTICIPANTS* **Park** (management, interpretation) **Partners** (who provide interpretive services) **Planners** (as needed)

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SEQUENCE OF EVENTS

Request. Park staff request assistance from planners to co-develop park's CIP. Park staff and planners discuss the planning process.

Approval. Planners add park request to planners' project-prioritization process. Request is ranked and approved.

Process Familiarization. Planners and park staff discuss the planning process in more detail and customize it to park needs. Planners send planning materials to the park staff.

Park Familiarization. Park staff sends park documents to planners.

Scope of Work. Park staff and planners develop a tentative schedule and approve a *Scope of Work*.

Park Staff Workshop Preparation. Park staff locates and reserves meeting room, addresses other meeting logistics, and invites participants. Park staff determines who comprises the park's CIP core team.

Planner Workshop Preparation. Planners review park documents, strategize their approach to the workshop, and prepare handouts and other workshop materials.

Pre-Workshop CIP Development. The park's CIP core team may elect to begin to compile the CIP's Interpretive Database (ID) component.

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WORKING WITH STAKEHOLDERS

DAY 1

Welcome and Introductions.

Overview of the Workshop (inc. the Mission of the Park's Interpretation & Education Program, Comprehensive Interpretive Planning, more).

Today's Activities and Facilitation Fundamentals.

Importance of Park Resources (Statements of Significance).

Fundamentals of Interpretation.

Using Story to facilitate Visitor Connections to Park resources (Primary Interpretive Themes).

DAY 2

Today's Activities.

Who Visits (*the park*)?

Desired Visitor Experiences.

Stakeholder Issues and Suggestions for Improving the Interpretation & Education Program.

Next Steps in the Process. *(The stakeholders are adjourned.)*

CIP CORE TEAM

DAY 3

Today's Activities for the CIP core team.

Audiences for the Program.

Management Goals for the Program.

Issues and Influences Affecting the Program (inc. Operational Considerations).

Actions for Improving Supportive Elements of the Program (6 topics).

CIP Component 3: ID

Next Steps in the Process.

</td><td valign="top">

The planners electronically compile all of the information gathered during the first workshop. They write it to an "archive" file (to be used as a permanent record of the process including multiple versions of various pieces as they evolve).

The planners extract interpretive audiences, significance statements, and primary interpretive themes from the file.

The planners electronically mail the extracted file (with handouts for context) to the park's CIP core team.

The park's CIP core team edits and refines the draft statements, then sends the significance statements and primary interpretive themes to stakeholders for review.

The park's CIP core team incorporates the stakeholder comments, creating next-draft versions.

The park's CIP core team electronically mails refined statements to the planners, along with edits made to interpretive audiences.

The planners review this material in preparation for the second CIP workshop.

Workshop Preparation. The park's CIP core team reserves meeting room and addresses other meeting logistics.

The planners review the refined statements, strategize their approach to the workshop, and prepare workshop handouts.

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CIP CORE TEAM, DAY 1

Welcome and Introductions.

The Mission of, and Management Goals for, the Interpretation & Education Program.

Overview of the Workshop.

Today's Activities and Facilitation Essentials.

Set of Significance Statements.

Set of Primary Interpretive Themes.

Set of Audiences for the Program.

Set of Visitor Experience Considerations.

Operational Considerations.

Identifying Suitable Locations for Services.

Identifying Suitable Types of Services.

Identifying Suitable Partnerships for the Program.

Future Interpretation & Education Program.

DAY 2

Today's Activities.

Future Interpretation & Education Program.

DAY 3

Today's Activities.

Future Interpretation & Education Program.

Next Steps in Developing the Future Program.

Individual Service Plans and Service-group Planning.

Role of the Cooperating Association in the Park's Interpretation & Education Program.

CIP Component 2: Annual Implementation Plan (AIP).

Developing an AIP from the LRIP.

Developing the AIP's Program Overview.

Describing the LRIPs Action List and Developing the AIP Action List.

Connecting Individual Efforts to the Operational Details in the CIP.

Revision Cycles of a CIP.

Next Steps in the Process.

</td><td valign="top">

Planners electronically compile information gathered between workshops and during the second workshop, and add this information to the Archive file. The archive file is now essentially complete, although the park may continue to update the file as CIP component-development continues.

Planners extract the information appropriate for placement in the LRIP component of the CIP, creating the first-draft LRIP.

Planners create the first-draft ID section.

Planners electronically mail the drafts to the park's CIP core team, along with instructions for the decision-making steps that must follow to complete the CIP.

Planners provide ongoing assistance as the park works through the following steps. The park:

    Reviews everything;

    Makes decisions regarding operational considerations;

    Refines the program overview;

    Refines long-range schedule of actions;

    Writes individual service plans;

    and completes other components of the LRIP.

Park sends LRIP draft(s) to stakeholders for review.

The CIP core team completes LRIP and ID components of the CIP.

The CIP core team creates the first-year Annual Implementation Plan (AIP) component of the CIP based on the completed LRIP.

</td><td valign="top">

The park manager reviews and approves all three components of the CIP. At this point, the park's CIP now formally exists as a plan.

Formal implementation of the CIP begins at the beginning of next fiscal year: Park and interpretive partners provide interpretive and educational services as specified in the first-year AIP, basing all interpretive operations on the CIP.

Ongoing evaluation of individual services begins by park staff and partners.

Actions are accomplished to successfully and completely implement the future interpretation & education program.

The park updates the LRIP, AIPs, and ID as needed so that the CIP remains relevant to the interpretive operation.

At some later date (usually about five years later), a similar process begins again, built upon the first-generation CIP. Major course corrections are initiated and a second-generation CIP is produced.

</td></tr>
</table>

Relationship of the Program Overview to an ISP

Program Overview

LRIP's Future Interpretation & Education Program *or*
AIP's Annual Interpretation & Education Program

PRIMARY INTERPRETIVE THEMES *and* INFORMATIONAL TOPICS	1. General Audience.	2. Org *Grades*
Theme A. The approachable, active volcanoes of Hawai'i Volcanoes National Park allow first-hand discovery and connection with one of the most fundamental forces	e6 **Interpretive talks** [FY2002] at Jaggar, KVC, VH, eruption sites, satellite broadcast.	e7 **Guide** at KV
	e6 **Guided hikes** [FY2003] at Summit area, Chain of Craters Road, lava tubes...	e6 **Curri** [FY2003] a
	e6 **Wayside exhibits** [FY2004] at Parkwide (to be specified in the Wayside Exhibit Plan).	e5 **Interp** VH, er
	e5 **Site bulletin (Dynamic Volcanism)** [FY2002] at KVC, ECS, Jaggar, via mail.	e4 **Trave**

Individual Service Plan

Program Overview Information	
Interpretive or Informational Service(s)	**Interpretive talks.** *(Note: Already conducting this service as part of the existing program, but need to revise talk content for FY2002 to reflect new primary interpretive themes.)*
Primary Interpretive Theme(s)	A: The approachable, active volcanoes of Hawai'i Volcanoes National Park allow first-hand discovery and connection with one of the most fundamental forces of our world — in both its creative and destructive roles.
Location(s)	Jaggar, Kilauea Visitor Center (KVC), Volcano House (VH), eruptions sites.
Audience(s)	1: General Audience.

Management's Intent, Critical Resource Issues, and Visitor Safety Issues	
	To facilitate visitor understanding of how societies can benefit from, and be harmed by, the Earth's dynamic geological processes, especially volcanism. Facilitate visitor understanding and appreciation of the long-lasting affects these events can have on societies and the evolution of their perspectives of the world in which we live.
	Visitor safety information should be emphasized, especially for the talks at the eruption sites where first-hand, up-close experiences are available to visitors.

Key Operational Details	
Presenters	Park interpretive staff (by twos at the eruption sites for safety reasons).
Service Availability	At Jaggar, KVC, VH: 3 talks daily between 9:00 and 3:30, March 1 -October 31. At eruption sites: 2 talks daily at 10:00 and 2:00, year-round as weather permits.
Service Duration	At Jaggar, KVC, VH: 15 minutes each. At eruption sites: 30 minutes each.
Maximum Audience Size	At Jaggar, KVC, VH: 25 visitors. At eruption sites: 35 (more when wind is calm).
Support Materials	At Jaggar, KVC, VH: None. At eruption sites: Backpacks equipped with first-aid supplies, park brochures (for maps).
Logistics	At Jaggar, KVC, VH: 15 minutes of travel time (use loop road) before/after each. At eruption sites: Minimum of 45 minutes travel time before and after each talk.
Staff Time Commitment	At Jaggar, KVC, VH: 45 minutes per presentation, plus appropriate preparation/developmental time. At eruption sites: 2 hours per presentation, plus additional time for roving when the schedule allows, plus preparation/developmental time.

Annual Reporting Data		
Servicewide Interpretive Report	`Personal Services — Formal Interpretation`	(Program category)
Number of Presentations	1,200	*
Number of People Served	36,000	*

An estimate that will be replaced with actual data as it becomes known (throughout, or at the end, of the fiscal year).

Based on the Draft CIP of Hawai'i Volcanoes National Park, 1999.

Individual Service Plan — Interpretive Talks

Program Overview Information	
Interpretive or Informational Service(s)	**Interpretive talks.** *(Note: Already conducting this service as part of the existing program, but need to revise talk content for FY2002 to reflect new primary interpretive themes.)*
Primary Interpretive Theme(s)	A: The approachable, active volcanoes of Hawai'i Volcanoes National Park allow first-hand discovery and connection with one of the most fundamental forces of our world — in both its creative and destructive roles.
Location(s)	Jaggar, Kilauea Visitor Center (KVC), Volcano House (VH), eruptions sites.
Audience(s)	1: General Audience.

Management's Intent, Critical Resource Issues, and Visitor Safety Issues	
	To facilitate visitor understanding of how societies can benefit from, and be harmed by, the Earth's dynamic geological processes, especially volcanism. Facilitate visitor understanding and appreciation of the long-lasting affects these events can have on societies and the evolution of their perspectives of the world in which we live.

Visitor safety information should be emphasized, especially for the talks at the eruption sites where first-hand, up-close experiences are available to visitors. |

Key Operational Details	
Presenters	Park interpretive staff (by twos at the eruption sites for safety reasons).
Service Availability	At Jaggar, KVC, VH: 3 talks daily between 9:00 and 3:30, March 1 -October 31. At eruption sites: 2 talks daily at 10:00 and 2:00, year-round as weather permits.
Service Duration	At Jaggar, KVC, VH: 15 minutes each. At eruption sites: 30 minutes each.
Maximum Audience Size	At Jaggar, KVC, VH: 25 visitors. At eruption sites: 35 (more when wind is calm).
Support Materials	At Jaggar, KVC, VH: None. At eruption sites: Backpacks equipped with first-aid supplies, park brochures (for maps).
Logistics	At Jaggar, KVC, VH: 15 minutes of travel time (use loop road) before/after each. At eruption sites: Minimum of 45 minutes travel time before and after each talk.
Staff Time Commitment	At Jaggar, KVC, VH: 45 minutes per presentation, plus appropriate preparation/ developmental time. At eruption sites: 2 hours per presentation, plus additional time for roving when the schedule allows, plus preparation/developmental time.

Annual Reporting Data		
Servicewide Interpretive Report	**Personal Services — Formal Interpretation**	(Program category)
Number of Presentations	1,200	*
Number of People Served	36,000	*
	*An estimate that will be replaced with actual data as it becomes known (throughout, or at the end, of the fiscal year).	

Based on the Draft CIP of Hawai'i Volcanoes National Park, 1999.

Individual Service Plan — Wayside Exhibit

PROGRAM OVERVIEW INFORMATION	1. General Audience.
Primary Interpretive Theme A. The approachable, active volcanoes of Hawai'i Volcanoes National Park allow first-hand discovery and connection with one of the most fundamental forces of our world — in both its creative and destructive roles.	**Wayside Exhibit.** *(This service will be further developed when the park conducts the planning necessary for a parkwide Wayside Exhibit Plan. This ISP, therefore, remains conceptual at this time.)* **Halema'uma'u Trail.** *(Location is approximately one-eighth mile from the east trailhead.)*

Operational Date: Date this service will become available for visitor use: FY2004.

Management's Interpretive Intent: To be determined.

Critical Resource and Visitor Safety Issue(s): Visitors should be cautioned to remain on the trail for their safety, and the safety of the fragile biota adjacent to the trail.

Subject: Crater origination process.

Orientation: Northeast.

View: Overlooking the crater.

Purpose: To explain the geologic processes that make craters, and the continual evolution of a crater once it's made.

Comments: The trail will have to be enlarged to allow for adequate traffic flow while the wayside exhibit is being used by other visitors.

Potential Graphics: Historic photographs of the crater, and illustrations of associated geologic processes.

Exhibit Base: 36" or 42" x 24" low profile, final size to be determined by actual content; 30° angle, in-ground, dark brown.

Staff Time Commitment: To be determined; will occur as part of the parkwide wayside exhibit planning effort.

Servicewide Interpretive Report (SIR) Category: (Not applicable.)

Based on the Draft CIP of Hawai'i Volcanoes National Park, 1999.

Individual Service Plan — Translated Park Brochure

KEY INFORMATION FROM THE
OVERVIEW OF THE DESIRED FUTURE INTERPRETATION & EDUCATION PROGRAM

Interpretive-informational service. <u>Translation of the park brochure.</u> *Availability is ONGOING*.

Primary interpretive themes. This service includes all themes (A through E), plus orientation and safety information, and information on the National Park System and NPS mission.

Distribution locations. Entry stations, KVC, via mail, Jaggar, ECS, KMC, VH, AEC, Educational Center, and at outlets run by partners (provided to partners at cost).

Audiences. Non-English speaking audience. Languages include Japanese, Chinese, Korean, German, Spanish, French, and Hawaiian.

OPERATIONAL DETAILS

Management's interpretive intent. Translations of the official park brochure.

Medium. Publication in site bulletin format.

Service availability. 43,000 copies of the park brochure translation are available for distribution this fiscal year:

```
Japanese .....   15,000
Chinese ......    8,000
Korean .......    6,000
German .......    6,000
Spanish ......    5,000
French .......    2,000
Hawaiian .....    1,000
Total .......    43,000
```

Support services and materials. Full-color English language version. Contract services of professional translators (four hours per language).

Logistics. Distribution boxes at the locations mentioned above are replenished as part of the daily check of handouts; partners are contacted once a month for re-orders.

Staff time commitment. Annual update and reprinting of translations requires 12 hours staff time of a GS-9 Park Ranger (Interpretation).

GPRA reporting. Costs are made available for annual GPRA reporting; estimated cost* for this fiscal year is $5,700.00, including staff salary and benefits.

Servicewide Interpretive Report (SIR). The following information meets the SIR requirements for this interpretive service:

```
Program Category ......   Non-Personal Services — Park-Produced Pubs
Number of Presentations   43,000 *
Number of People Served   43,000 *
```

These are estimates; they will be replaced with actual data as it becomes known throughout the year, or at the end of the fiscal year.

Based on the Draft CIP of Hawai'i Volcanoes National Park, 1999.

Materials Used
Between CIP Workshops

Between the workshops, the planners enter the workshop-generated information into the *Archive file*.

Then they copy the draft statements of significance and draft primary interpretive themes into the *Foundational Information to Be Edited Between Workshops* file.

The planners also open their *Interpretive Database template file*, customize it for the park, and prepare this for email.

> *Note: Please write or call us to receive these MS Word® XP electronic files. (See inside back cover for contact information.).*

The last step is sending the Foundational Information file and ID file to the park, along with the transmission memo (below). Note: The planners also copy the draft set of audiences for the program into the cover memo for use by the CIP core team.

The core team will edit all three elements of the LRIP (significance statements, primary interpretive themes, strategic interpretive audiences) as well as begin work on the ID. They'll return the edited information to the planners before the second workshop so that the planners can make the next set of workshop handouts. ••

Email Transmission Memo: Foundational Information and ID

Hi {name},

We consider the first CIP workshop to be a solid start on comprehensively planning for effective interpretation at {parkname}. As promised, attached below is an MS Word file containing the **draft significance statements** and **draft primary interpretive themes**.

[attach file here]

All of these draft statements need editing to ensure that they speak as clearly as possible about this important place to a reader who might be unfamiliar with it. The significance statements need to be a complete and accurate set of statements describing the importance of the place. The interpretive themes also need to be a complete, accurate set. They need to focus on universal concepts related to the park's resources so that they are relevant to the greatest number of people. And they need to be clearly and succinctly stated without unnecessary redundancy. The themes need to be broad enough to allow for subtheme development, yet specific enough to capture the broad stories of this specific place. {Planner's name} and I made minor edits for clarity and grammar as we keyed these statements into the file. We also included various notes that were made during the discussion of the first-draft statements in the workshop.

We anticipate that you'll want to send the draft statements to stakeholders for review — both those that were at the workshop and others. This will ensure that the dialogue continues and truly expands to all parties that have a stake in the stories of the place. We applaud your efforts to date, and encourage you to keep on keeping on. We agree with you that it's better to find out what all the stakeholders are thinking as early in the process as possible, and then continue dialogue from that point forward.

We have designed the attached file with these things in mind. It not only includes the draft statements, but also the related handouts used in the workshops. That way, someone who wasn't there can better understand the intent of statements of significance and primary interpretive themes, and offer their input accordingly. {Planner's name} and I will continue our role as advisors, counselors, and editors, and would appreciate working closely with you on the continuing development of these statements between now and the second workshop.

We suggest the CIP core team edit the significance statements and primary interpretive themes in this handout BEFORE forwarding it to stakeholders. Such editing should include ordering the statements in a way that makes the most sense to the core team: chronologically, bigger to smaller scope, more specific to more broad, by types of resources — whatever works best for you. Performing this editing before forwarding this information to others will ensure a more useful set of statements for their review. As the CIP core team and others continue work on the themes, please keep in mind that besides the park's primary interpretive themes, "Orientation Information and Visitor Safety Information" and "National Park System and National Park Service Mission" topics will also be a part of what the {parkname}interpretation & education program includes.

It should be noted that the draft significance statements were generated through an interpretive process, for interpretive purposes. It seems that there is a lot of good information here that is not found in the park's current significance statements, per the *Strategic Plan*. We recommend that the management team of the park consider modifying the next set of park significance statements — for the *Strategic Plan* or similar documents — based on this more recent set. And, of course, these statements will continue to improve as the editing moves forward.

We've also included, for your review, the set of **draft audiences** generated in the workshop by the CIP core team. (These are included here, rather than in the attached file, because this is really something for the core team to review rather than the larger stakeholder group.) Here is the draft set of audiences you identified for the interpretation & education program:

> **General Audience**. {Includes …}
> **{Educational Groups**. Includes …}
> **{Local and Regional Neighbors**. Includes …}

We will need the revised sets of significances, themes, and audiences back from you no later than COB {date}. That way, we'll have time to prepare the handout materials for the second workshop, scheduled for {date}. Of course, if you would like to discuss edits, send latest versions back and forth, or otherwise cooperate to move these key pieces of the work forward between now and then, that's great. Please send all such messages to both planners. Those addresses appear below.

{filename} – This is the FIRST DRAFT of the park's Interpretive Database (ID) component of the CIP. We suggest you use the ID not only for referencing information, but also to contain the park's ISPs. As we've discussed, the ID should be considered ready for signature at the time the LRIP and AIP components are ready to be signed, regardless of the level of completeness in the ID component at that time. The ID, more than the other two components, is a perpetual work in progress.

> [attach file here]

Regards,

{Richard & Kim

richard_kohen@nps.gov
kim_sikoryak@nps.gov}

••

Materials Used in Conducting
the Second CIP Workshop

The materials in this section are used to conduct the second workshop of the comprehensive interpretive planning process.

The key tool is the *Planners' Guide for the Second CIP Workshop* that begins on the following page. We suggest that planners prepare to conduct the second CIP workshop in the following ways:

- Customize the *Planners' Guide* by adding any project-specific or park-specific information that you feel is needed. (There is usually very little additional information needed.)

- Print a hard copy of the *Planners' Guide*.

- Update the table of *Contents* to account for any shift in paging due to your customization of the *Planners' Guide*.

- Print the *Contents* as a temporary reference.

- Thumb through the *Planners' Guide* page by page. Every time you come to a handout in the planners' guide, simply locate that handout by name on the *Contents* and print that page (or those pages) in the quantity needed. Referencing or printing the *Comprehensive Map of Planning Materials* will also assist you in printing workshop handouts.

- Some handouts for this workshop will be printed pages from the incomplete CIP Archive file. In these cases, we will often:

  o Open the Archive file in Microsoft Word®.

  o Place temporary page breaks before and after a text section that we want to print.

  o Print the necessary multiples of that isolated section, creating handouts.

  o Go to the next needed section in the Archive file, place temporary page breaks around it, and print again. Repeat the process until the tasks are completed.

  o Note. When the planners have printed everything they need to from the Archive file, *care must be taken not to save the file*. Close it without saving it to avoid the temporary page breaks from complicating the edits you'll make later in the process.

When all the handouts have been printed and you've assembled them in the order of their use, all that's left is to run through the *Supplies and Materials* checklist on the first page of your *Planners' Guide*, pack, and travel. ••

Planners' Guide for the Second CIP Workshop

{parkname}

{Richard Kohen & Kim Sikoryak}, Interpretation Planners, {National Park Service}

Schedule in Brief

	MONDAY, {w2date1}	Scheduled travel day.
8:00 a.m. – 4:30 p.m.	**TUESDAY**, {w2date2}	Scheduled workshop day.
8:00 a.m. – 4:30 p.m.	**WEDNESDAY**, {w2date3}	Scheduled workshop day.
8:00 a.m. – 4:00 p.m.	**THURSDAY**, {w2date4}	Scheduled workshop day (and travel home?).
	FRIDAY, {w2date5}	Potential travel home.

Supplies and Materials

Park provides: (1) flipchart easel w/paper pads, tape, table tents, writing paper and pens.

Planners provide (pack and travel with):

☒ This *Planners' Guide for the Second CIP Workshop*.
☐ Complete package of planner's handouts and support materials and personal notes.
☐ Various park planning and background documents.
☐ (2+ boxes) markers.
☐ (2+ packages) ranking dots for use in brainstorming the program overview.
☐ Workshop handouts: multiples for the CIP core team   (_____ +2+2 = _____).

> *Reminder note:* Handouts printed from the Archive file include:
> ☐ The Mission of, and Management Goals for, the Interpretation & Education Program.
> ☐ Set of Significance Statements (draft) — *May be the park-edited, between-workshops version.*
> ☐ Set of Primary Interpretive Themes (draft) — *May be the park-edited, between-workshops version.*
> ☐ Set of Audiences for the Program (draft) — *May be the park-edited, between-workshops version.*
> ☐ Set of Visitor Experience Considerations (draft) (*drafted by planners between workshops*) ***and*** desired visitor experience statements.

MONDAY, {w2date1}

Today's Schedule for the Planners

Travel. // Lunch or snack? // Drive to park?

3:00 p.m.	Meet with Superintendent and Chief of Interpretation at _____
3:00 p.m.	Review and set up workshop meeting room at _____
Before 5:00 p.m.	Experience the park or visitor center, as appropriate and as time allows.

TUESDAY, {w2date2}

Pre-workshop Preparation

Similar to the first workshop, but on a smaller scale, set up tables and chairs in a "U"-shape, with a table for the planners angled into one of the two ends of the semicircle. The flipchart should be placed against the wall which the semicircle faces, centered in that space.

Begin at about 8:00 a.m. — Lasts about 5 minutes

Welcome and Introductions

*Although the park **superintendent** might be present, and the **chief** is always present, the meeting is opened by the **planners**.*

*The **first planner** stands, introduces himself/herself, then asks these two questions of participants.*

> Who are you?
> What do you do at the park?

*This ends when the **second planner** responds. The second planner then has the floor and conducts the following session.*

Lasts about 20 minutes

The Mission of, and Management Goals for, the Interpretation & Education Program (review)

*Handout (Archive extract): **The Mission of, and Management Goals for, the Interpretation & Education Program***

Distribute. Participants self read. Verbally reinforce key ideas. Answer questions.

Verbally highlight how the mission influences planning.

> These are the guiding principles underpinning interpretation & education programs at parks of the National Park System.

Verbally read the superintendent's response to the question, "What does management expect the interpretation & education program to accomplish for the park?"

> Is management's intent accurately conveyed through these statements? Let's modify them if not.

***FLIPCHART: MANAGEMENT GOALS.** Write the title and record management's response **only** if correction or modification need to be made to the notes that were handed out. Often though, these modifications are **only** made by each individual on their own handouts — in which case the planners do this too (and use these notes to update the Archive file at a later date).*

***Planners' notes.** The planners need to have the park's purpose and/or mission statement on hand (photocopies, reprints, park planning documents).*

Verbally read the park's purpose or mission statement(s).

Note. *As appropriate, do or don't do the task described in the shaded text.*

Note. Reviewing portions of the park's General Management Plan is only useful if the park relies on the GMP for guidance. Skip this next prompt and handout if the GMP is outdated or of little use to the staff:

> Now let's look at the park's GMP, and the guidance for interpretation that it outlines.

Handout (photocopied or reprinted from the park's general management plan):
(excerpts related to the program, or to visitor experience more generally)

Distribute. Participants self read. Verbally reinforce key ideas. Answer questions.

> Superintendent and chief: Is there any part of this that you'd like to emphasize?

Note. Reviewing portions of the park's Strategic Plan (Park Long-term Goal IIb1) is only useful if the park relies on the plan for operational guidance. Skip this next prompt and handout if this is not the case — if its of little operational use to the staff:

> Now let's look at the park's Strategic Plan, and the guidance for interpretation that it outlines.

Handout (photocopied or reprinted from the park's Strategic Plan):
(excerpts related to the program, or to visitor experience more generally)

Distribute. Participants self read. Verbally reinforce key ideas. Answer questions.

> Superintendent and chief: Is there any part of this that you'd like to emphasize?
>
> These sideboards...
> - The mission of the interpretation & education program and the core rubric of the NPS Interpretive Development Program (IDP)
> - The general management plan guidelines for visitor experience and interpretation
> - The park's purpose and/or mission statement(s)
> - The superintendent's/management's goals for the interpretation & education program
> - And the expression of all of these things in the park's Strategic Plan
>
> ...together define the strategic vision for the park's interpretation & education program.
>
> These sideboards frame the desired outcomes of this program.

Lasts about 15 minutes

Overview of the Workshop

Comprehensive Interpretive Planning (review)

> Achieving these outcomes in an effective, coordinated manner only results from thoughtful, comprehensive planning.
>
> The Comprehensive Interpretive Plan (CIP) is the basis for virtually all programmatic decisions regarding interpretation in the park.

FLIPCHART: COMPREHENSIVE INTERPRETIVE PLAN (CIP). Write title and ask the following question.

What are the three components that comprise a CIP?

(FLIPCHART: COMPREHENSIVE INTERPRETIVE PLAN (CIP).) As the participants provide the name of each CIP component, add that component name to the flipchart. **Allow the participants to generate the answers.** *(Don't be afraid to let them struggle a little bit with these answers. This will help set a productive tone to the workshop.) Answers:*

Comprehensive Interpretive Plan ("CIP" is one of the few acronyms we'll use)
- *Long-Range Interpretive Plan*
- *Annual Implementation Plan(s)*
- *Interpretive Database*

The CIP is composed of three components:
- a long-range (5 years) component
- a short-range (annual) component
- a reference database of supportive materials

The Comprehensive Interpretive Plan (CIP) is the basis for virtually all programmatic *decisions* regarding interpretation & education in the park.

The CIP addresses both **long-range and annual** planning needs.

The CIP addresses both **personal and non-personal** services, regardless of provider.

The CIP addresses both **interpretive and informational** services, regardless of provider.

The CIP involves *stakeholders* in establishing the foundation and vision for the interpretation & education program. The process involves all of you, and others.

The CIP is **designed to be updated** as needed while staying true to the stakeholders' vision for the program. That's how it remains relevant to operations.

The CIP combines long-range planning with daily operational planning. All three of its components are designed to be fully **integrated** and work together as a useful, adaptive plan that maintains its functionality over time.

The Different Roles of the CIP Core Team and Planners

Our role is to provide guidance, advice, council, and editing, and to generally provide technical assistance regarding interpretive planning.

Your role — as people who are intimate with the park and stationed here — is to customize this process so that it meets your particular needs

Help us ensure that this CIP is no more complex than need be, that it is accurate, and that it is constructed in such a way that it really does provide a reliable foundation on which to base decisions regarding the interpretation & education program.

Service Types, Service Development, and Program-organizing Structures

Handout (side 1): **The CIP's Three Components and their Elements**

Distribute 2-sided handout (side 2: Comprehensive Interpretive Planning Process Details).

Participants self read. Verbally review the first workshop. Indicate the current location in the process.

Handout (side 2): **Comprehensive Interpretive Planning Process Details**

Participants self read. Verbally review the first workshop. Indicate the current location in the process.

> In the next few days, we'll begin to develop the park's future interpretation & education program. This is the parkwide program that you determine should exist here.

Handout (side 1): **Developing Interpretive and Informational Services**

Distribute 2-sided handout (side 2: Overview of the Future Interpretation & Education Program / Case Study).

Participants self read. Briefly reinforce key ideas. Explain components of the program overview. Answer questions.

Handout (side 2): **Overview of the Future Interpretation & Education Program /** **Case Study**

Participants self read. Verbally reinforce key ideas. Answer questions.

Stapled multipage handout (sides 1-4):
  Relationship of the Program Overview to an ISP */ Case Study*
  Individual Service Plan — Interpretive Talks */ Case Study*
  Individual Service Plan — Wayside Exhibit */ Case Study*
  Individual Service Plan — Translated Park Brochure */ Case Study*

Distribute the stapled handout. Planners lead participants through SIDES 1-4 *while verbally reinforcing key ideas. Answer questions.*

Planners describe the purpose, nature, and use of ISPs.

Lasts about 5 minutes

Today's Activities and Facilitation Essentials

> That's a quick look at where we're headed in this workshop.
>
> Here's how we're going to get there:

Handout: **Today's Agenda (Day One)**

Distribute. Participants self read. Verbally reinforce key ideas. Answer questions.

Handout: **Are You Really Here at the Workshop?**

Distribute. Ask the workshop participants to "sign in."

> If you participated in the first CIP workshop, and signed in, we just need your name today (not the rest of the information).

Handout: **Do You Know Something We Don't Know?**

Distribute. Inform the participants that any sheets received will be addressed by the end of the workshop, as appropriate (some comments may be confidential).

Logistics and Workshop Administration

Present meeting logistics information: food, restroom locations, phone, and any similar concerns.

__FLIPCHART: PARKING LOT.__ Write the title. Describe intended use of this sheet. Post.

> The parking lot is intended to capture ideas that are better addressed later in the workshop. We don't want to lose your ideas, so we'll park them here until they can best be addressed. Our promise to you: By the end of the workshop, we'll review any ideas left on the sheet to make sure that everything gets addressed.
>
> Questions?

Plan for each break to last about 15 minutes

Break

Lasts about 30 minutes

Set of Significance Statements (finalize)

Handout: __Developing the Set of Significance Statements__

Distribute. Participants self read. Verbally reinforce key ideas. Answer questions.

__Note.__ The next handout — an extract from the Archive file — might include statements reviewed and modified during the first workshop, statements edited between workshops, or both sets.

Handout (Archive extract): __Set of Significance Statements__

Distribute. Participants self read. Verbally reinforce key ideas. Answer questions.

If the planners or participants have questions regarding the set's clarity or accuracy, now's the time to ask them and resolve them.

__FLIPCHART: SIGNIFICANCE STATEMENTS.__ Write the title and record participant responses __only__ if correction or modification needs to be made to the current draft set of significance statements. Often though, these modifications are __only__ made by each individual on their own handouts — in which case the planners do this too (and use these notes to update the Archive file at a later date).

Conduct this session to achieve consensus on a final wording for use in the CIP.

Lasts about 45 minutes

Set of Primary Interpretive Themes (finalize)

Handout: __Developing the Set of Primary Interpretive Themes__

Distribute. Participants self read. Verbally reinforce key ideas. Answer questions.

__Note.__ The next handout — an extract from the Archive file — might include statements reviewed and modified during the first workshop, statements edited between workshops, or both sets.

Handout (Archive extract): **_Set of Primary Interpretive Themes_**

Distribute. Participants self read. Verbally reinforce key ideas. Answer questions.

If the planners or participants have questions regarding the set's clarity or accuracy, now's the time to ask them and resolve them.

FLIPCHART: PRIMARY INTERPRETIVE THEMES. *Write the title and record participant responses* **_only_** *if correction or modification needs to be made to the current draft set of primary themes. Often though, these modifications are* **_only_** *made by each individual on their own handouts — in which case the planners do this too (and use these notes to update the Archive file at a later date).*

Conduct this session to achieve consensus on final wording for use in the CIP.

Achieve consensus on the **order** *in which the statements are listed within the set.*

Set of Audiences for the Program (finalize)

Handout: **_Developing the Set of Audiences for the Program_**

Distribute. Participants self read. Verbally reinforce key ideas. Answer questions.

Handout: **_Tenets of an Effective Program and its Services_**

Distribute as a reminder that these tenets are assumed to be in force. Briefly discuss.

Note. *The next handout — an extract from the Archive file — might include statements reviewed and modified during the first workshop, statements edited between workshops, or both sets.*

Handout (Archive extract): **_Set of Audiences for the Interpretation & Education Program_**

Distribute. Participants self read. Verbally reinforce key ideas. Answer questions.

If the planners or participants have questions regarding the set's clarity or accuracy, now's the time to ask them and resolve them.

FLIPCHART: AUDIENCES FOR THE PROGRAM. *Write the title and record participant responses* **_only_** *if correction or modification needs to be made to the current draft set of audiences. Often though, these modifications are* **_only_** *made by each individual on their own handouts — in which case the planners do this too (and use these notes to update the Archive file at a later date).*

Conduct this session to achieve consensus on final wording for use in the CIP.

Achieve consensus on the **order** *in which the statements are listed within the set.*

Break

Set of Visitor Experience Considerations (finalize)

What guides the future interpretation & education program regarding the experiential aspects of the visitor's park experience?

Note. Delete the following statement if the GMP is outdated or of little use to the staff:

The park's GMP contains some useful information about desired visitor experiences.

In the first workshop, the stakeholder group identified and ranked desired visitor experiences.

We're going to review these statements, then consider how best to summarize them so that we have some guiding statements for the development of the future interpretation & education program.

These *visitor experience considerations* will help us keep in mind what it is visitors want to do in regards to experiencing the park (regarding things in which interpretation has a role).

*Handout: **Developing Statements of Desired Visitor Experiences***

Distribute. Participants self read. Verbally reinforce key ideas. Answer questions.

*Note. The next handout — an extract from the Archive file — includes the **visitor experience considerations** drafted by the planners between workshops, and the ranked **desired visitor experiences** generated by stakeholders in the first workshop. These two groups of text appear in different places in the Archive file, so some creative, temporary cutting and pasting is usually necessary to place these text sections in proximity on the handout.*

*Handout (Archive extract): **Set of Visitor Experience Considerations***

Distribute. Participants self read. Verbally reinforce key ideas. Answer questions.

If the planners or participants have questions regarding the set's clarity or accuracy, now's the time to ask them and resolve them.

***FLIPCHART: VISITOR EXPERIENCE CONSIDERATIONS.** Write the title and record participant responses **only** if correction or modification needs to be made to the current draft set of visitor experience considerations. Often though, these modifications are **only** made by each individual on their own handouts — in which case the planners do this too (and use these notes to update the Archive file at a later date).*

Conduct this session to achieve consensus on final wording for use in the CIP.

Lasts about 45 minutes

Operational Considerations

In addition to the foundational information, a number of issues frequently need to be resolved in a holistic way and incorporated into the park's strategic approach to interpretation.

Often, the challenges to be resolved are intimately interrelated: Most options for addressing each one have fundamental ramifications regarding the others.

Situations vary widely; resolution of these issues can occur at any stage of the process from here forward, but issues that will significantly affect the development of the future interpretation & education program are best resolved before that program is drafted.

Summarizing the most prominent of these issues in the LRIP can be useful in documenting their interconnection and evolution, prompting their resolution.

Note. *The next handout — an extract from the Archive file — might include sketchy notes made by the planners or a more coherent narrative of operational concerns. If in the form of sketchy notes, these might be better verbally read to the group rather than handed out to them.*

Handout (Archive extract): ***Operational Considerations***

Distribute. Participants self read. Verbally reinforce key ideas. Answer questions.

A brief discussion ensues regarding the description of any of this kind of issue that needs to be discussed, especially is resolution of approaches to some of these issues need to be determined by the CIP core team.

FLIPCHART: ***OPERATIONAL CONSIDERATIONS.*** *Write the title and record participant responses* ***only*** *if such issues exist, and* ***only*** *if something actually needs to be described on a flipchart because of its complexity or criticality. (The planners will use these notes to update the Archive file at a later date).*

The lunch break often occurs at this time, but can also occur before or after any of the next three sessions. If too early, continue the sessions. Whenever it occurs, it lasts about 1 hour and 15 minutes

Lunch Break

Lasts about 15 minutes

Identifying Suitable Locations for Services

We're now going to briefly look at potential locations for interpretive and informational opportunities.

This is good information to have in mind when deciding what services to provide our visitors, and it also ties us back to the tangible resources of the park.

Handout (side 1): ***Identifying Suitable Locations for Services***

Distribute 2-sided handout (side 2: Identifying Suitable Types of Services).

Participants self read.. Verbally reinforce key ideas. Answer questions.

Discuss, in general terms, how the information applies to this park.

Lasts about 15 minutes

Identifying Suitable Types of Services

In the first workshop, we determined what visitors want to be able to do, see, and experience from their park visit.

Now let's take a look at what types of interpretive and informational services may be needed to facilitate those experiences.

Handout (side 2): ***Identifying Suitable Types of Services***

Participants self read.. Verbally reinforce key ideas. Answer questions.

Discuss, in general terms, how the information applies to this park.

Identifying Suitable Partnerships for the Program

Let's consider another aspect of the word "comprehensive" in comprehensive interpretive planning.

Comprehensive interpretive planning not only refers to looking at long-range goals and short-range actions, not only looking at all types of services concurrently; it also means looking at who might best provide the services we've just identified. Who makes up the work force?

Let's take a strategic look at the park's current partners, and potential partners.

*Handout: **Identifying Suitable Partnerships for the Program***

Distribute. Participants self read. Verbally reinforce key ideas. Answer questions.

Discuss, in general terms, how the information applies to this park.

> *Note. As time and core team inclination indicate, do or don't do the task described in the shaded text.*
>
> ***Delete** this shaded section if you don't use it.* (OR) ***Remove** the shading if you do use it.*

Let's list this park's current partners, potential partners, and any specific assistance the park may need from them.

*FLIPCHART: INTERPRETIVE PARTNERS. Write the title and record participant responses **only** if time and core-group inclination indicate this would be useful. If so, it's often easier to list current partners first, then potential partners. Or, if the group insists on both at once, use a color distinction or provide some other key to indicate which partners are which.*

Discuss the usefulness of the CIP core team creating a table (at a later date) to identify partners and the services or assistance provided by them — like the example strategic table on the handout.

Break

During the break:

FLIPCHART: (brainstorming question). Write the following question large and in a bright color, to be used later this afternoon and throughout the remainder of the workshop. Leave the sheet concealed after writing the question.

> *Over the next 5 years,*
> *what types of services,*
> *at what locations, will*
> *most effectively facilitate*
> *the understanding and*
> *exploration of Theme/Topic ___*
> *by Audience ___?*

Future Interpretation & Education Program

Note. For this session to be meaningful, the planners must take the core team all the way through both 1) brainstorming the Theme A - Audience 1 combination, as well as 2) the subsequent ranking of the brainstormed services. By ensuring that this occurs, a thorough introduction of this process will be completed and participants can mull it over before tomorrow, where the entire day will be spent repeating these steps. If the timing of sessions lags through the day and less than 1.5 hours remain, it may be better to start this A-1 combination clean the next morning. As always, the planners need to weight the group's energy level and interest, as well as time remaining, when considering such options.

We finally have all the parts needed to develop the future interpretation & education program:

- **TENETS.** We've reviewed some important tenets of the interpretive profession.

- **MISSION & MANAGEMENT.** We've reviewed the mission of the interpretation & education program, and the specific emphases this park's management team expects of it.

- **SIGNIFICANCE.** A strong foundation has been built with stakeholders as they explored the significances ascribed to the resources of the park, and produced an improved set of significance statements.

- **PRIMARY THEMES.** A well-crafted set of primary interpretive themes has been developed to provide visitors with opportunities that facilitate an exploration of the meanings ascribed to this park's resources.

- **AUDIENCES.** A useful set of audiences for the program has been identified, which will help guide the selection of services and locations.

- **VISITORS.** Consideration of what visitors are seeking from their park experience led to the development of visitor experience considerations, which will also help guide the selection of services and locations.

- **OPERATIONS.** Complex operational considerations have been discussed so that a common approach exists for drafting the future interpretation & education program.

- **LOCATIONS.** We've discussed which locations for offering opportunities may be most suitable to successfully facilitate an exploration of the meanings of park resources.

- **SERVICES.** We've discussed the variety of services that are available to successfully facilitate an exploration of the meanings of park resources.

- **PARTNERS.** A discussion of current and potential interpretive partners has enhanced understanding of what types of support and/or interpretive services partners may provide in conjunction with the park, which will help guide the selection of interpretive services and locations.

Now it's time to use this information to develop your park's future interpretation & education program.

(Handout Review / side 2 only): Overview of the Future Interpretation & Education Program / Case Study

Briefly review. Describe the components of the program overview.

Reinforce the idea of enhancing visitor enjoyment of heritage by connecting visitors (audiences 1,2,3,...) to resources via primary interpretive themes (A,B,C,...) and

informational topics (safety,... NPS,...) — and using this as the basis for developing the parkwide program.

Brainstorm the Most Effective Services and Locations for Theme A - Audience 1

Let's start the process by brainstorming.

There are no right or wrong answers — we're looking for ideas.

Here's the central question. (We'll be asking you this question throughout the remainder of the workshop.)

FLIPCHART: (brainstorming question). Reveal the pre-written sheet and read it for everyone:

Over the next 5 years, what types of services, at what locations, will most effectively facilitate the understanding and exploration of Theme/Topic ___ by Audience ___?

(FLIPCHART: (brainstorming question).) Post the sheet next to the flipchart in a place that's visible to all participants.

I need a volunteer to read Theme A for the group. [*Accomplished.*] Thank you.

Now we need someone to read the description of Audience 1 for the group. [*Accomplished.*] Thanks.

Now, with this question in mind, for Theme A and Audience 1, what interpretive services, at what locations, will best enable this audience to understand and explore this primary theme and all of the subthemes that will connect to it?

We need pairs of services and locations
(such as "Interpretive talks @ VC, overlooks, campground").

*FLIPCHART: ABBREVIATIONS. Write the title. Post where everyone can see it. (While one planner is recording participant responses, the other is working in tandem with the first, recording location abbreviations on this posted sheet.) Use **any marker color** desired for this sheet.*

*FLIPCHART: THEME A – AUDIENCE 1. Write the title using **any marker color** desired. (Note: It's often helpful to use the same color within a theme. For instance, you might use purple for all Theme A combinations.) The sheet now looks like this:*

THEME <u>A</u> — AUDIENCE <u>1</u>

PAIRS RECORDED. Record participant responses, leaving about 6-8 inches blank on the left side of the sheet. You'll be using this blank space later for 1) dot scores, 2) adhesive dots, 3) and key numbers — all listed to the left of the service-location pairs. The sheet now looks like this:

THEME <u>A</u> — AUDIENCE <u>1</u>

Interpretive talks @ VC, campgrounds
Wayside exhibit group @ Gopher's Trail
Site bulletin (Ecosystem Balance) @ Entry stations

Always write new service-location pairs using a <u>BLACK MARKER</u>. Throughout the process, the <u>first time</u> that a service-location pair is suggested, it is recorded in black to maintain a color key that helps participants find what they're looking for as swiftly as possible.

Usually, about 20-25 responses are voiced, and fill the sheet. Go to a second sheet if needed (don't let the imagined fear of space limitations affect you or the participants).

Expect to respond frequently to questions about lumping and splitting types of services, descriptions of what different ideas actually represent, abbreviations for locations, and similar considerations.

Note. *Make sure that you provide thinking time for participants. It's unlikely that they've been party to this exercise before, and there is a lot of information and personal experience to analyze, formulate, and bring forth. However, when the ideas substantially wane, 1) prompt them with questions if they're not up to at least 20 service-location pairs or 2) if they already have 20+ pairs, then it's time to describe the next part of the process.*

Rank the Most Effective Services and Locations for Theme A - Audience 1

Great. Now we need to rank this list because it's unlikely you'll be able to provide all of these services. If we can't do them all, how do we prioritize them?

Because you're all professional interpreters and have a wealth of experience, we've found that a good way to rank the list is simply to go by your gut reaction to answering that question [*point to brainstorming question*].

You also might want to consider how to do that. Here's a partial list of some informal criteria that you might want to consider using.

Please take a minute to look them over.

Handout: **<u>Informal Ranking Criteria for Service-Location Pairs</u>**

Distribute. Participants self read. Verbally reinforce key ideas. Answer questions.

Discuss the range of definitions for "most effective" and the universe of considerations, only some of which are represented in the handout. Ultimately, it's up to the individual to decide for himself/herself what this term means based on their own experiences, and the intent of this session.

<u>SELF-ADHESIVE DOTS (used for ranking).</u> *The planners use scissors to cut dot sheets into quantities-per-participant that approximate a **third** of the service-location pairs on the A-1 sheet.*

Distribute ranking dots to each participant. Each participant receives the same number of self-adhesive dots.

Note. *Discrimination between types of participants, groups, or individuals defeats the consensus power of the exercise — and should not be allowed: No different-sized dots for some participants; no one person or group receiving a distinct color from others.*

Instructions:

- The dots symbolize "effectiveness."

- Each of you has an equal number of dots.

- You may only place one dot on a given service-location(s) pair.

- Place your dots to the left of the pair, in the blank space.

- By placing your dots, you're answering this question.
  [*Point to brainstorming question and read it aloud.*]

Questions? Rank 'em!

DOTS PLACED. When participants are finished, the sheet now looks like this:

THEME <u>A</u> — AUDIENCE <u>1</u>

● ● ● ●   Interpretive talks @ VC, campgrounds
●   ● ● ●   ● ● ●   ●   Wayside exhibit group @ Gopher's Trail
● ●   ● ●   Site bulletin (Ecosystem Balance) @ Entry stations
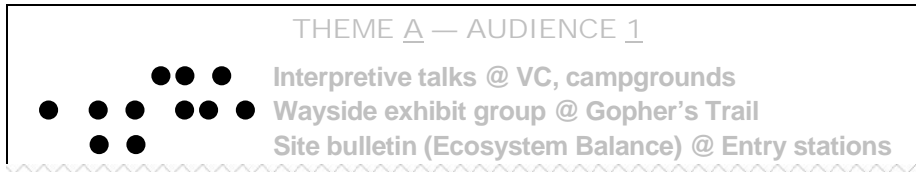
*DOTS BUNCHED. The participants usually fill the entire area with dots, so the planners now need to move dots inward from both sides. That is, they need to **bunch the dots** by making a clear space both to the left and right of each group of dots. A pen knife is a great tool for this. (Note. The participants have enough on their minds — it's counterproductive to constrain their dot placement at this time other than to say "left of the pair." And bunching the dots grabs their attention when they first see their carefully placed dots being moved by the planners for some mysterious reason.)*

THEME <u>A</u> — AUDIENCE <u>1</u>

●●● ●   Interpretive talks @ VC, campgrounds
●●●● ●●   Wayside exhibit group @ Gopher's Trail
●●   Site bulletin (Ecosystem Balance) @ Entry stations
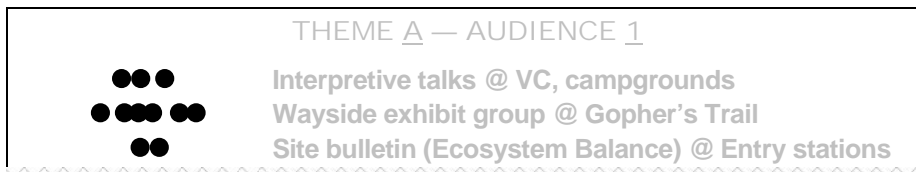
*DOTS TALLIED. In the clear space to the left of each group of dots, one of the planners tallies the dots. **Planners tally the dots using a <u>LIGHT GREEN MARKER</u>.** The sheet now looks like this:*

THEME <u>A</u> — AUDIENCE <u>1</u>

e3   ●●●   Interpretive talks @ VC, campgrounds
6   ●●●● ●●   Wayside exhibit group @ Gopher's Trail
2   ●●   Site bulletin (Ecosystem Balance) @ Entry stations
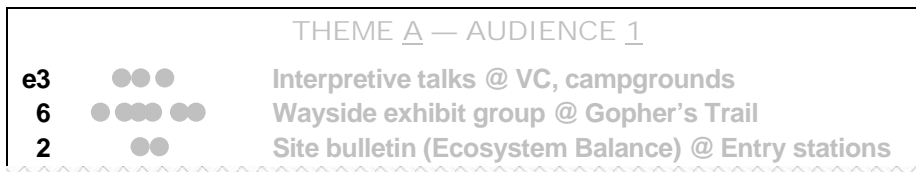
The list usually breaks into three lumps:
- Service-location pairs receiving the most dots
- Pairs receiving a few dots
- Pairs receiving no dots

Your top-scoring pairs for Theme A – Audience 1 are [read 3-5 of them]. These are the ones that you, as a group, think will be most effective out of this entire list, composed of services you think will be effective.

The service-location pairs and their relative rankings are an indication of how you, at this time, composed of these people, thought these should be ranked. (Much like a focus group.)

Questions?

What do you think the "e" stands for?

Right. It symbolizes that the basis of the ranking is "effectiveness."

You might be wondering what this other space is for.

KEY NUMBERS PLACED. *A planner now places a consecutive key number in the clear space immediately to the left of each pair (and to the right of each dot group). At this point, each line looks like this: 1) paper edge, 2) dot tally number in **LIGHT GREEN**, 3) dot group (some pairs will have no dots), 4) key numbers in **BLACK**, and 5) service-location pairs in **BLACK**.*

Planners write the key numbers using a BLACK MARKER and a period after each number. *The sheet now looks like this:*

		THEME A — AUDIENCE 1	
e3	●●●	**1.**	Interpretive talks @ VC, campgrounds
6	●●●● ●●	**2.**	Wayside exhibit group @ Gopher's Trail
2	●●	**3.**	Site bulletin (Ecosystem Balance) @ Entry stations

Any surprises? Questions?

We're also going to add a separator line at the bottom of each list.

When you think of other relevant service-location pairs for Theme A – Audience 1 — and chances are that you will — we'll add them below the line to indicate that these newer ideas weren't ranked along with the others.

This doesn't mean they're less valuable; it just means you didn't have the opportunity to rank them beside the others on this theme-audience combination.

SEPARATOR PLACED. *A separation line is drawn to indicate the set that was ranked as distinct from any service-location pairs added later in the process. How and in what color the service is written depends on whether the service in question is a **repeated idea** or a **new idea**.*

REPEATED IDEA

*1. If the service-location pair is first recorded on some other theme-audience combination sheet, then it would be copied over to this sheet using a **LIGHT BLUE MARKER**. If the service type is the same as originally cited elsewhere, only the number is recorded here.*

2. However, if changes to locations are made to this service in order to customize it for this specific combination, then those notations are made here in addition to writing its key number.

Always write repeated services (whether locations are the same or different) using a LIGHT BLUE MARKER. Throughout the process, secondary instances of services are written in light blue to maintain a color key that helps participants find what they're looking for as swiftly as possible. *The sheet now looks like this:*

		THEME A — AUDIENCE 1	
e3	●●●	**1.**	Interpretive talks @ VC, campgrounds
6	●●●● ●●	**2.**	Wayside exhibit group @ Gopher's Trail
5	●● ●●●	**21.**	Evening program @ Campgrounds
		42.	**@ + amphitheater, museum patio**

NEW IDEAS

New service-location pairs are recorded here in their complete format (key number, service type, locations), and are written using a __BLACK MARKER__. The sheet now looks like this:

> **THEME <u>A</u> — AUDIENCE <u>1</u>**
>
> e3 ●●●   1. Interpretive talks @ VC, campgrounds
> 6   ●●●● ●●   2. Wayside exhibit group @ Gopher's Trail
> 5   ●● ●●●   21. Evening program @ Campgrounds
>
> 42. **Cultural demonstration @ VC, lodge**

If time Allows, Continue the Brainstorming-Ranking Process with Other Theme-Audience Combinations

*Stay with the **same theme** and move through the audiences, one at a time. The next combinations are A-2, A-3, and so on — before moving on to B-1.*

*For A-2, the planner recording ideas at the flipchart starts by reviewing services already cited (key numbers 1 through "n" on the A-1 sheet). If the participants think any of the A-1 service-location pairs are also a good answer to the primary question as regards A-2, the planner records this information in a specific way. On the A-2 sheet, each of these repeated ideas is written by copying only the key number from the A-1 sheet. These key numbers are written using a __LIGHT BLUE MARKER__ because they are **repeated ideas**. (There's no reason to re-write the long form of the A-1 entry on the A-2 sheet — the participants will refer to the first citation of each service, written in __BLACK MARKER__, throughout the remainder of the process to remind themselves of the particulars regarding this service. This is the case regardless of which sheet the first citation is recorded on, and one of the reasons why all theme-audience combination sheets must remain visible.) In addition to key numbers, annotations are sometimes added. They usually indicate a change in location(s) (shifting from the locations in the original citation to those locations that best fit this specific theme-audience combination). Also, if a service cites specific subject matter, this subject matter may also shift from theme to theme, such as "site bulletin ({subject}) @ {location(s)}," although the service, such as "__site bulletin ({subject}) @ {location(s)}__," remains the same.*

After the Second Combination (A-2)

Following the ranking of A-2, mention to the participants that the rankings only have meaning within a given theme-audience combination. Five dots on one sheet does not equal five on another sheet.

Continue with other combinations as time and attention allows.

Day One is Adjourned

Thank you for all of your hard work today. We look forward to continuing this tomorrow. We'll start at the same time tomorrow, same place. Have a great evening!

ADJOURN.

Debrief with the Chief. *How did it go today? Anything unexpected happen? Best parts of day? Worst parts of day? Getting what you need? Any course corrections the planners need to make?*

Before dinner. *Reposition flipchart sheets as necessary in preparation for tomorrow's work. Hang completed flipcharts in an orderly and understandable arrangement.*

Dinner. *During dinner, the planners debrief with each other and strategize how best to conduct the workshop tomorrow.*

WEDNESDAY, {w2date3}

Today's Activities

*Handout: **<u>Today's Agenda (Day Two)</u>***

Distribute. Participants self read. Verbally reinforce key ideas. Answer questions.

*Handout: **<u>Are You Really Here at the Workshop?</u>***

Distribute. Ask the workshop participants to "sign in."

> If you participated in the first CIP workshop, and signed in, we just need your name today (not the rest of the information).
>
> Questions?

Future Interpretation & Education Program (continued)

Continue the brainstorming-ranking process with other theme-audience combinations. Work through all audiences of one theme before starting the next theme.

***<u>FLIPCHART: THEME __ – AUDIENCE __</u>**. Write the title using **any marker color** desired. (Note: It's often helpful to use the same color within a theme. For instance, you might use purple for all Theme A combinations.)*

Acknowledge that participants need to use their extensive experience to brainstorm, but they should not feel constrained to stay within their experience.

Participants should be approaching this desired future program pragmatically, but at the same time thinking creativity.

After the Second Combination (A-2)

After the second combination is brainstormed, refer the participants to the helper lists now and then to keep the effort on track.

> Let's check the items on the brainstorming list against the guidelines and helper lists we've set up.
>
> This will help us make sure that we're staying on track.
>
> - Do the listed ideas for this theme and audience reflect what we're trying to achieve regarding visitor experience? (*Refer to the handout or flipchart sheet.*)
>
> - Do the listed ideas reflect the best uses of park locations and tangible resources to facilitate increased understanding and appreciation? (*Refer to the handout or flipchart sheet.*)
>
> - Do the listed ideas capitalize on using interpretive services to provide opportunities for visitors to connect to meanings? (*Refer to the handout or flipchart sheet.*)

- Do the listed ideas adequately address universal accessibility, hierarchy of sophistication, providing a range of interpretive services, and presenting multiple points of view? (*Refer to the handout or flipchart sheet.*)

Lunch Break

Lasts about 3 hours

Future Interpretation & Education Program (continued)

Continue the brainstorming-ranking process with other theme-audience combinations. Work through all audiences of one theme before starting the next theme.

*__FLIPCHART: THEME __ – AUDIENCE __.__ Write the title using **any marker color** desired. (Note: It's often helpful to use the same color within a theme. For instance, you might use purple for all Theme A combinations.)*

Acknowledge that participants need to use their extensive experience to brainstorm, but they should not feel constrained to stay within their experience.

Participants should be approaching this desired future program pragmatically, but at the same time thinking creativity.

After the Theme-Audience Combinations are Brainstormed

After the themes are completed, switch language to "informational" instead of "interpretive." For example, when adding the headers for the combinations, actually write out the informational topic in place of the keyed theme: "Orientation & Visitor Safety Information – Audience 1."

Keep on keepin' on.

Day Two is Adjourned

Thank you for all of your hard work today. We look forward to continuing this tomorrow. We'll start at the same time tomorrow, same place.

Have a great evening!

ADJOURN.

Debrief with the Chief. *How did it go today? Anything unexpected happen? Best parts of day? Worst parts of day? Getting what you need? Any course corrections the planners need to make?*

Before dinner. *Reposition flipchart sheets as necessary in preparation for tomorrow's work. Hang completed flipcharts in an orderly and understandable format.*

Dinner. *During dinner, the planners debrief with each other and strategize how best to conduct the workshop tomorrow.*

THURSDAY, {w2date4}

Note. *If traveling home at end of day, check out of hotel this morning!*

Today's Activities

*Handout: **Today's Agenda (Day Three)***

Distribute. Participants self read. Verbally reinforce key ideas. Answer questions.

*Handout: **Are You Really Here at the Workshop?***

Distribute. Ask the workshop participants to "sign in."

> If you participated in the first CIP workshop, and signed in, we just need your name today (not the rest of the information).
>
> Questions?

Future Interpretation & Education Program (concluded)

Continue the brainstorming-ranking process with other theme-audience combinations. Work through all audiences of one theme before starting the next theme.

***FLIPCHART: THEME __ – AUDIENCE __ / or / (Topic) – AUDIENCE __.** Write the title using **any marker color** desired. (Note: It's often helpful to use the same color within a theme or topic. For instance, you might use purple for all Theme A combinations.)*

Acknowledge that participants need to use their extensive experience to brainstorm, but they should not feel constrained to stay within their experience.

Participants should be approaching this desired future program pragmatically, but at the same time thinking creativity.

Break

Next Steps in Developing the Future Program

Discuss the process of refining the overview of the future program, taking into account the workshop-produced ranking but not being bound by it. In fact, it may be useful to set the plan aside for a short time, then perform additional evaluation as staffing and other finite factors are applied more rigorously to the future interpretation & education program.

The park will need to determine not only which services they intend to provide, but also the extent to which those services will be developed.

- *Will a particular guided walk be available once a week, or twice daily?*
- *Will a particular theme be interpreted at an overlook using one wayside exhibit, or a set of nine exhibits along a short trail?*

The dates of initiation for various services will also need to be determined.

- *Will revised wayside exhibits be available next year, or not until five years from now?*

- *Will that project be planned so that installation of all the revised panels occurs in a single year, or will replacement be phased in over several years?*

These kinds of decisions need to conform to the expected capacity of the program's budgeting and staffing — and will heavily influence work planning during the life of the plan.

Individual Service Plans (ISPs) and Service-group Planning

(Handout Review / side 2): Overview of the Future Interpretation & Education Program / Case Study

Reference as a point of departure (from strategic to tactical, from generalized to detailed).

(Handout Review / 2 stapled sheets / sides 1-4):
   Relationship of the Program Overview to an ISP / Case Study
   Individual Service Plan — Interpretive Talks / Case Study
   Individual Service Plan — Wayside Exhibit / Case Study
   Individual Service Plan — Translated Park Brochure / Case Study

Planners lead participants through SIDES 1-4 while verbally reinforcing key ideas. Answer questions.

Planners describe the purpose, nature, and use of ISPs.

Discuss the mechanics of how the program overview is related to the ISPs.

Discuss the types of detail needed to make justifiable decisions. This is the type of information recorded on ISPs.

Service-group Planning

*Although planning for interpretive services needs to occur thematically, procurement of some services is most effectively done by media type, e.g., wayside exhibits. Media procurement **often occurs in multiples**, e.g. a set of wayside exhibits. Grouping ISPs can greatly improve the efficiency of procurement.*

The lunch break will usually occur about here.
Whenever it occurs, it lasts about 1 hour and 15 minutes

Lunch Break

Role of the Cooperating Association in the Park's Interpretation & Education Program

Let's briefly talk more about the role of your cooperating association in supporting the park's program.

The same philosophy behind the future interpretation & education program should be applied to the sales line of the cooperating association.

*Handout (stapled, 2 sheets, sides 1-3): **Role of the Cooperating Association in the Park's Interpretation & Education Program***

Distribute stapled handout. (Side 4: Blank. Note that some changes may be made as a result of the FY2005 policy review of NPS Director's Order #32: Cooperating Associations.)

Planners lead participants through the handout while verbally reinforcing key ideas. Answer questions.

Discuss the parallel methodology — overview and detail layers — used for evaluating and planning interpretive and informational sales items provided by the cooperating association.

Discuss the related topic of concessions and their relation to this park's program (if applicable).

CIP Component 2: Annual Implementation Plan (AIP)

Developing an AIP from the LRIP

Stapled multipage handout (sides 1-4):
> **_Developing an AIP from the LRIP_**
> **_Developing the AIP's Program Overview_**
> **_Developing the AIP Action List_**
> **_Revision Cycles of the CIP_**

Distribute. Planners lead participants through <u>SIDE 1</u> while verbally reinforcing key ideas. Answer questions.

Describe how the elements in the LRIP are transferred, then manipulated to create each year's AIP.

Developing the AIP's Annual Interpretation & Education Program

*Stapled multipage handout (side 2):**Developing the AIP's Program Overview***

Planners lead participants through <u>SIDE 2</u> while verbally reinforcing key ideas. Answer questions.

Describe how the elements in the LRIP's program overview are transferred into the AIP, and developed into the Annual Interpretation & Education Program.

Describing the LRIP's Action List and Developing the AIP's Action List

*Stapled multipage handout (side 3):**Developing the AIP Action List***

Planners lead participants through <u>SIDE 3</u> while verbally reinforcing key ideas. Answer questions.

Discuss how some of the actions to improve infrastructure, as well as develop specific services cited on the program overview, need to be pre-planned on a "to do" list.

Discuss how these actions often relate to:
- *Partnering*
- *Staffing and Training*
- *Service-group Planning:*
  Exhibit Plan
  Wayside Exhibit Plan
  Publication Plan
  Education Plan
  Audio-Visual Plan

Describe how the elements in the LRIP Action List are transferred into the AIP, and developed into the AIP Action List.

Discuss the expanded nature of the annual version. Level of detail is up to the park.

Discuss how these actions can connect to individual employees' annual work plans.

Connecting Individual Efforts to the Operational Details in the CIP

Discuss the value of the program overview, ISPs, and action lists in helping staff understand their range of responsibilities and how their work connects to accomplishing the long-range vision for the program, and the overall mission of the park's interpretation & education program.

*Discuss what information the park records currently, how it's gathered, and how mechanisms for ensuring program balance can be easily added — **such as adding a "Primary Theme Addressed" column on the talk-data form**.*

Discuss how ISPs can lead to support materials like notebooks of talk outlines that can greatly help new interpretive staff and aid supervisors in program quality assurance.

Revision Cycles of a CIP

*Stapled multipage handout (side 4): **Revision Cycles of the CIP***

Planners lead participants through SIDE 4 while verbally reinforcing key ideas. Answer questions.

Discuss how each AIP provides feedback for the LRIP, from which the next AIP is created. This keeps both components relevant to operations.

Building on the discussion above, broaden the discussion to the larger cycles of a CIP and when stakeholders might be brought in again for a major review and course adjustment (approximately every 5 years).

Lasts about 15 minutes

Break

Lasts about 1 hour

Next Steps in the Process

(Handout Review / side 1): The CIP's Three Components and their Elements
(Handout Review / side 2): Comprehensive Interpretive Planning Process Details

Planners lead participants through SIDES 1-2 while indicating the current location in the planning process and highlighting the future components.

***Note.** The following 4 handouts can be produced from any park that has a completed CIP on file with us. Planners need only produce 1-3 examples of each of these, as they'll be left with the park and the participants can share them and review them in depth at a later time.*

*Stapled multipage handout: **Archive File from {Park X} / Case Study***

Planners briefly describe the Archive file: its purpose, nature, and use.

*Stapled multipage handout: **Long-Range Interpretive Plan (LRIP) from {Park X} / Case Study***

Planners briefly describe this component of a CIP: its purpose, nature, and use.

*Stapled multipage handout: **Annual Implementation Plan (AIP) from {Park X} / Case Study***

Planners briefly describe this component of a CIP: its purpose, nature, and use.

*Stapled multipage handout: **Interpretive database (ID) from {Park X} / Case Study***

Planners briefly describe this component of a CIP: its purpose, nature, and use.

The planners explain that the park will receive two deliverables from the planners following the second workshop: 1) an Archive file of the planning process and 2) a draft LRIP. Both will look very similar to the examples from {Park X}.

(POSTED: PARKING LOT.) Address any items remaining on the parking lot or any written notes received by the planners (as appropriate).

*Handout: **Developing the Schedule for Completing the CIP***

Distribute. Discuss the follow-through to be accomplished by the CIP core team and planners. Complete this estimated schedule by working with participants to determine the appropriate due dates for various aspects of the process. Customize the contents as necessary.

Lasts about 5 minutes

Day Three is Adjourned

Thank you for all of your hard work this week.

ADJOURN.

Debrief with the Chief. *How did it go today? Anything unexpected happen? Best parts of day? Worst parts of day? Getting what you need? Any course corrections the planners need to make?*

The planners remove all of today's used sheets from the flipchart and neatly stack all of the sheets, retaining the order that the sessions were conducted (this facilitates subsequent data entry in chronological order for the Archive file). They fold them and pack them. Planners also pack markers and other miscellaneous supplies that need to return with them.

Travel and/or dinner. *During dinner, the planners debrief with each other and strategize how best to continue the project.*

FRIDAY, {w2date5}

Note. *If traveling home today, check out of hotel this morning. Travel. END TRIP.* ••

{parkname}

Second Comprehensive Interpretive Planning Workshop

SCHEDULE FOR DAY ONE

8:00	Morning Sessions Begin
11:45	Lunch Break
1:00	Afternoon Sessions Begin
4:30	Adjourn

SUBJECTS ADDRESSED TODAY

Welcome and Introductions

The Mission of, and Management Goals for, the Interpretation & Education Program *(review)*

Overview of the Workshop

Today's Activities and Facilitation Essentials

Set of Significance Statements *(finalize)*

Set of Primary Interpretive Themes *(finalize)*

Set of Audiences for the Program *(finalize)*

Set of Visitor Experience Considerations *(finalize)*

Operational Considerations

Identifying Suitable Locations for Services

Identifying Suitable Types of Services

Identifying Suitable Partnerships for the Program

Future Interpretation & Education Program

Are You Really Here at the Workshop?

{parkname}

Second CIP workshop. Please sign in. Thank you.

Name	Title	Organization	Telephone number	Email address	1	2	3

Identifying Suitable Locations for Services

What Service Locations are Most Suitable?

In planning a park's interpretation & education program, the characteristics of locations must be considered so that the park's interpretive and informational services can most effectively enhance the experiences of visitors.

Suitable locations for services are generally places in the park that offer exceptional access to significant tangible resources, or facility locations that are especially useful to the park's program. Off-site locations often include places conducive to a positive remote experience with the resources of the park.

Using Locations in Planning

Reviewing the types of locations below, and applying them to your park's conditions, comprises another major factor needed for developing the future interpretation & education program.

Potential Locations
In the Park

Types of potential in-park locations:

- Locations of exceptional resources.

- Overlooks or other places for viewing distant vistas or other significant resources.

- Trails and trailheads.

- Various places in and around the visitor center.

- Ranger stations, contact stations, entry stations.

- Park education facilities.

- Campgrounds and amphitheaters.

- Concessioner facilities.

- Boat ramps and parking lots.

Potential Locations
Off Site

Types of potential off-site locations:

- Various places used to access the Internet (home, school, business).

- Various places used to view films (home, library, school).

- Schools and universities (formal and non-formal education).

- Community sites requesting interpretive media or presentations.

- Forests, nature centers, zoos, museums, etc.

- Locations of partners' resources or facilities, including those of concessioners.

Identifying Suitable Types of Services

What Services are Suitable?

In planning a park's interpretation & education program, the characteristics of services must be considered so that they are maximally effective at enhancing the experiences of the audiences for which they are intended.

Service Delivery Methods

Personal services are those services that are conducted, performed, or presented by one or more interpreters.

Non-personal services are not personally presented, as in the case of exhibits, publications, films, etc. These services are often referred to as *media*.

Service Content Types

The types of *interpretive services* that are most suitable for inclusion in the park's interpretation & education program are those services that have been identified as potentially being the most successful in facilitating an exploration of the meanings ascribed to the place.

The types of *informational services* that are most suitable for inclusion in the program are those services that create an environment in which enjoyment and appreciation of heritage can be enhanced for the visitor.

Using Services in Planning

Reviewing the types of interpretive and informational services below, and applying them to your park's primary interpretive themes and informational topics, comprises another important task preceding the development of the future interpretation & education program.

Potential **Personal Services**

Children's interpretation
- *Children's walks and talks*
- *Junior Ranger program*
- *Puppet shows*

Demonstrations

Educational activities
- *Day trips to the park*
- *Elderhostel*
- *Multi-day, in-park programs*
- *Parks-as-Classrooms programs*
- *Student mentoring*
- *Teacher workshops*
- *Visits to groups and classrooms*

Evening activities
- *Campfire programs, sky observation programs, etc.*

Fixed-station interpretation

Guided walks

Information desk enquiries

Telephone enquiries

Interpretation in period dress
- *Living history interpretation, first-person*
- *Living history interpretation, third-person*
- *Theatrical performances*

Outreach
- *Programs for groups (service clubs, senior centers, etc.)*
- *Recruiting*

Roving interpretation

Scheduled talks

Special activities & presentations
- *After-hours open house*
- *Artists-in-Residence Program*
- *Public lecture series and seminars*
- *Special events (i.e. March for Parks)*
- *Storytelling*
- *Workshops with the public*

Potential **Non-personal Services**

Audio wand walking tours

Auto tour audio systems

Bulletin boards

Cooperating association sales items

Curricula and teacher's guides

Donation boxes

Films, IMAX, slides

Information signing

Interactive computer stations

Interpretive messages attached to sales items

Kiosks

Maps and other wayfinding elements

Museum exhibits

Public Service Announcements (PSAs)

Publications
- *Educational books, in-flight magazines, junior ranger publications, newsletters, newspapers, park map & guide, press releases, site bulletins, trail guides, etc.*

Radio, TIS (Travelers Information System)

Responses to enquiries via mail

Responses to enquiries via email

Self-guided trail markers and publications

Student information packs

Trailhead registers

Traveling trunks

Video tapes and discs

View tubes; telescopes

Virtual tours

Wayside exhibits and kiosks

Website

Identifying Suitable Partnerships for the Program

What and Who are Partners?

Partners of the park's interpretation & education program support and/or deliver interpretive and/or informational services in concert with park staff. Partners include cooperating associations, friends groups, concessioners, educational institutions, other agencies, state entities — even other divisions within the park can be viewed as partners in accomplishing the mission of the program. Assistance from partners may range from equipment to staffing to special events assistance.

Considering Partners in Planning

Reviewing the types of partners below, and applying them to your park's program, helps identify the actual "work force" that will implement the park's future interpretation & education program.

Potential **Types of Partners**

Types of potential partners:

- Archeological/historical societies
- Chambers of commerce
- City parks and recreation departments
- Community colleges
- Conservation organizations
- County and local libraries
- County sheriff's offices
- Departments of public safety
- Elderhostel
- Elected officials
- Federal agencies
- Other divisions within the park
- State departments of transportation
- State game, fish, wildlife divisions
- State historic preservation offices
- State natural history associations
- State offices of tourism
- State parks
- Universities, schools, and district education offices

Potential **Types of Assistance**

Types of potential assistance provided by partners:

- Advocacy
- Distribution of information
- Donating funds or supplies
- External perspectives, viewpoints, advice
- Fundraising
- Labor for service projects
- Providing experiences not appropriate in the park
- Providing facilities and equipment
- Research
- Sharing resources
- Special events assistance
- Special projects
- Specialized materials and equipment
- Staff (front-line or support personnel)
- Training

Types of benefits that partners can receive from their affiliation with the park:

- Mutual mission accomplishment
- Service to the community
- Enhanced employee satisfaction and development
- Joint training
- Association with the prestige of the park

Program Strategy for Partnership Interaction

Considering the generic lists above is only the beginning. A park strategy is developed when the park determines which partnerships will best benefit the park's interpretation & education program — and also takes into account the needs of potential partners — and the two parties agree to such cooperation. This table illustrates how a strategic approach to partnerships could be graphically displayed to aid in clearly identifying partners, park needs, partners' needs, and highlighting overlapping or absent partnering opportunities.

Partner	Advocacy	Distribution of information	Donating funds or supplies	External perspectives, viewpoints, advice	Fundraising	Labor for service projects
				Assistance		
Colorado Historical Society (CHS)			●			●
Denver Chamber of Commerce	●	●	●		●	
Denver Parks Department				●		

Informal Ranking Criteria for Service-Location Pairs

Some Thoughts about Ranking Criteria

The CIP core team is composed mostly of interpreters, and often represents anywhere from decades to hundreds of years of combined experience in the profession of interpretation. As workshop participants brainstorm service-location(s) pairs for each theme-audience or topic-audience combination, they draw heavily on their combined, extensive experience to internally clarify, describe, and characterize the multiple meanings in the specific primary interpretive theme, informational topic depth, specific audience, the types of services available and how effectively they work under varying conditions, and the park's resource types and locations as they relate to this theme or topic.

Each participant weighs these considerations via an internal dialogue — using internal criteria — to make value-based decisions. These criteria often include considerations like:

- To what degree can this primary interpretive theme be made accessible to all ages, and how might that affect the weighing of various service-location(s) pairs?

- Does this specific service-location(s) pair have good potential for increasing visitor understanding and appreciation?

- How well does this pair lend itself to presenting the thematic material from multiple points of view?

- Does this pair offer good opportunities for universal accessibility?

- How well does this pair offer opportunities for the theme to be presented within a hierarchy of sophistication, thereby serving a wider range of ages, learning styles, and preferences of presentation within this audience?

- How well does this pair provide ways for the story to relate to audiences from a range of educational and socioeconomic backgrounds? How universal are the "universal" elements of the theme?

- How well does this pair capitalize on locations rich in tangible resources? How will those resources be impacted?

- How many visitors could this pair reach, and how does this compare to other service-location(s) pairs?

- Does this pair effectively communicate with several audiences or only a single audience?

- How well does this service-location(s) pair fit into a school curriculum?

- How complex or simple are the logistics to access this pair?

- How much initial cost, then ongoing maintenance costs, does this service-location(s) pair require, including staffing considerations?

- How well does this pair attract visitors to under-utilized locations, enabling overused locations to recover from use fatigue?

- Does this service-location(s) pair affect future staffing decisions? Are specialized skills required to maintain this pair?

- Who can most successfully provide this type of service (agency or partner such as the cooperating association, concessioner, others), and how will that impact operations?

As the brainstorming begins and participants start to voice service-location(s) pairs that they believe will be highly successful, they begin to construct internal shortcuts as their internal criteria evolve. The case-by-case consideration of criteria like those above — both of the ideas they voice themselves, and those ideas voiced by others in the group — establishes precedents that streamline future decision-making for each individual and, ultimately, for the group as a whole as they share these thoughts with each other through discussion and subsequent ranking of each theme-audience or topic-audience combination.

{parkname}

Second Comprehensive Interpretive Planning Workshop

SCHEDULE FOR DAY TWO

8:00	Morning Sessions Begin
11:45	Lunch Break
1:00	Afternoon Sessions Begin
4:30	Adjourn

SUBJECTS ADDRESSED TODAY

Today's Activities

Future Interpretation & Education Program

{parkname}

Second Comprehensive Interpretive Planning Workshop

SCHEDULE FOR DAY THREE

8:00	Morning Sessions Begin
11:45	Lunch Break
1:00	Afternoon Sessions Begin
4:00	Adjourn

SUBJECTS ADDRESSED TODAY

Today's Activities

Future Interpretation & Education Program *(concluded)*

Next Steps in Developing the Future Program

Individual Service Plans and Service-group Planning

Role of the Cooperating Association in the
Park's Interpretation & Education Program

CIP Component 2: Annual Implementation Plan (AIP)

Developing an AIP from the LRIP

Developing the AIP's Program Overview

Describing the LRIPs Action List and
Developing the AIP Action List

Connecting Individual Efforts to the
Operational Details in the CIP

Revision Cycles of a CIP

Next Steps in the Process

Role of the Cooperating Association in the Park's Interpretation & Education Program

The Scope of Sales Statement

Purpose and Value of the Scope of Sales Statement

Developing a *Scope of Sales Statement* is an opportunity for parks and cooperating associations to work together to achieve shared goals. The Statement is a cooperative planning document usually prepared by the association's executive director and the park's cooperating association coordinator (often the chief of interpretation). It is a strategic document critical to the development of a sales line that meets the needs of the public, the association, and the park.

Components

Statement of Relationship

This component states the relationship between the cooperating association and the National Park Service. It references the documents that govern the roles of the two partners (the Standard Agreement and Supplemental Agreements – if any, *Director's Order #32: Cooperating Associations*, and the Articles of Incorporation and Bylaws of the cooperating association) and provides an opportunity for the association to state how its reasons-for-being connect with the park's reasons-for-being. It outlines the current sales operation and describes how that function relates to the interpretive function of the park.

Park's Set of Significance Statements

These statements identify the significant resource values that make the park special and capture the park's essence.

Park's Purpose Statement(s)

These are the stated purposes (often indicated directly in the park's enabling legislation) for which the park was established.

Park's Set of Primary Interpretive Themes

These are the ideas about the park's resources that are critical to public understanding and exploration of the meanings ascribed to park resources.

The park's set of significance statements, purpose statement(s), and set of primary interpretive themes are foundational elements of a park's interpretation & education program. These elements are described in the park's Comprehensive Interpretive Plan, and are periodically updated as part of that ongoing planning process. Cooperating associations are integral partners in that process. By cooperating in the development of the basic assumptions that underlie the park's interpretation & education program, and by analyzing its own operation based on those same assumptions, the association is best able to identify, influence, and facilitate the park program's goals, as well as meet its own.

Strategic Evaluation of the Sales Line

The strategic evaluation process is a "two-layer" process enabling strategic improvement and in-depth analysis of an association's sales line.

Themes, audiences, and services table (layer one). This table provides an overview of the sales line with each sales item placed according to the primary interpretive theme(s) it addresses and the audience(s) it serves.

Themes. These are the primary interpretive themes stated in the Comprehensive Interpretive Plan. "Orientation and Visitor Safety Information" and "National Park System and National Park Service Mission" are also included as universal subjects for all parks. Note that visitor convenience items, sold under a concession permit, are a separate class of sales items that are not related to a park's interpretive themes and so are not part of this evaluation process.

Audiences. These are the audiences for which strategic interpretive planning crafts distinct communication strategies; they are also stated in the Comprehensive Interpretive Plan. Marketing considerations may suggest additional audiences. These may vary from park to park but should include the audiences for which distinct interpretive services are needed, such as:

- General audience
- Young adults
- Children
- Non-English speaking audiences
- Teachers and other educators
- Non-traditional park users or other special populations

Services. In the first and best sense, association sales items are really interpretive services that visitors to the park (and others in the case of mail order sales) can purchase, use in the park, and take home with them. Note that a given sales item can appear in more than one cell on the table if it interprets more than one theme and/or serves more than one audience.

Strategic Evaluation — Themes/Topics, Audiences, and Sales Items
Mountainshore Natural History Association / Mountainshore National Park

PRIMARY INTERPRETIVE THEMES *and* INFORMATIONAL TOPICS	AUDIENCES			
	1. General Audience. *Mostly tour groups and families.*	**2. Young Adults.** *Ages 12-18.*	**3. Non-English Speaking Audiences.** *Chinese, Korean, Japanese languages.*	**4. Educators.** *Includes college level.*
Theme A. Mountainshore National Park Offers a rare opportunity to explore how humans have adapted to the wide variety of Pacific Northwest ecosystems.	**BK** / *Indians and Mountain Men* **BK** / *Pacific Northwest Ethnobotany* **EL** / *Seashore Seasons* (captioned videotape) **EL** / *Sounds of the Forest* (audio tape) **GR** / *Animals of the Mountains* (poster) **TI** / Fort Webfoot (model) **TI** / Miwok Basket (handicraft) **TI** / Miwok Fish Hook (replica)			
Theme B. Mountainshore...				
Orientation Information *and* **Visitor Safety Information**				
National Park System *and* **National Park Service Mission**				

Note: To make these tables more meaningful, a fictitious park (Mountainshore National Park) and its cooperating association (Mountainshore Natural History Association) are used as examples.

Media types and price points tables (layer two). A second layer of tables expands and analyzes the contents of those cells generated in the overview table for which additional analysis is desired. This analysis allows strategic design or choice of products to appeal to the widest range of audiences by assuring variety of product types and price points. An example expanded from the completed cell in the overview table above is shown in the table below.

Media types. A variety of media are offered for sale to accommodate different tastes and learning styles. Examples of media types offered by cooperating associations are cited below. Other categories may evolve to expand this list.

- Books
- Graphic arts (posters, prints, and similar items)
- Electronic media (CD-ROMs, video tapes, DVDs, audio tapes, and similar items)
- Thematic items (replicas, models, handicrafts, puzzles, and similar items)

Price points. Ranges of price point categories may also vary according to audiences. Example categories include:

- Less than $2.00
- $2.00 to $4.99
- $5.00 to $9.99
- $10.00 to $50.00
- More than $50.00

Strategic Evaluation — Media Types, Price Points, and Sales Items
Mountainshore Natural History Association / Mountainshore National Park

Theme A. Mountainshore National Park Offers a rare opportunity to explore how humans have adapted to the wide variety of Pacific Northwest ecosystems.

Audience. General Audience. *Mostly tour groups and families.*

MEDIA TYPES	PRICE POINTS				
	Less than $2.00	**$2.00 to $4.99**	**$5.00 to $9.99**	**$10.00 to $50.00**	**More than $50.00**
BK Books			*Indians and Mountain Men*	*Pacific Northwest Ethnobotany*	
GR Graphic Arts		*Animals of the Mountains* (poster)			
EL Electronic Media			*Sounds of the Forest* (audio tape) *Seashore Seasons* (captioned videotape)		
TI Thematic Items	Miwok Fish Hook (replica)			Fort Webfoot (model)	Miwok Basket (handicraft)

Both layers of tables provide an easy, direct way to examine the degree to which the sales operation is assisting the widest range of audiences in the understanding and exploration of the primary interpretive themes. It is important for both partners to remember that the selection of specific sales items will also be influenced by the association's need to accommodate the realities of profitability, security, stock storage, and time criticality.

Selection Process and Criteria for Specific Sales Items

Parks and associations cooperate in suggesting and evaluating specific items proposed for sale. Some partners discuss the merits of specific items in face-to-face meetings, though most develop a simple evaluation form to expand and document the process. No standard evaluation form exists, but evaluation criteria should include considerations such as:

- *Appropriateness:* How well does this product interpret park themes and serve audiences? Is this product sensitive to the culture(s) it represents or interprets?

- *Quality:* How well does the product provide opportunities to explore the park's themes? What is the level of craftsmanship or workmanship involved?

- *Accuracy:* Does the product reflect the best scholarship and knowledge?

- *Value:* Is the product a good buy for the customer at the suggested sales price?

- *Currency:* Is the product up-to-date?

- *Authenticity:* Special concerns regarding craft items are described in DO-32:

  > 3.5.3d Craft items represented as being Indian-made shall be sold in accordance with the Indian Arts and Crafts Act of 1990 (Public Law 101-644 [104 Stat. 4662], 11/29/90.)
  >
  > Public Law 101-644, states that it is unlawful to offer or display for sale or sell any good, with or without a Government trademark, in a manner that falsely suggests it is Indian produced, an Indian product, or the product of a particular Indian or Indian tribe or Indian arts and crafts organization, resident within the United States. The law allows severe penalties for individuals or organizations found to be in violation of the law.
  >
  > Associations offering a product for sale as American Indian artwork or handcraft should confirm that the person who made it is a member of an Indian tribe. Associations that deal directly with the producer could retain a copy of the tribal document which acknowledges their membership, or at least note the artisan's tribal enrollment number. Associations that deal with intermediaries would be wise to have the intermediary guarantee that the item was produced by a member of an Indian tribe.
  >
  > Associations can request a copy of P.L. 101-644 from the: *Indian Arts and Crafts Board, Room 4004, Main Interior Building, 1849 C Street, NW, Washington, DC 20240, telephone (202) 208-3773.*

- *Advertising:* Is it secondary or incidental to interpretive value?

- *Prohibition regarding sale of original objects:* Are replica items clearly labeled?

- *Origin:* Sale of items made in the USA is encouraged, but not mandatory.

- *Conflict:* Would selling this item conflict with a preferential right-of-sale held by a concessioner?

- *Visitor safety:* Does this item show or suggest unsafe practices or activities?

- *Protection of resources:* Does this item show or suggest practices or activities that impact resources or violate regulations?

Action Plan for Upgrading the sales Line

This section is a discussion of the strengths and weaknesses of the current sales line as indicated by the strategic evaluation process. It describes a strategy and time-line for enhancing the sales line to plug holes and strengthen weaknesses so that the greatest diversity of audiences are provided with the greatest variety of effective products consistent with the association earning a favorable rate of return.

The result is essentially a long-range strategy for evolving the *Annual List of Approved Sales Items*. This is the yearly listing of all items the association is authorized to sell. It is produced by the association executive director, submitted to the park cooperating association coordinator, and approved by the superintendent. No item can be sold without this approval. (Note that specific items can be approved at any time, not just once a year.) The annual list is maintained on file by the park and the association, and offers a look at where the sales line stands in relation to the long-range goals cited in the action plan.

Appendices

Other information helpful in developing an effective and successful sales line can be included in appendices to the Scope of Sales Statement. These may include:

- *Visitation and Sales Statistics:* Includes traditional on-site visitors as well as "visitors" to park and association Web pages.

- *Sources List:* References expert talent available to assist the partners in improving sales selection and operation: authors, artists, designers, publishers, marketing analysts, and similar resources.

Periodic Revision of the Scope of Sales Statement

The Scope of Sales Statement should be thought of as always subject to review and improvement. The executive director and cooperating association coordinator should work together to define a reasonable cycle for revisiting and updating the Scope of Sales Statement. It may be advantageous to synchronize its review with the major review of the park's Comprehensive Interpretive Plan, which is expected to occur about every five years. The Scope of Sales Statement is referenced in the Interpretive Database component of the park Comprehensive Interpretive Plan. ••

Developing an AIP from the LRIP

One. Complete the Long-Range Interpretive Plan (CIP Component 1).

Two. Open the LRIP electronic file (Microsoft Word®); then save it under a new name (such as "AIP-2005.doc").

Three. Customize the new file to create the upcoming year's AIP (Annual Implementation Plan, CIP Component 2).

Delete

Delete the service-location(s) pairs on the overview of the *future interpretation & education program* that are not relevant to the coming year, thereby turning it into the *annual interpretation & education program* (program overview) for the coming year.

Delete the tasks on the *LRIP Action List* that are not relevant to the coming year, thereby turning it into the *AIP Action List* for the coming year.

Add

Add the *annual operating budget* based on the *annual interpretation & education program* — interpretive and informational services that the park intends to provide in the coming year, including staffing and training considerations.

Add an evaluation of the current year's *annual interpretation & education program*, and compare it to the *annual interpretation & education program* for the coming year.

Modify

Modify the overview table of the *annual interpretation & education program* to account for new or changed management emphases, changes in staffing, training, funding, etc. Revise the program as actual budget information is generated during the year.

Modify the amount of detail in the *AIP Action List*, as needed, including adding deadlines, identifying lead staff for each task, partners involved, special recruiting efforts, etc. The CIP core team should ensure that these actions dovetail with other work-planning efforts that direct and monitor the work performed by the staff of this program.

Modify the *issues and influences* section to update changes in issues, or issues that management specifically needs to emphasize in the coming year.

Modify the ISPs in the ID component of the CIP, accounting for all of the above as appropriate.

Advantages of this Process

- It provides an appropriate opportunity for the long-range aspects of the CIP to be re-examined annually.

- It ensures that the long–range vision is still the driving force behind the annual interpretation & education program, which progressively implements that long-range vision (the future interpretation & education program).

- It reduces the time necessary to create an AIP because the bulk of the work has already been accomplished via the development and maintenance of the LRIP, much of which carries over to the AIP with little change.

Modifying the AIP Throughout the Year, then Making the Next One

Throughout the year, changing circumstances will influence the actual interpretation & education program conducted by the park and its partners. As this occurs, the AIP should be modified (updated) to reflect these changes, to the extent deemed useful by the park's interpretation manager. Those changing circumstances that will influence the interpretation & education program not only in the current year, but in subsequent years as well, should also prompt relevant updating of the LRIP. By virtue of this feedback method, the LRIP will remain a relevant and useful foundation for developing each year's AIP. Judgment should be exercised so that the LRIP continues to preserve the vision of the future interpretation & education program, while remaining relevant to current circumstances.

Subsequent AIPs are not based on the prior year's AIP; *they are always based on the up-to-date LRIP*. Using the LRIP as the master file *each year* for forming the coming year's AIP keeps the annual interpretation & education program firmly grounded in the consensus vision founded with stakeholders.

Developing the AIP's Program Overview

A Streamlined Process

Creating the Overview of the Annual Interpretation & Education Program in each AIP is as simple as duplicating the Overview in the LRIP and stripping out all of the services that are not yet relevant to the operational year in question.

In the example below, the AIP is being developed for fiscal year 2002. Therefore, only those services which are slated to begin in FY2002, or have already been initiated in previous years, are moved into the overview in the AIP. This keeps the LRIP and each AIP intricately connected, better ensuring the accomplishment of the desired future program.

Comprehensive Interpretive Plan
FY2002 - FY2006

Long-Range Interpretive Plan
FY2002 - FY2006

Program Overview
Future Interpretation & Education Program

PRIMARY INTERPRETIVE THEMES *and* INFORMATIONAL TOPICS	AUDIENCES
	1. General Audience.
Theme A. The approachable, active volcanoes of Hawai'i Volcanoes National Park allow first-hand discovery and connection with one of the most fundamental forces of our world — in both its creative and destructive roles.	e6 **Interpretive talks** [FY2002] at Jaggar, KVC, VH, eruption sites, satellite broadcast.
	e6 **Guided hikes** [FY2003] at Summit area, Chain of Craters Road, lava tubes...
	e6 **Wayside exhibits** [FY2004] at Parkwide (to be specified in the Wayside Exhibit Plan).
	e5 **Site bulletin (Dynamic Volcanism)** [FY2002] at KVC, ECS, Jaggar, via mail.
	e5 **Park brochure** [FY2002] at Entry, KVC, via mail, Jaggar, ECS, Ed Ctr, for sale by...
	e5 **Informal contacts (includes roving)** [FY2002] at KVC desk, special events off-site
	e5 **Illustrated talks** [FY2002] at KVC, KMC.
	e4 **Website** [FY2002] at Internet...
	e2 **CA sales items (publications)** [FY2002] at CA sales outlets.
	e2 **Nature trail brochure** [FY2002] at Pu'u Hulu Hulu.
Theme B.	

Annual Implementation Plan
FY2002

Program Overview
Annual Interpretation & Education Program

PRIMARY INTERPRETIVE THEMES *and* INFORMATIONAL TOPICS	AUDIENCES
	1. General Audience.
Theme A. The approachable, active volcanoes of Hawai'i Volcanoes National Park allow first-hand discovery and connection with one of the most fundamental forces of our world — in both its creative and destructive roles.	e6 **Interpretive talks** [FY2002] at Jaggar, KVC, VH, eruption sites, satellite broadcast.
	e5 **Site bulletin (Dynamic Volcanism)** [FY2002] at KVC, ECS, Jaggar, via mail.
	e5 **Park brochure** [FY2002] at Entry, KVC, via mail, Jaggar, ECS, Ed Ctr, for sale by...
	e5 **Informal contacts (includes roving)** [FY2002] at KVC desk, special events off-site
	e5 **Illustrated talks** [FY2002] at KVC, KMC.
	e4 **Website** [FY2002] at Internet...
	e2 **CA sales items (publications)** [FY2002] at CA sales outlets.
	e2 **Nature trail brochure** [FY2002] at Pu'u Hulu Hulu.
Theme B. The journeys of the Hawaiian people, who continue to inhabit these rich...	

Based on the Draft CIP of Hawai'i Volcanoes National Park, 1999.

Developing the AIP Action List

Why are Action Lists Useful?

As the initiation dates of services are considered, it is especially important to address the service-location(s) pairs which do not yet exist — interpretive talks that are not currently being presented, lesson plans which haven't yet been written, no existing waysides at that location, existing media does not address primary themes, etc. — because *future* interpretive services usually require more work to initiate than any adjustments required by services currently available.

LRIP Action List

The strategic *LRIP Action List* describes the major actions that are necessary to fully and successfully implement the future interpretation & education program.

AIP Action List

The tactical *AIP Action List* is a stepped-down, year-specific version of the LRIP Action List. It is more focused and detailed than the strategic version, and influences work plans of individual staff members.

Example Services

The example relationships illustrated below are based on two interpretive services described on the program overview table of a park's future interpretation & education program:

New film [FY2005] at Visitor center, cooperating association outlets.

Wayside exhibit (rain forest) [FY2003] at KVC parking area.

Comprehensive Interpretive Plan
FY2002 - FY2006

Long-Range Interpretive Plan
FY2002 - FY2006

LRIP Action List

Date	Item	Action
FY2002	**New film** [FY2005] at Visitor center, cooperating association outlets.	**Write the script** (conduct relevant research; write the film treatment; consult with affiliated cultural groups and other stakeholders; write the first draft).
	Wayside exhibit (rain forest) [FY2003] at KVC parking area.	**Update the panel's thematic content** (research the latest data on rain forest ecology; rewrite the text; select appropriate artwork).
FY2003	**New film** [FY2005] at Visitor center, cooperating association outlets.	**Film on site** (shoot eruption sites opportunistically starting in April; shoot coastal sites in July).
	Wayside exhibit (rain forest) [FY2003] at KVC parking area.	**Design, fabricate, and install.**
FY2004	**New film** [FY2005] at Visitor center, cooperating association outlets.	**Finalize and produce** (finalize script, edit photography, add sound track, perform other post production, procure copies).
FY2005	**New film** [FY2005] at Visitor center, cooperating association outlets.	**Begin public presentations in October.**
FY2006	*(None.)*	

Annual Implementation Plan
FY2002

AIP Action List

Date		Item	Action	Who
Q1	October	**New film** [FY2005]	Conduct relevant research.	Jeanette
	November	**Wayside exhibit (rain forest)** [FY2003]	Research the latest data on rain forest ecology.	Linda
	December	**Wayside exhibit (rain forest)** [FY2003]	Rewrite the text.	Judy & Linda
Q2	January	*(None.)*		
	February	**New film** [FY2005]	Write the film treatment.	Laura
	March	**New film** [FY2005]	Consult with affiliated cultural groups and other stakeholders.	Steven
		Wayside exhibit (rain forest) [FY2003]	Select appropriate artwork.	Judy
Q3	April	*(None.)*		
	May	*(None.)*		
	June	*(None.)*		
Q4	July	**New film** [FY2005]	Write the first draft.	Laura
	August	*(None.)*		
	September	*(None.)*		

Based on the Draft CIP of Hawai'i Volcanoes National Park, 1999.

Revision Cycles of the CIP

The CIP extends about five years forward from the time of initial planning. During this period, minor updates to the plan will be made to accommodate changing circumstances at the park. Minor updates may be made periodically or on an as-needed basis.

The CIP should undergo a major revision when it becomes obvious that the upcoming AIP will diverge so widely from the LRIP that a major review of the LRIP component is required to reestablish a consensus vision. Although there is

no way to predict this cycle — the cycle of major course corrections to the CIP, with stakeholder participation — we recommend the park align the stakeholder review of the CIP with other major park planning efforts, if possible. The review of the park's Strategic Plan and implementation plans occurs every five years, offering just such an opportunity. The difference between the initial start dates of these other plans and the CIP will, of course, have some bearing on the feasibility of this suggestion.

Developing the Schedule for Completing the CIP

Target Dates	CIP Component 1 **Long-Range Interpretive Plan** ## LRIP	CIP Component 2 **Annual Implementation Plan** ## AIP	CIP Component 3 **Interpretive Database** ## ID
	Complete Archive file. Planners finish transcribing workshops into Archive file. **Create draft LRIP.** Planners create rough draft LRIP from Archive file and LRIP template. **Transmit Archive file and draft LRIP.** Planners email files to CIP core team.		**Create draft ID.** CIP core team creates rough draft ID (from ID template emailed to team by planners between workshops).
	Complete Program Overview Table. CIP core team completes table. **Concurrently, complete LRIP Action List.** CIP core team notes long-range actions necessary to successfully implement the vision being completing in Program Overview Table.	**Concurrently, design and write draft ISPs for first year.** CIP core team designs ISP formats, then writes ISPs for first year that correspond to Program Overview Table and LRIP Action List. *(Note: This work relates to AIP, but is not typically located in the AIP.)*	**Concurrently, add draft ISPs to ID.** CIP core team places rough drafts of ISPs in "ISP" portion of ID.
	Edit and refine all other LRIP portions. CIP core team edits and refines all other portions of LRIP.	**Complete ISPs for first year.** CIP core team completes ISPs for first year. *(Note: This work relates to AIP, but is not typically located in the AIP.)*	**Complete ISPs for first year.** CIP core team replaces draft ISPs with completed ISPs in the "ISP" portion of the ID.
	Solicit comments from stakeholders and planners. CIP core team solicits stakeholder comments on entire LRIP (or select parts of it). Planners review and comment on entire LRIP. **Incorporate comments.** CIP core team incorporates comments.		
	Complete editing and refinement of LRIP. CIP core team accomplishes final editing and refinement before approval.	**Next: Create AIP from LRIP.** CIP core team duplicates LRIP file to start AIP file. **Customize file.** CIP core team deletes, modifies, and adds to AIP file to make it year-specific and appropriately detailed.	
		Complete editing and refinement of AIP. CIP core team accomplishes final editing and refinement before approval.	
	Scope of Sales Statement. CIP core team and cooperating association develop the Statement based on LRIP. *(Note: This work might best occur at this point or later in the sequence, but is not typically located in the LRIP.)*		**Concurrently, complete references.** CIP core team completes "referenced information" portion of ID. *(Note: This work includes referencing the Scope of Sales Statement if completed.)*
			Complete editing and refinement of ID. CIP core team accomplishes final editing and refinement before approval.
	Approve LRIP. Park's superintendent approves this CIP component.	**Approve AIP for first year.** Park's superintendent approves this CIP component.	**Approve ID.** Park's superintendent approves this CIP component.

Approved CIP. Implementation begins. CIP core team keeps the CIP components meaningful to operations.

Materials Used
After the CIP Workshops

At this point in the process, the planners can enter the remaining workshop-generated information into the *Archive file*, completing this document.

Then they copy the appropriate sections of information from the *Archive file* and paste it into the draft *Long-Range Interpretive Plan* template file.

> *Note: Please write or call us to receive these MS Word® XP electronic files. (See inside back cover for contact information.).*

The last step is sending both files to the park, along with the cover memo (below).

The core team works through the schedule of tasks for completing the CIP, the superintendent approves it, and the park officially implement its. ••

Email Transmission Memo: Archive File and Draft LRIP

Hi {name},

After a tempest of typing, here's what you've been waiting for: Attached are two documents formatted in MS Word XP.

{filename} – This file serves as the park's archive of the comprehensive interpretive planning process. It contains more information than is needed in the Long-Range Interpretive Plan (LRIP) file itself, and should be stored as a relatively non-changing record (after you edit it) of events that led to the park's first CIP. We noticed that some participants in the workshops did not provide their full contact information, or their handwriting was difficult to decipher. Please review this document and add any missing information and correct mistakes. You'll want to also ensure that the corrected information is also transferred to the LRIP file.

[attach file here]

{filename} – This file is the FIRST DRAFT of the park's Long-Range Interpretive Plan component of the CIP. It was derived from the Archive file. There are numerous notes throughout the text for your consideration. Also, you'll notice that the CIP schedule we discussed in the second workshop appears at the back of the document. All of these notes serve as guides to assist you in completing the document; delete all extraneous material after you finish the various components.

As we discussed in the second workshop, the major steps include refining the Program Overview, refining and completing the actions described in the LRIP Action List, and developing the Individual Service Plans (ISPs) for the upcoming fiscal year, as well as for any other years you wish to generate at this time. We suggest that you place the ISPs in the Interpretive Database component of the CIP.

Following the completion of the LRIP, you'll be in a position to copy the file and modify the new file to become the park's first Annual Implementation Plan (AIP) component of the CIP.

[attach file here]

If you have any questions, please give us a holler. We are dedicated to your success in this endeavor, and would like to maintain regular communication with you. We look forward to seeing the edited drafts of all three CIP components (LRIP, AIP, ID) as the process continues, and are glad to see that {parkname} is well on its way to its first CIP.

{Richard & Kim}

••

Appendix: Complete Reference Sets of Significance Statements and Primary Interpretive Themes from Diverse Parks

The following pages contain actual sets of significance statements and primary interpretive themes from large and small parks, in various regions of the country, possessing a variety of natural and cultural resources. Although the significances and primary interpretive themes are the most current available to our office at the time of publication, the parks cited might now be using updated versions. All of these reference sets were generated using the planning process described in *CIP Guide*. ••

Alibates Flint Quarries National Monument

Set of Significance Statements

Alibates flint is a beautiful, distinctive, workable, multi-colored stone with excellent edge-holding properties. These characteristics prompted various North American peoples to quarry, shape, and use this stone to construct tools that were critical to survival: projectile points, knives, scrapers, axes, drills, awls, and many others.

The only exposed bedrock source of Alibates flint is found in and around the monument.

The 736 largely unexcavated quarry pits in the monument document at least a 12,000-year story of continuous resource detection, extraction, manipulation, and use. Alibates flint projectile points have been found with the remains of mammoths and giant bison that roamed the High Plains during the Ice Age. Tools made from Alibates flint have been used by a variety of cultures over time, including the Clovis, Folsom, and Plainview peoples.

Due to its particular aesthetic and practical properties, Alibates flint was highly prized and traded extensively throughout much of North America.

Alibates Ruin (inside monument boundaries) and the nearby Antelope Creek Site comprise the type-site for the Antelope Creek Phase of the Plains Village Culture (circa A.D. 1150-1500), one of a number of cultures to benefit from the quarries. These sites include architectural remains, petroglyphs, and more than 1.5 million collected objects. The park manages about 800,000 of these objects. This collection comprises almost 10% of all collections in the largest National Park Service region (Intermountain Region), and almost 3% of all National Park Service collections.

At least 45% of the tools excavated at the important Blackwater Draw II Clovis type-site in New Mexico, which documents the earliest known mammoth-hunting site, were made of Alibates Flint.

Set of Primary Interpretive Themes

The broad distribution and long and diverse history of use of Alibates flint (dating almost to the earliest evidence of people in North America), and the story of the Plains Village Culture associated with the area foster appreciation of the surprising richness and sophistication of early cultures.

The story of quarrying and using Alibates flint offers unique opportunities to explore the inherent human need to make and use tools to improve the quality of life.

The history of people using Alibates flint exemplifies the powerful human drive to combine practical functionality with aesthetic beauty in everything we do — even in crafting common, utilitarian objects.

Aztec Ruins National Monument

Set of Significance Statements

The community that took shape here from the late 1000s to A.D. 1280 contains a unique complex of architectural features that includes rare tri-walled structures, multi-story great houses, road alignments, earthworks, and ceremonial buildings that together contribute to a highly modified, ritual landscape exhibiting symmetry and careful planning.

Because of the nature and extent of the resources here, Aztec Ruins National Monument provides outstanding opportunities for continued archeological research and discovery. Aztec Ruins contains some of the most remarkably well-preserved and visible indigenous architecture in the Southwest. The designed landscape and many of the individual structures are monumental in scale. Masonry, wood elements, earthwork features, and artifacts are unusually well-preserved. Aztec Ruins is the best tree-ring-dated site in the Southwest.

Aztec Ruins is a prominent expression of a much longer human history in the larger Four Corners region. The site played a significant role in the widespread Chacoan system, and offers insights into that system's nature, extent, and chronology. Its physical integrity and ability to contribute to understanding that system were recognized in 1987 when Aztec Ruins National Monument was included in the designation of Chaco Culture National Historical Park as a World Heritage Site.

Aztec Ruins is sacred for many American Indians who maintain strong spiritual connections to the site.

The pioneering excavations of the American Museum of Natural History provided archeological data and explanations that influenced interpretations of cultural history in the San Juan Basin for half a century, and the profession as a whole. The reconstruction of the Great Kiva was an unparalleled effort in the history of southwestern archeology, and offers visitors an exceptional opportunity to connect with the people who built this ceremonial structure.

Set of Primary Interpretive Themes

The monumental scale and accessibility of the remarkably well-preserved West Ruin and its associated artifacts foster contemplation of the rich culture of the ancestral Puebloan builders, and offer evocative and inspirational connections to the people themselves.

The world-class resources of Aztec Ruins provide an opportunity to explore the complexity, diversity, and longevity of the indigenous cultures of the Four Corners region, and their relationship to our overall understanding of human history.

The evolution and interaction of archeological and other scholarly and popular perspectives with indigenous perspectives of Aztec Ruins increase opportunities to understand and appreciate this special place.

The proximity of the Aztec Ruins landscape to the contemporary City of Aztec provides a rare opportunity to compare and contrast how different people interact with their environment.

Bandelier National Monument

Set of Significance Statements

Bandelier National Monument is an excellent place to study important aspects of the world-famous Jemez Volcanic Field, including the Valles Caldera, Pajarito Fault Zone, the Bandelier Tuff, and the Pajarito Plateau.

Bandelier National Monument contains one of the highest densities of archeological sites dating from the Paleo-Indian Period to Ancestral Puebloan sites built just before Spanish occupation of the area.

Bandelier National Monument is an integral component of the larger Puebloan culture of the American Southwest, and it provides a continuing context for traditional practices today.

Archeologists and scientists working at Bandelier in the early 20th century played a defining role in the development of modern archeological techniques.

The fire history and ecology of Bandelier National Monument and the Jemez Mountains is one of the most thoroughly studied in the world.

Bandelier National Monument and the Pajarito Plateau contain one of the highest concentrations of cavate pueblos in the world. The ancestral Pueblo people living here 500-900 years ago created these unusual architectural features by digging into the soft volcanic tuff cliffs.

The Civilian Conservation Corps (CCC) historic district in Bandelier contains the highest concentration of CCC structures and furnishings in the National Park System. The combination of Spanish Colonial and Native American design motifs used in the architecture and furnishings of the CCC Historic District provide a sense of place unique to Bandelier.

Bandelier National Monument is a leader in landscape scale research because of it's long-term resource protection and in-depth research (with its archeological, historical, ethnographical, geological, ecological and scenic resources), and collaboration between scientists and land managers across the landscape.

Although relatively small, Bandelier National Monument supports a high diversity of vegetation types and associated faunas due to its range of elevation and variety of landforms — and contains vital habitat for several threatened, endangered, and sensitive species.

With seventy percent of Bandelier National Monument federally designated as wilderness, the park provides rare opportunities for visitors to experience an environment rich in archeological sites and wilderness values in an approachable and scenic landscape.

Set of Primary Interpretive Themes

The long, rich, and continuing human history of the Pueblo people in the Bandelier area provides opportunities to explore how cultures and individuals shape, and are shaped by, the land.

The unusually intact and diverse ecosystem of the Bandelier area offers outstanding opportunities to explore natural processes and the value of maintaining healthy, functioning systems.

Subthemes:

- The Bandelier Wilderness, rich with evidence of long human habitation yet a seemingly timeless natural landscape, offers rare opportunities for exploration, inspiration, solitude, and reflection on how "wildness" relates to human use of land.

- The early and on-going work of both natural and cultural resource scientists at what is now Bandelier National Monument has reinforced the importance of conducting long-term, landscape-wide research and enables an in-depth exploration of how people learn about, and learn from, the past.

- The early work of preeminent researchers at what is now Bandelier National Monument gave rise to modern American archeology, especially the interdisciplinary approach to studying archeological resources.

- The geologic resources of the Jemez Volcanic Field — including the Pajarito Fault Zone, Pajarito Plateau, Bandelier tuff, and the Valles Caldera — constitute a landscape of superlative beauty and offer a laboratory and classroom for investigating some of the most powerful forces that shape our world.

The high concentration and integrity of Civilian Conservation Corps structures and furnishings at Bandelier National Monument foster appreciation for the hard work and talent of those involved, and the importance of the 1930s' American public works programs as a response to national environmental and economic crisis.

Big Bend National Park and **Rio Grande** Wild & Scenic River

Set of Significance Statements for Big Bend National Park

Big Bend National Park protects the largest and most representative example of the Chihuahuan Desert ecosystem in the United States.

Big Bend National Park's river, desert, mountain, and grasslands environments support an extraordinary richness of biological diversity and endemic and rare plants and animals.

The Chisos Mountains "sky island" contains many relict species which reflect climatic conditions once found over a broader area thousands of years ago.

Big Bend National Park's size, diverse ecosystems, scenic landscapes, remoteness, and wilderness character provide a variety of outstanding recreational and educational opportunities.

The park's location along a major bird flyway, its diversity of habitats, and its proximity to Mexico attract more bird species than any other national park.

Big Bend National Park is noted for its dark, clear night skies, among the darkest in the lower 48 states.

Dramatic, diverse, and well-exposed geologic features provide opportunities to study a wide range of sedimentary, igneous, and metamorphic geologic processes in Big Bend National Park. The park's geologic diversity includes marine rocks, continental rocks, ancient volcanoes, lava flows, ash beds, igneous intrusions, faults, folds, mineralized zones, landslides, badlands, and erosion.

The numerous scientifically-important Cretaceous-age and Tertiary-age fossils that are found in Big Bend National Park record the evolution and history of ancient life from the Age of Reptiles through the Age of Mammals.

Big Bend National Park is part of one of the largest transboundary protected areas in North America (Maderas del Carmen, Canon de Santa Elena, Ocampo, and Big Bend Ranch State Park), covering about three million acres.

Big Bend National Park occupies the intersection of the three greatest North American mountain building episodes: the Ouachita (which created the Appalachian Mountains), the Laramide (which created the Rocky Mountains), and the Basin and Range.

The Comanche War Trail traverses Big Bend National Park. [*Consultation underway to verify.*]

Thousands of archeological sites record the presence of humans in the Big Bend for the past 12,000 years, demonstrating their survival strategies and their adaptations to changing climatic conditions.

Big Bend National Park contains examples (architecture, farming, mining, ranching, etc.) of cultural interaction among Euro-Americans, Mexicans, and American Indians, who combined to form a distinctive borderlands culture, and a landscape exhibiting [~~the evidence of~~] cultural change and the effects of human activities upon the land.

Set of Significance Statements for Rio Grande Wild & Scenic River

The Rio Grande Wild & Scenic River is the only free-flowing portion of the lower Rio Grande, and as such, characteristically exhibits wide variations in water flows and volume. When sufficient flow exists, the Rio Grande permits a wide range of recreational activities.

The Rio Grande Wild & Scenic River, with waters contributed largely by the Rio Conchos in Chihuahua, Mexico, provides a valuable opportunity for bi-national cooperation between the United States and Mexico to protect and manage this outstanding resource.

As the most ecologically intact portion of the entire Rio Grande, the Rio Grande Wild & Scenic River is part of a rich ecological system that represents riparian and aquatic habitats of the Chihuahuan Desert. Its remoteness provides a refuge for rapidly dwindling and irreplaceable natural and cultural resources.

The spectacular river canyons, primitive wilderness character of the river, and international setting provide opportunities for high quality recreational and scenic experiences.

Set of Primary Interpretive Themes for Big Bend National Park and Rio Grand Wild & Scenic River

The convergence of desert, mountain, and river ecosystems in Big Bend National Park supports a remarkable diversity of life and provides abundant opportunities to experience and learn about the natural world.

Big Bend's rugged and remote wilderness, spectacular river canyons, vast expanses, panoramic vistas, dark night skies, and proximity to Mexico provide outstanding recreational opportunities, and inspire wonder, reflection, and rejuvenation.

For thousands of years, the Big Bend region has been a focus of human activity — bringing people together from all directions, sometimes in harmony and sometimes in conflict.

Survival strategies and adaptations of living things in the Chihuahuan Desert are as wondrous as the environment is extreme — often defying our expectations about the ability of life to thrive in such conditions.

Abundant fossils in Big Bend National Park, including some found nowhere else in the world, record the existence and demise of dinosaurs and the flourishing of mammals, enabling us to ponder evolution and our own impermanence in the world.

Diverse, well-exposed, and accessible geologic features [*throughout the park*] enable us to learn about the processes that shaped, and continue to shape, the Earth and influence its inhabitants.

Capulin Volcano National Monument

Set of Significance Statements

Capulin Volcano is a classic cinder cone and striking example of a recent volcano.

Capulin Volcano is part of the geologically diverse Raton-Clayton Volcanic Field, the easternmost Late Cenozoic volcanic field in North America.

Capulin Volcano provides for scientific investigation, interpretation, education and accessible visitor experience of a volcano.

The geology and environment of Capulin Volcano contributes to regional biodiversity with a rich variety of species within a relatively small area.

The dramatic view from the volcano rim connects people with a landscape that gives context to the geology of Capulin Volcano and human use of land.

Set of Primary Interpretive Themes

Dramatic yet accessible, Capulin Volcano invites people to explore an exceptional cinder cone volcano, and offers rare opportunities for scientific research, educational study, and personal inspiration.

The geologically diverse Late Cenozoic eruptions of the Raton-Clayton Volcanic Field created an evocative and evolving landscape that opens the door to an understanding of how volcanism shapes our world.

The volcanic nature of the Capulin landscape, which initially devastated resident lifeforms, now provides a variety of habitats supporting an unusually rich flora and fauna.

Capulin Volcano and the Raton-Clayton Volcanic Field of which it is a part provide opportunities to explore how people have learned to live and prosper in a volcanic landscape — an environment often thought of as hostile and barren.

Carlsbad Caverns National Park

Set of Significance Statements

Carlsbad Caverns National Park, universally recognized as a World Heritage site, contains the deepest limestone cave in the United States and the largest easily accessible cave room in the world.

Carlsbad Cavern, one of more than 100 caves in the park, reveals surprisingly huge chambers and formations unsurpassed in variety and beauty.

Lechugilla Cave contains some of the world's most spectacular speleothems, including features found nowhere else in the world.

The caves of Carlsbad Caverns National Park have been formed through the process of sulfuric acid dissolution, a distinctly different process from most caves in the world.

Carlsbad Caverns National Park provides a sanctuary for an easily viewed, world-famous colony of Mexican free-tailed bat species, some of which are rare and endangered.

Carlsbad Caverns National Park preserves one of the best exposures of Permian-aged fossil reefs in the world.

Remarkable new species of microbes continue to be discovered in the caves of Carlsbad Caverns National Park, offering great potential for research and understanding.

The nature and extent of water-created cave formations found just beneath this desert landscape provide opportunities to understand past and present climates here, including Pleistocene-era environments.

Carlsbad Caverns National Park protects a wide range of important fossil resources, including one of the continent's most diverse assemblages of undisturbed Pleistocene fauna.

Carlsbad Caverns National Park protects a significant intact portion of the Chihuahuan Desert ecosystem, the most biologically diverse desert ecosystem in North America.

Over 75% of Carlsbad Caverns National Park is federally designated as Wilderness where visitors can experience a natural sound environment, Class I air quality, clear night skies, expansive vistas, and opportunities for solitude.

The cultural resources of the park include two National Register historic districts, 30 historic structures, the Rattlesnake Springs cultural landscape, and nearly a million museum objects, reflecting enduring and diverse use of this desert landscape.

Carlsbad Caverns National Park protects more than 200 surface and subsurface pictographs, including examples of rock art which are unusual in the deep-cave dark zone.

Thirteen Native American tribes have longstanding and ongoing relationships with the landscape that is now Carlsbad Caverns National Park.

Surrounded by desert, rattlesnake Springs is an important riparian area and is populated by a rich diversity of birds, including neo-tropical migrants.

Set of Primary Interpretive Themes

Phases in the speleogenesis of Carlsbad Caverns National Park (a living reef, uplifted limestone, cavern dissolution, cave decoration, and the current condition) all invite exploration of a 250-million-year process that has resulted in one of the wonders of the natural world.

The continuing discovery and study of organisms found in Carlsbad Caverns National Park, such as the Mexican free-tailed bat colony of Carlsbad Cavern and the "microbial forest" of Lechuguilla Cave, invite greater understanding of how seemingly inconsequential, little-understood life-forms play significant roles in natural processes and affect our lives.

The largely intact natural and cultural resources of the Chihuahuan Desert in Carlsbad Caverns National Park reveal how plants, animals, and people have adapted to this arduous environment.

The relationship between the diverse surface environment and world-class underground wonderland of Carlsbad Caverns National Park provides unique opportunities to explore the sometimes-surprising interconnections and interactions of these two seemingly disparate worlds.

The historical and ongoing discoveries at Carlsbad Caverns National Park exemplify the innate human desire to overcome challenges and explore new frontiers.

The ongoing story of resource preservation and development at Carlsbad Caverns National Park reveals how humans value and showcase heritage and continue to learn how to protect it.

Chickasaw National Recreation Area

Set of Significance Statements

Chickasaw National Recreation Area contains a large concentration of freshwater springs and highly charged mineral springs that vary significantly in mineral content and volume of output. This spring system stems from one of the most complex geological and hydrological systems in the United States and has a long history of recreational and medicinal use, including commercial use.

Located where the Western Plains and Eastern Woodlands meet, Chickasaw National Recreation Area supports an unusual richness and diversity of plant and animal species.

The sedimentary rocks of Chickasaw National Recreation Area contain a large concentration and variety of Paleozoic and Mesozoic invertebrate marine fossils.

The rocks of Chickasaw National Recreation Area preserve a 500-million-year-old record of geologic deposition in southern Oklahoma.

Chickasaw National Recreation Area contains major accessible exposures of the Arbuckle Mountains - one of the oldest mountain ranges on Earth.

Chickasaw National Recreation Area is a relatively large piece of accessible, publicly-owned land that offers a wide range of opportunities for recreation, including swimming, boating, fishing, hiking, observing nature, hunting, camping, biking, horseback riding, family reunions, picnicking, and others for over 1.6 million visitors per year.

The landscape of Chickasaw National Recreation Area is intimate in scale and invites interaction.

The diversity, variety, and quality of natural and cultural resources in the Chickasaw National Recreation Area (geology, flora, fauna, history) — combined with the infrastructure of and services offered by the Goddard Youth Camp, a private foundation environmental education youth camp operating under a special use permit, and the Travertine Nature Center with adjoining Environmental Study Area, one of two formally designated "nature centers" in the National Park System — provide unparalleled environmental educational opportunities in the region.

The history of the establishment of Chickasaw National Recreation Area is intimately connected with the history of the Chickasaw and Choctaw peoples in Oklahoma.

Originally set aside in 1902, this place was one of the first places in the United States reserved for conservation and public enjoyment. The long, dynamic history of Chickasaw National Recreation Area exemplifies the evolution of the American conservation movement and the National Park System. The proposed Platt Historic District, including the structures created in the 1933-1940 era by the Civilian Conservation Corps (CCC), and historic structures from other periods specifically exemplifies National Park Service "rustic" design.

Set of Primary Interpretive Themes

Chickasaw National Recreation Area's 500-million-year record of sedimentary deposition, complex hydrogeological system, and diverse flora and fauna foster enriched connections with the dynamic relationships among geology, water, and life.

The attractive and intimate scale of the landscape, the wide range of recreational opportunities, the history of the freshwater and mineral springs, and the comfortable, rustic built environment of Chickasaw National Recreation Area invite an exploration of the concepts of personal and societal health and well-being.

The Eastern Woodlands-Western Plains ecotone at Chickasaw National Recreation Area offers outstanding opportunities to appreciate the rich ecological relationships that nurture and sustain our civilization.

Chiricahua National Monument

Set of Significance Statements

Chiricahua National Monument contains one of the most spectacular and extensive areas of rhyolitic pinnacles and spires in the world.

Chiricahua National Monument protects part of the Sierra Madre "sky island" complex — one of the three major "megadiversity" areas found in the world where four major biomes intersect each other (Sierra Madre, Rocky Mountain, Chihuahua Desert, and Sonora Desert).

Chiricahua National Monument is a Congressionally mandated wilderness area.

Chiricahua National Monument preserves exceptionally clean air and low levels of light and noise that enhance biodiversity, scenic viewsheds, and night sky viewing.

Chiricahua National Monument preserves the transition from prehistoric peoples to Chiricahua Apaches to 19th century pioneer settlers to the mid-20th century (Faraway Ranch) including an Army encampment used during the Geronimo campaign, a homestead, a working cattle/guest ranch, and related artifacts.

Chiricahua National Monument contains one of only two known monuments created by Buffalo Soldiers.

Chiricahua National Monument preserves the location of a Civilian Conservation Corps (CCC) camp as well as CCC-built stone structures and trails listed on the National Register of Historic Places.

Set of Primary Interpretive Themes

Begun with an afternoon's violent deposition of white-hot ash, the spectacular rhyolite formation of Chiricahua National Monument has been sculpted by erosion through the ages, and continues to be sculpted today as a living work-in-progress.

Chiricahua National Monument is centered at a crossroads of four major environments (Sierra Madre, Rocky Mountain, Chihuahua Desert, and Sonora Desert), providing opportunities to explore and study a surprisingly accessible wilderness of richly diverse plant and animal life where natural processes continue relatively unaffected by human influence.

The lack of major human enterprise and development, and the history of rural lifestyles, have protected the land in and around Chiricahua National Monument and its wilderness character of clean air, low noise, and clear night skies, all of which contribute to opportunities for rejuvenation and contemplation.

The rich and enduring heritage of the land in and around the Chiricahua Mountains is a testament to how the area's inhabitants have left their mark on the land and, in turn, have been changed by it.

Colonial Dorchester State Historic Site (South Carolina)

Set of Significance Statements

The village of Dorchester is a remnant of the global process of European colonization and exemplifies, in microcosm, many elements of colonial and revolutionary era life in South Carolina.

Extensive historical records exist for colonial Dorchester, adding tremendous integrity to the site.

The village site has maintained a high degree of archeological integrity, and in the process provides us with extensive documentation of life during the period 1690 to 1780. It is one of the most intact and protected colonial town complexes in South Carolina.

Colonial Dorchester State Historic Site is one of the few ongoing archeological projects open to the public in South Carolina. Here visitors can observe daily investigations, a source of ongoing discoveries.

The fort and village are significant for their association with the American Revolutionary War. The fort is one of only a handful of surviving fortifications remaining in South Carolina that were occupied by both British and American troops.

The fort at colonial Dorchester is a tangible reminder of the anxiety and insecurity that the French and Indian War created among colonial South Carolinians.

The fort at colonial Dorchester is the largest, best preserved, and most complete tabby fortification in North America.

Colonial Dorchester documents an important relationship between Anglicans and Congregationalists in colonial South Carolina.

Colonial Dorchester signifies an important link in the migration of Congregationalists from England to Massachusetts, South Carolina, and Georgia.

In the time period that colonial Dorchester's church bell tower was built, few existed in South Carolina; this bell tower signifies the relative affluence of the colonial Dorchester populace.

The oldest continuing school board in America has its roots in colonial Dorchester.

Colonial Dorchester, located at the furthest inland navigable point on the Ashley River, served as a strategic commerce center in colonial South Carolina.

Set of Primary Interpretive Themes

The social, political, economic, and religious forces that framed the founding and evolution of colonial Dorchester provide opportunities for us to explore how communities survive and prosper through human interdependence.

The ongoing investigation of colonial Dorchester's cultural resources provides interactive opportunities to understand how archeological and historical investigation help us to learn from our past.

The Anglican bell tower standing in a community that was founded by Congregationalists is emblematic of the dynamic relationship among the various religious groups of colonial Dorchester.

The fort at colonial Dorchester, built as a response to the French and Indian War and adapted for use in the Revolutionary War, exemplifies the need of communities to ensure the safety of their members.

Colorado National Monument

Set of Significance Statements

Erosion in the monument has exposed a billion and a half years of Earth history. Here, a dramatic sequence of folded and fractured rock formations has been sculpted to form a spectacular array of canyons, plateaus, arches and towering spires.

The monument's 1.7-billion-year-old Precambrian basement rock and the 1.5-billion-year Precambrian-to-Triassic gap in the geologic record at Colorado National Monument illustrate important episodes in the continuing cycle of dynamic earth processes with continent-wide ramifications.

Once a range of the ancestral Rockies, the ancient highlands that existed here as a result of several uplifts were the source of sediments deposited over much of the Colorado Plateau, creating the spectacular landforms seen in other parks (Arches, Canyon de Chelly, Canyonlands, Grand Canyon, etc.).

Colorado National Monument is a clear and powerful example of ongoing dynamic geologic cycles such as uplift, erosion, and deposition that serve as and provide a "living laboratory" for scientific study, education, and interpretation.

Colorado National Monument provides an introduction to many of the physical and biological features of the Colorado Plateau.

Spectacular landforms and the interplay of light, shadow, and color create glorious vistas from vantage points in the Grand Valley and the national monument.

In close proximity to the urban and rural settings of the Grand Valley, Colorado National Monument provides an opportunity for quiet solitude, recreation, and enjoyment that can evoke strong emotional responses.

The monument's landforms acted as a significant barrier to human use and travel between Glade Park and the Grand Valley; the cultural resources of the monument document how people overcame these barriers.

Visionary, trail builder, champion of the idea that these red rock canyons should be a national park, the life of the monument's first custodian, John Otto, showed how one person can make significant contributions to society.

Set of Primary Interpretive Themes

Colorado National Monument's dramatic landforms and spectacular vistas are but the latest manifestation of our Earth's continuous recycling process of mountain building, erosion, and deposition within a greater geologic story of continent building and the evolution of unique regional landforms.

The evidence of human use within the imposing and dramatic landscapes of Colorado National Monument is a powerful reminder of how geologic features and forces have challenged, and continue to challenge, the human drive to occupy, survive, and thrive in seemingly inhospitable landscapes.

The spectacular landforms and sublime natural beauty of Colorado National Monument provide opportunities for solitude, exploration, inspiration, and renewal that can fulfill the human need for self-discovery through connection to the land.

Established during the Progressive Era in American history, Colorado National Monument is emblematic of our nation's first conservation movement, during which concerned citizens like John Otto worked with vision and perseverance to have recognized and preserved for future generations those special lands and values that comprise our American heritage.

The protected lands of Colorado National Monument, adjacent to a large and growing urban population, preserve valuable habitat for biotic communities of the Colorado Plateau — and serve as an outdoor laboratory for scientific research and environmental education.

Devils Tower National Monument

Set of Significance Statements

Devils Tower is a monolith of uncommon igneous rock (phonolite) with many visually stunning, symmetrical, columnar joints, which are the tallest (some more than 600 feet) and the widest (10-20 feet in diameter) in the world.

The Tower has long been sacred to many peoples. It continues to be prominent in the traditional cultural beliefs and lifeways of First Nations (Plains Indians and others).

The Tower commands attention due to its prominence in the landscape (867 feet from base to top). The Tower has long been a dominant landmark in the Northern Great Plains.

Devils Tower National Monument was the first national monument established. President Theodore Roosevelt used the 1906 Antiquities Act to create the monument, which broadened the intended use of the Act by justifying the establishment based on natural values rather than cultural features.

The dramatic character of the Tower provides an evocative setting for many types of experiences and forms of personal expression.

The Tower has a colorful 100+ year climbing history. Management efforts such as the landmark 1995 Climbing Management Plan strive to balance climbing with other resource uses and values.

Devils Tower National Monument protects mountain and Northern Plains species, which meet here in an ecological mix distinctive to the Black Hills.

Set of Primary Interpretive Themes

Proclaimed by President Theodore Roosevelt as America's first national monument, Devils Tower exemplifies the challenges of managing public places [that are] used and valued by many people in may ways to provide the greatest benefit for all.

This place has always been recognized as innately sacred by many American Indian peoples [tribes and nations] — and respected in diverse ways that are socially and spiritually significant to their cultural identity and their sense of responsibility.

The variety of stories regarding how the tower came to be offer opportunities to experience how affiliated cultures, scientists, and others understand this special place.

The Tower, a widely recognized landmark of the Black Hills, entices us to explore and define our sense of place in the natural and cultural world.

The dramatic and alluring character of the Tower evokes a powerful sense of wonder, prompting many forms of personal expression that nourish our relationship with the land.

Dinosaur National Monument

Set of Significance Statements

The geologic record at Dinosaur National Monument is significant for the many rock layers exposed in a relatively small area. These 23 formations provide a scenic landscape for understanding the geologic history of the Colorado Plateau.

The historic Douglass Quarry contains the most concentrated, diverse, and abundant collection of well preserved Jurassic Period dinosaur bones in the world. Fossils from the Morrison Formation enable scientists to reconstruct the 150 million-year-old ecosystem in which the dinosaurs and their contemporaries lived.

Dinosaur National Monument is the only National Park Service site established to preserve an *in-situ* (fossil bones left in place) historic dinosaur quarry, and is known internationally for the continued discovery and scientific study of new fossil specimens.

Dinosaur National Monument preserves a portion of the Uintah Basin, which is characterized by an impressive biological diversity that results from the interplay between geologic deposition, uplift, erosion, time, and biological communities.

Dinosaur National Monument offers outstanding opportunities to experience solitude, natural quiet, dark night skies, and wild environments.

Dinosaur National Monument reveals an 11,000-year record of continuous human occupation, cultural development, and exploration from Paleo-Indian culture to the present. The pristine and intact cultural resources provide excellent opportunities for research and education.

Fur trappers, explorers, and early boaters on Dinosaur National Monument's wild rivers set the stage for white water boating —a unique, high-quality, non-motorized boating experience. This history of human interaction with the Green River contributes to a better understanding of our relationship to this river system.

The proposal to dam the Green River below Echo Park in the 1950s galvanized the nation's fledgling conservation organizations into a potent political power that defended the National Park idea.

The Yampa River is the last natural-flowing river in the Colorado River System. As such, it provides necessary habitat for all native aquatic and riparian species remaining in the Upper Green River System, and has forestalled the extinction of four endangered fish species. Outstanding research opportunities exist within the monument to compare the river and riparian systems of the Yampa to the regulated flow regime of the Green.

Set of Primary Interpretive Themes

Dinosaur National Monument's scenic river canyons, world-class geologic resources, and biological diversity provide opportunities for people to encounter uncrowded wild environments, better understand and appreciate the complexity of ecosystems, contemplate their place in nature, and renew their sense of well being.

The diverse and accessible fossil resources in Dinosaur National Monument allow personal discovery and reflection upon life and the history of Earth, including deep time, change, adaptation, survival, evolution, and extinction.

The cultural resources in Dinosaur National Monument provide rich and abundant opportunities to reflect upon the kinship between ancient and modern cultures, the exploration and continuous occupation of this land, and the relationships of people to their environments.

The defeat of the proposed Echo Park dam in Dinosaur National Monument in the 1950s played a significant role in the development of the American conservation movement, and continues to frame public debate over the best uses of public lands.

The monument's rivers are the only remaining living laboratory in the Colorado River System for the comparative study of controlled and natural-flowing rivers and their effects on ecosystems, and illustrate the past and present struggles over how best to manage life-sustaining water in the arid West.

El Malpais National Monument

Set of Significance Statements

Repeated episodes of volcanic activity at El Malpais have created an unusually diverse and well preserved basaltic lava field featuring:

- One of the longest lava tube systems
- Ice caves
- Flow top features
- Cinder features
- Tree molds

The volcanic landscape of El Malpais has created and maintained a wilderness of dramatic contrasts, subtle diversity, and unusual associations of landforms, flora, fauna, and human use.

Characteristics of the volcanic terrain have created an unusual woodland community including the oldest living Douglas fir trees yielding the longest tree ring chronology and longest continuous climate record in the Southwest.

The many special environments/habitats of El Malpais have provided a living laboratory that has produced significant scientific discoveries and promises more.

El Malpais provides an opportunity to explore a long history of cultural interactions between:

- Mogollon and Anasazi
- Zuni, Acoma, Navajo, and Laguna
- Hispanic, Anglo, Indian, European, and Middle East

El Malpais National Monument and National Conservation Area provide opportunities to study Chacoan culture at its southernmost fringes.

Set of Primary Interpretive Themes

The complex geological history (specifically volcanism) at El Malpais has created an unusually diverse landscape with unique ecosystems, which have yielded significant scientific discoveries and promise more.

The El Malpais area has a long history of inhabitation by more than one cultural group at a time; this history of interaction and adaptation has created and continues to support a rich cultural mix.

The many conditions and unusual environments of El Malpais has created a diverse wilderness providing varied opportunities for exploration, discovery, and solitude.

El Morro National Monument

Set of Significance Statements

The sandstone cuesta of El Morro (Inscription Rock) documents 1,000 years of human history in the Southwest:

- Over 200 petroglyphs were carved between A.D. 1000-1400 by Ancestral Pueblo Indians;
- Over 2,000 names were inscribed between A.D. 1600-1900 by Spanish explorers, American surveyors, immigrants journeying west, U.S. Army soldiers, and area settlers.

The natural catchment basin at the base of El Morro served many people as a rare and reliable source of water for over 1,000 years:

- It supported two major Ancestral Puebloan pueblos;
- It influenced the location of a major trade route and has cultural, religious, and historical significance to the Zuni, Navajo, Acoma, Laguna, and 15 other culturally affiliated tribes;
- It enabled European and American explorers, soldiers, and travelers on their way west.

The two major Ancestral Puebloan pueblo sites in the monument are especially valuable because they date between A.D. 1200-1300 (a period that has had relatively little archeological investigation) and are largely unexcavated.

Set of Primary Interpretive Themes

Water permeates the story of El Morro: the power of water carved this compelling landscape; the reliable availability of water here has attracted settlers and travelers for over 1,000 years; the importance of this place moved many to leave their marks on the cuesta of Inscription Rock; the impacts of water now threaten to destroy that rich historic record, challenging us to respect natural forces while protecting our cultural heritage.

The 1,000-year-long human record preserved on Inscription Rock documents the stories of cultural interactions in the pre-Columbian Southwest, New Spain, and New Mexico; no other single site offers such a diverse panorama of American history.

Fire Island National Seashore

Set of Significance Statements

Fire Island National Seashore is a relatively natural seashore area near large concentrations of urban populations and containing no paved road.

Seventeen private communities help define the cultural character of Fire Island National Seashore.

The Fire Island Light Station tells the story of the lifesaving ethic embodied in the U.S. Lighthouse Service, the U.S. Life Saving Service, and the U.S. Coast Guard.

The William Floyd Estate, associated with General William Floyd, a signer of the Declaration of Independence, was owned and occupied by the Floyd family for 250 years; tangible features from all periods are preserved and interpreted there.

The Sunken Forest is a 250-300 year old American holly-shadblow-sassafras maritime forest considered to be at or near climax.

The Otis Pike Fire Island Wilderness contains a variety of barrier island ecosystems in a relatively natural state, and is the only federal wilderness in the State of New York.

Set of Primary Interpretive Themes

William Floyd's bravery in signing the Declaration of Independence exemplifies the tension between feelings of loyalty and desire for liberty that characterized the struggle of the American Revolution.

The Fire Island Light Station, protecting a major maritime approach to New York Harbor, embodies the ethic of life-saving and the evolution of communication and navigation.

The constantly changing nature of barrier islands is a dramatic example of how dynamic natural processes create diversity and stability.

Fire Island National Seashore is an ongoing experiment exploring how people can live and recreate responsibly in a complex and dynamic barrier island environment.

The Fire Island Wilderness and the Sunken Forest provide opportunities to millions of urban and suburban visitors for exploration, discovery, recreation, and solitude.

Fire Island National Seashore provides a window into an isolated maritime environment characterized by distinctive island communities dominated by the dangers and opportunities wrought by the sea.

The diverse cultural resources of the William Floyd Estate provide a dynamic moving picture of over 250 years of one influential American family's life.

Florissant Fossil Beds National Monument

Set of Significance Statements

The completeness and detail of the fossils preserved at Florissant are among the best in the world.

The abundance and taxonomic diversity (plants, arthropods, fish, birds, mammals) of Florissant fossils make them one of the richest assemblages in North America.

Florissant provides the most complete record of an extinct late Eocene (34-35 million years old) ecosystem from the southern Rocky Mountains.

The Florissant Formation is unusual in that it includes species from a variety of habitat types — subtropical, temperate, semiarid — preserved together.

The present montane ecosystem, which largely maintains its presettlement character, provides opportunities for onsite comparison with the paleoecosystem of the late Eocene.

The permineralized tree stumps at Florissant are an impressive example of preservation through a volcanic mud flow event (lahar), and include the world's only known petrified trio (three stumps from a common base).

The Florissant fossils found in extensive collections throughout the world, and unexcavated (in situ) resources at Florissant, provide excellent opportunities for new research and learning.

The Hornbek Homestead provides insights into the role of women in the settlement of the West and the role of Western women in furthering the women's movement.

Set of Primary Interpretive Themes

The rich and varied fossil resources of Florissant Fossil Beds National Monument provide excellent opportunities to explore change over time using science as a way of understanding our world.

The paradoxical aspects of fossilization in the Florissant Formation fuel our drive to solve Earth's mysteries and inspire us to marvel at the complexity and subtlety of the natural world.

The personal struggle and success of Adeline Hornbek exemplifies the limitations imposed on women in the early West and inspires us to overcome the constraints and challenges of our own time.

Florissant Fossil Beds National Monument provides a contemplative environment in which to ponder the great questions of life posed by the monument's natural and cultural resources.

Fort Bowie National Historic Site

Set of Significance Statements

Fort Bowie began as a strategically placed outpost and evolved into the command center of United States military operations against the Chiricahua Apaches.

Fort Bowie National Historic Site preserves the ruins of the original and subsequent constructions of Fort Bowie.

Fort Bowie National Historic Site preserves a rich concentration of important historic sites in a landscape of high integrity; including the locations of:

- 1854 Parke Railroad Survey campsite
- Butterfield Stage station and improved road
- Bascom Affair
- 1861 wagon train massacre
- Battle of Apache Pass
- Fort Bowie post cemetery
- Chiricahua Apache Indian Agency
- Apache Spring
- Apache Pass

Set of Primary Interpretive Themes

The proximity of Apache Pass to Apache Spring gave rise to an environment conducive to many important historic events that continue to affect the destinies of those living in southeast Arizona and beyond.

The clash of cultures and the subsequent Apache Wars resulted in expanded opportunities for entrepreneurs at the expense of the Chiricahua Apaches who lost their homeland.

Fort Bowie National Historic Site provides an opportunity to understand the history of the Apache Wars through the experiences of those who participated in the events.

Fort Davis National Historic Site

Set of Significance Statements

Fort Davis is one of the best remaining examples in the Southwest of a typical post-Civil War frontier fort because of the extent of the surviving structures and ruins.

Fort Davis provides an excellent opportunity for understanding and appreciating the important role played by African Americans in the West and specifically in the frontier army because black troops served at the post from 1867 to 1885.

Fort Davis provided essential troops and supplies to the Victorio Campaign, which ended meaningful resistance of Apache bands in the Trans-Pecos.

The historic integrity and character of the military post has not been significantly altered since its establishment. Much of the landscape immediately adjacent to the post has undergone little change.

Fort Davis was strategically located to defend the Trans-Pecos portion of the San Antonio-El Paso Road and the Chihuahua Trail. This encompassed controlling activities on the southern stem of the Great Comanche War Trail and Mescalero Apache war trails.

Set of Primary Interpretive Themes

The history of Fort Davis, encompassing the conflict between native peoples (Apaches, Comanches, and Kiowas) and the ever-increasing flow of emigrants and settlers to the Trans-Pecos region, provides opportunities to explore the ideas of security, sovereignty, and cultural identity in the American West.

The historical integrity of Fort Davis (including quality and quantity of original fabric, historic records and artifacts, and the cultural/natural landscape) enables a deeper understanding of the realities of frontier military life in the American West.

The history of African-American soldiers at Fort Davis is an important chapter in the larger American social movement toward equality for all citizens, a movement that continues today.

Grand Canyon National Park

Set of Significance Statements

Grand Canyon's immense and richly colored scenic vistas, enhanced by a near-pristine natural setting, inspire a variety of emotional, intellectual, artistic, and spiritual impressions.

- Grand Canyon National Park is located in of one the cleanest remaining pockets of air in the United States and is a Class I area.
- Legislation passed in 1975 to enlarge Grand Canyon National Park contained the first-ever clause mandating the federal protection of "natural quiet and experience".
- The high elevation, dry air, and remote location create exceptional viewing of the night sky.
- Over one million acres of undeveloped backcountry, hundreds of miles of trails, and 277 river miles containing world-class white-water provide tremendous opportunities for exploration, personal challenge, discovery, learning, social interaction, or solitude.

The Grand Canyon of the Colorado River is the world's greatest example of arid land erosion and one of the most spectacular exposure of stratified rocks.

- Although Grand Canyon reveals rocks ranging from 245-1840 million *(1.8 billion)* years old, the landscape is relatively young, having been sculpted in just the last 5-6 million years.
- The vastness of its landscape — an average depth of 4000 feet, width of 10 miles, and a length of 277 river miles — contains a seemingly infinite system of colorfully sculptured plateaus, mesas, buttes, cliffs, slopes, ridgelines, and side canyons.
- Grand Canyon is composed of a wide variety of rock types that respond differently to the forces of erosion. These rock layers vary in thickness, composition, and uplift, resulting in six geologically distinct sections.
- The Grand Canyon Supergroup is one of the most complete records of Middle and early Late Proterozoic age exposed on the North American continent.
- Early studies of Grand Canyon provided evidence for fundamental geologic concepts, specifically the principles of base level erosion, antecedent and superimposed streams, and the power of rivers to cut canyons.
- Grand Canyon remains a powerful illustration of geology, widely used by educators to convey an understanding of geologic principles.

Grand Canyon's extensive sedimentary strata and dry caves have preserved a remarkable record of past plant and animal life.

- 1.2 billion-year-old stromatolites (algal mats) preserved in Precambrian Bass Limestone,
- Plant imprints, animal tracks, and extinct species of marine life in Paleozoic strata ranging from 245-540 million years ago, and
- Remains of ice age to post-glacial mammals and birds from the Late Pleistocene to Early Holocene.

Grand Canyon is an "exhibit-in-place" of the effects of geography on plants and animals.

- Grand Canyon's extreme and abrupt changes in elevation, exposure, and climate support a diversity of communities ranging from desert (including three of the four North American deserts) to boreal forest in unusual proximity.
- Early investigations into the biology of the Grand Canyon led to the development of fundamental ecological principles, including:

  - the impact of eliminating predators on prey populations (Kaibab Plateau, 1920s),
  - the influence of geographic isolation on the evolution of species as illustrated by the Kaibab squirrel, and
  - C. Hart Merriam's delineation of "life zones."

Grand Canyon has played, and continues to play, a pivotal role in precedent-setting conservation issues, including air quality, natural quiet, fire ecology, and adaptive river management.

- The Bureau of Reclamation's proposal to build two dams in Grand Canyon in the 1960s sparked one of the most notable conservation battles in U.S. history. A nation-wide protest defeated the projects and influenced the modern environmental movement. This pivotal battle set in motion a historic transition from decades of dam building to the present era of proposed dam removal — a shift in societal values currently being played out across the nation.
- Study of the effects of Glen Canyon Dam has resulted in an unprecedented adaptive management approach to mitigate downstream impacts of dam operations. The experimental flood in 1996 marked the first time water was released from a federal dam to benefit the downstream environment.
- The challenges of protecting park resources while providing for the enjoyment of millions of annual visitors led to the implementation of mass transit, in the form of shuttle buses, in 1974. Early in the 21st century, Grand Canyon National Park will become the first unit of the national park system to implement a light rail system to preserve park resources and to enhance visitor experience.

A variety of American Indian cultures, past and present, are represented in and around Grand Canyon.

Cultural evidence includes:
- Folsom artifacts indicating habitation 10,000 years ago, a large collection of well-preserved split twig figures from hunting-gathering culture of 4,500 years ago, and ample remains of Ancestral Puebloan people including examples of dry-land farming.
- Many American Indian tribes have close and sacred cultural ties to Grand Canyon, including the Hualapai, the Havasupai, the Hopi, the Kaibab Band of Paiute, the Navajo Nation, the Pueblo of Zuni, the San Juan Southern Paiute, and the Shivwits Band of Paiute. Some of these tribes consider Grand Canyon to be their place of origin/emergence and homeland.
- Despite centuries of conflict with Spanish soldiers, missionaries, miners, settlers, and the U.S. Government, most tribes in and around Grand Canyon have maintained a high degree of cultural integrity.

Grand Canyon's cultural history is a study in exploration, exploitation, development, and preservation of land in the American West.

- In 1540, a company of Spanish conquistadors in search of the mythical Seven Cities of Cibola, led by Garcia Lopez de Cardenes (dispatched by Pedro de Tovar) became the first Europeans to set eyes on the Grand Canyon. Their legacy is reflected in place names throughout the canyon. Most significantly, they named the *Colorado* River for its reddish brown color.
- During the late 1800s and early 1900s, Grand Canyon reflected the history of the West as it was exploited for minerals. Unlike many "boom and bust" western settlements, however, miners found more economic rewards in promoting Grand Canyon tourism.
- Prior to the establishment of Grand Canyon National Park in 1919, the Santa Fe Railroad, the Fred Harvey Company, and the U.S. Forest Service played significant roles in the tourist development of the South Rim.
- Mary E. J. Colter, an employee of the Fred Harvey Company, creatively combined local American Indian architectural styles and materials into her buildings for Grand Canyon National Park, which are now listed on the National Register of Historic Places.
- The use of native rock and log structures in Grand Canyon National Park led to a proliferation of rustic architecture in other national parks, which has come to symbolize and romanticize the West of the late 1800s and early 1900s. The site plan and collection of historic buildings in Grand Canyon Village is an example of early community planning.
- Yavapai Observation Station is one of the first examples of museums in the national park system.
- Emery and Ellsworth Kolb built a home and photographic studio between 1904-1926 on the canyon's rim. The footage the brothers filmed of their adventurous boat trip on the Colorado River from 1911-1912 was the first-ever movie of river running in Grand Canyon. Emery narrated public showings of the film for the next six decades.

Grand Canyon National Park was designated in 1979 as a World Heritage Site by the United Nations Educational, Scientific and Cultural Organization (UNESCO), recognizing it as a place of universal value to be preserved as a part of the heritage of all peoples. Because of its superlative features, Grand Canyon National Park qualifies under both natural and cultural world heritage site criteria, placing it in elite company; only 4 percent of more than 460 sites world-wide are distinguished by this dual designation.

Set of Primary Interpretive Themes

The immense and colorful Grand Canyon is valued worldwide as one of Earth's most powerful and inspiring scenic landscapes, offering people enriching opportunities to explore and experience wild beauty in both vast and intimate spaces.

Water is the lifeblood of Grand Canyon — a force of erosion, a sustainer of scarce riparian habitat in a desert environment, a spiritual element for native peoples, a provider of recreation, and a central factor in the exploration, development, and politics of the American West.

The Colorado River and other erosional forces sculpted the southern edge of the Colorado Plateau to form the Grand Canyon, revealing a beautiful sequence of rock layers that serve as windows into time.

Extreme changes in elevation, exposure, and climate in the Grand Canyon support a remarkable range of biotic communities in unusual proximity; a relatively undisturbed ecosystem that allows natural processes to continue, providing sanctuary for present and future life.

Grand Canyon remains a homeland and a sacred place to a number of American Indian cultures, a point of emergence to some, offering us an opportunity to consider the powerful and spiritual ties between people and place.

Grand Canyon has sustained people materially and spiritually for thousands of years — wider recognition of its value led to its designation as a national park and world heritage site; however, continuing threats to its preservation generate dialogue about our need and responsibility to conserve our local and global environment.

Grant-Kohrs Ranch National Historic Site

Set of Significance Statements

Established by pioneer stockman John Grant, and subsequently expanded as the home and headquarters of influential cattleman Conrad Kohrs, Grant-Kohrs Ranch exemplifies successful cattle ranching operations in the American West from 1860 to 1920.

Grant-Kohrs Ranch National Historic Site is the only unit of the National Park System specifically designated to commemorate the frontier cattle era, and its role in the larger and more complex history of the United States from the mid-19th to early 20th centuries.

Due largely to the foresight and preservation efforts of Conrad and Nell Warren, Grant-Kohrs Ranch offers unparalleled opportunity to experience an authentic, living, evolving western ranch — encompassing historic landscapes, original buildings, furnishings, implements, and records spanning 130 years — rare in its integrity and completeness.

The diversity of people and natural resources in the area were integral to the viability, scale, and success of the Grant-Kohrs Ranch and surrounding Deer Lodge Valley community.

The near extermination of the native bison from the Northern Plains by the early 1880s created the opportunity for new lifestyles based on cattle ranching, while profoundly disrupting traditional Plains Indian lifeways.

Set of Primary Interpretive Themes

The historical integrity and intactness of Grant-Kohrs Ranch facilitates a deeper understanding of the myths and realities of cattle ranching and the American West.

The story of Conrad Kohrs' rise from hopeful emigrant to powerful cattle baron exemplifies the pursuit of the American Dream through flexibility, vision, determination, and good fortune.

The relationship of the cultural and natural landscape at Grant-Kohrs Ranch provokes appreciation for the interconnectedness of all life; the direct human dependence on natural resources for food and other products; and the necessity of wise and sustainable resource stewardship to ensure continued prosperity.

The history of Grant-Kohrs Ranch offers insights into how an enterprise often attributed to the effort of one person or family is inextricably tied to many people of diverse talents and backgrounds working together for individual and mutual advantage.

The deliberate preservation of Grant-Kohrs Ranch by Conrad and Nell Warren — including original buildings, records, artifacts, and landscapes — represents values of historical awareness and respect, and connects to the larger idea of cultural memory and its preservation.

Great Sand Dunes National Monument

Set of Significance Statements

Great Sand Dunes National Monument contains the tallest dunes in North America (over 700 feet high) and one of the most complex dune systems in the world created by the continuing interaction of wind, sand, and water.

The dunes are an internationally significant high-altitude, seasonally cold climate eolian system.

The creeks that flow near the dunes support a consistent surge flow that is a unique hydrologic phenomenon.

The monument's 38,000 acres support a great diversity of plants and animals, spanning desert to montane life zones.

The dunes represent a unique high desert habitat that supports at least three known endemic insect species: the Great Sand Dunes Tiger Beetle, a species of Darkling Beetle, and an unnamed Flower Beetle.

The park provides a unique opportunity for recreation and play without fear of damage to the dunes or adjacent water resources.

The unexpected combination of massive dunes surrounded by alpine peaks, a desert valley, and creeks flowing on the surface of the sand make Great Sand Dunes a unique American landscape that inspires an emotional response.

Great Sand Dunes has been identified as an area of special importance by people of various cultures.

Great Sand Dunes is situated along a major historic route into the San Luis Valley.

Great Sand Dunes contain rare Clovis/Folsom archeological sites and the largest known stand of culturally scarred ponderosa pine.

The landscape of Great Sand Dunes National Monument and the extensive surrounding areas characterized by vast, primitive mountains and rural rangeland offer a rare opportunity to experience this national treasure in a harmonious setting.

Great Sand Dunes National Monument, particularly the backcountry, offers exceptional solitude, quiet, and an unspoiled day and night sky dome. These exceptional values are further complemented by the current levels of visitation, which have resulted in a spacious and uncongested experience.

Set of Primary Interpretive Themes

The unexpected combination of massive dunes surrounded by alpine peaks, a desert valley, and creeks flowing on the surface of the sand makes Great Sand Dunes National Monument a unique landscape that inspires awe, mystery, and wonder.

Though the active dune field appears stark and empty, Great Sand Dunes National Monument is actually a rich and complex environment with a great diversity of plants and animals living in a variety of distinctive natural communities, creating opportunities for unique experiences, personal exploration and recreation, scientific discovery, and enjoyable learning.

The tall dunes and the life they support are the most visible indicators of the health of an ecosystem that extends far beyond monument boundaries; to protect the ecological health of the park, Great Sand Dunes National Monument must partner with the larger community in managing the whole.

Just as human survival is dependent upon water, this complex, dynamic dune ecosystem, with its distinctive geological and biological character, is dependent on the area's rare, fragile, and pristine water system for its continued existence.

The same physical characteristics that influenced the formation of the sand dunes created a major cultural crossroads, resulting in a landscape of special significance to many people over thousands of years.

Harpers Ferry National Historical Park

Set of Significance Statements

The geography of the Harpers Ferry area (including the "gap" and confluence of the Potomac and Shenandoah rivers in the Blue Ridge Mountains) has made this a key travel, trade, and communications crossroads (trails, highways, canals, and railroads) from the times of earliest human inhabitation by American Indians through the present.

The challenges and opportunities provided by the terrain and natural resources at Harpers Ferry, including the abundance of waterpower and mineral ores, spurred it to be a nationally important center for technological experimentation, innovation, and invention.

Upon the recommendation of President George Washington, Harpers Ferry was designated by Congress as a Federal Armory in 1796.

Harpers Ferry preserves the site of John Brown's raid of 1859 — an epic event in opposition to slavery, precipitating the Civil War.

The speech made by Abraham Lincoln at Cooper Union in New York City regarding John Brown's raid on Harpers Ferry was a crucial factor in his selection in 1860 as the Republican candidate for President of the United States.

The first property damage in Virginia attributable to the Civil War occurred in Harpers Ferry.

During the Civil War, Harpers Ferry served as a fortified and defensible "bastion" to the Union capital at Washington, D.C.

As a result of its strategic location, the citizens of Harpers Ferry suffered under almost continuous military occupation (by both North and South) and restrictive martial law throughout most of the Civil War.

Harpers Ferry's fall to Confederate General Stonewall Jackson, as part of the Maryland Campaign of 1862, was the largest surrender of United States troops during the Civil War.

Harpers Ferry served as a staging and supply area for General Sheridan's Shenandoah Campaign.

Harpers Ferry became a primary theater in the waging of and opposition to guerrilla warfare as a predominant tactic for destroying the war-making capabilities of the opponent.

The Harpers Ferry Armory was the first instance in the history of the world of developing and using interchangeable machine parts in mass manufacturing, and documents many of the social changes attendant with that cultural shift.

The Lewis & Clark expedition was supplied with key arms technology from Harpers Ferry.

Harpers Ferry preserves a historic landscape of such importance that it is a Historic District on the National Register of Historic Places. The longevity of preservation activity at Harpers Ferry documents the evolution of the national preservation ethic and its methodologies.

The cultural resources of Harpers Ferry document an outstandingly broad range of the African-American experience — from the slavery of Colonial times to the Civil War and abolition to the continuing march toward Civil Rights today.

The park preserves the campus of Storer College; one of the first institutions of higher learning for freed slaves established during Reconstruction, and where Frederick Douglas served as one of the founding trustees.

In 1906, Storer College was the site of the second Niagara Movement Convention, where W.E.B. DuBois devised the first modern philosophy and strategy for civil rights that led to the formation of the National Association for the Advancement of Colored People (NAACP).

Harpers Ferry National Historical Park enjoys a special relationship with the Harpers Ferry Design Center and Stephen T. Mather Training Center by serving as a national proving ground for research, development, and training in resource preservation and interpretation.

Set of Primary Interpretive Themes

The physical and historical geography of the Harpers Ferry area demonstrates how landscapes shape human history, and how human endeavors profoundly affect natural landscapes — a powerful reminder that the actions of today determine the opportunities of tomorrow.

The invention of interchangeable parts in arms manufacturing at the Harpers Ferry Armory provided unprecedented momentum to the Industrial Revolution, forever changing the human experience and intensifying the ongoing dialogue regarding the costs and benefits of technological innovation.

The cataclysmic impact of John Brown's raid, followed by the intense and pervasive impacts of the Civil War on the community of Harpers Ferry and the nation, provide myriad insights into the violent, transformative reality of war.

The history of Harpers Ferry chronicles many critical milestones and issues in the continuing struggle to achieve the American ideal of freedom and equality for all.

The history of Harpers Ferry weaves together many common threads in the tapestry of 18[th,] 19th, and 20th century America enabling a deeper understanding of the roots of the great American experiment, and providing important context for the challenges and opportunities facing us today.

Hawai'i Volcanoes National Park

Set of Significance Statements

Hawai'i Volcanoes National Park features Mauna Loa and Kilauea, two of the most active volcanoes in the world.

Mauna Loa — measured from its base deep beneath the surface of the sea to its peak — contains more material by volume than any other mountain on Earth.

The unusually high degree of approachability to the park's active volcanism affords opportunities for fundamental and detailed research not duplicated (or even approached) in any other park in the world, offering relatively safe experiences with lava flows, fountains, and other products of active volcanism.

The long history and collaborative nature of the research performed by the USGS Hawai'i Volcano Observatory and others at Hawai'i Volcanoes National Park have made Mauna Loa and Kilauea among the most studied and best understood volcanoes in the world.

Hawai'i Volcanoes National Park provides critical living space in a wide variety of ecological zones for the highly endemic native biota, much of which is threatened or endangered, requiring active management of native and non-native species.

The diversity and importance of the cultural resources in Hawai'i Volcanoes National Park — and the protection of natural features and processes afforded by national park status — combine to make Hawai'i Volcanoes critically important to the perpetuation of traditional native Hawaiian religion and culture.

Hawai'i Volcanoes National Park encompasses the largest expanse of Hawaiian natural environment managed as wilderness, with the associated wilderness values of natural sounds, lack of mechanization and development, natural darkness, and opportunities for solitude.

The park's resources are so rare, valuable, and inspirational to all the people of the world that the United Nations has declared the park an International Biosphere Reserve and a World Heritage Site.

Hawai'i Volcanoes National Park protects the most extensive tract of protected montane tropical rain forest in the National Park Service.

The structural complexity and isolation of the Hawaiian Islands and their active volcanic setting makes them a world-class living laboratory of biogeography and evolution. The protected status of Hawai'i Volcanoes National Park lands offers important opportunities for this work to continue.

Set of Primary Interpretive Themes

The approachable, active volcanoes of Hawai'i Volcanoes National Park allow first-hand discovery of and connection with one of the most fundamental forces of our world — in both its creative and destructive roles.

The journeys of the Hawaiian people, who continue to inhabit these rich and diverse lands, include cultural clashes, adaptations, and assimilations that provide enduring lessons about human resourcefulness, interdependence, and respect for the life of the land.

In Hawai'i, active volcanism created an isolated home for a few immigrant species that gave rise to a rich yet fragile endemic biota; due to the accelerating change brought about by human actions, much of that unique heritage continues to be lost to extinction, challenging all of us to learn from the past and work together to preserve the remaining native plants and animals.

Kilauea, the home of Pele, is sacred to many Native Hawaiians: it is a place of birth and the well-spring of many spirits and forces; the active volcanism, the features of the terrain, and the plants and animals that live there are all important to Native Hawaiian sense of identity, unity, and continuity.

Hawai'i Volcanoes National Park provides an opportunity for people to experience the values of Hawai'i's diverse wilderness; the park's designation as a World Heritage Site and International Biosphere Reserve attests to its importance as a benchmark for monitoring environmental change.

Lake Meredith National Recreation Area

Set of Significance Statements

Lake Meredith, created in 1965 by the Bureau of Reclamation's impoundment of the Canadian River, provides water for half a million people in 11 Texas cities.

Located on the windswept, semiarid plains of the Texas Panhandle, Lake Meredith is the largest body of water within a 250-mile radius. The lake and associated public lands provide numerous and diverse recreational opportunities for the five-state region of the Panhandle Plains, including cool-water sport fishing, hunting, boating, horseback riding, hiking, scuba diving, wildlife and bird watching, and camping.

Lake Meredith National Recreation Area has one of the largest grassland areas in the National Park System. As an ecological transition zone, the Canadian River breaks are vegetatively a part of the Rolling Plains providence, which lies to the east and makes the break.

The lake, wetlands, and High Plains prairie provide premier habitat for migratory and threatened and endangered species, and other wildlife and unique vegetative communities.

The national recreation area contains exposed geological features including Alibates flint and filled chimneys. The colorful, picturesque setting of Canadian River breaks reveals more than 250 million years of geological history. This geology has led to a relatively long and continuous history of energy industry development, including oil, natural gas, and helium.

The Canadian River drainage contains the evidence of more than 12,000 years of continuous human occupation.

Set of Primary Interpretive Themes

The many and varied natural resources of the Lake Meredith area — including Alibates flint, the water resources of the Canadian River drainage, the High Plains grassland, and the abundant deposits of oil, natural gas, and helium — provide insights into the powerful connections between the environment and human prosperity.

The importance of Lake Meredith to the Texas Panhandle highlights the intimate link between water resources and quality of life for people, plants, and animals in the arid West.

The popularity of recreational activities at Lake Meredith National Recreation Area are testament to the importance of both relaxing and also invigorating recreation in maintaining a happy and productive life.

The creation and management of Lake Meredith affords an opportunity to explore the benefits and challenges of sustainable management of natural resources for the greater good.

Mesa Verde National Park

Set of Significance Statements

Mesa Verde is an example of human interaction with the environment over thousands of years. Mesa Verde represents a significant aspect in the history and heritage of 24 specific tribes, as well as visitors and employees who have also developed and maintained multi-generational ties to the park.

Mesa Verde represents a significant and living link between Puebloan Peoples' past and present ways of life that provide the world community an opportunity to understand and respect the diversity of human history. The cliff dwellings and pueblo structures allow visitors to experience the Ancestral Pueblo people as a living culture.

Mesa Verde is a significant natural resource preserve within a larger ecosystem — the Colorado Plateau, Four Corners Area. The high integrity of the park's dynamic biotic communities (including wildland fire and other processes), geologic features, water sources, natural soundscapes, clean air, and dark night skies, form the core of the local Mesa Verde ecosystem.

Mesa Verde National Park contains nationally significant historic resources including early park structures, landscapes, and design, which reflect the Civilian Conservation Corps, Homesteaders, the National Park Service, and American Indian experiences.

Pioneering archeological research of the concentrated and well-preserved Ancestral Pueblo and historic sites has advanced the field of Southwest archeology.

Grassroots concern about site destruction and artifact removal from Mesa Verde served as a catalyst for passage in 1906 of the Antiquities Act and the establishment of Mesa Verde National Park. Mesa Verde National Park's significance and worldwide value was recognized by its selection in 1978 as one of the eight original World Cultural Heritage Sites.

Mesa Verde National Park preserves the largest number of "cliff dwellings" in North America, including the largest cliff dwelling: Cliff Palace. These resources are also among the most accessible cliff dwellings on the continent. Cliff Palace is the Type Site for this type of archeological feature.

Set of Primary Interpretive Themes

The superlative character of the cultural resources of Mesa Verde, and the integrity of the natural setting in which they exist, prompt exploration of and reflection on the daily lives of the Ancestral Pueblo peoples, and how their cultures flourished in this region.

Mesa Verde is vitally important to many affiliated peoples who view the park's resources as critical to their religious beliefs, cultural identity, and sense of place in the world.

The diversity, context, and sheer volume of cultural and natural resources at Mesa Verde make the park an important center for studying how science and traditional cultural knowledge interact to help us learn about, and learn from, the past.

One of America's first national parks, and a World Cultural Heritage Site, Mesa Verde National Park is one of the best places to study the evolving ethics of resource conservation, preservation, interpretation, and stewardship.

National Museum of **African American History & Culture**

Mission Statement

The mission of the National Museum of African American History and Culture is to enhance civic life by increasing knowledge, understanding, and appreciation of African American history and culture.

Set of Purpose Statements

The purposes of the National Museum of African American History and Culture are to:

Foster appreciation of the complexity of the African American experience in the United States.

Explore the African Diaspora in the Americas and its impact on the world.

Explore the history of the United States as a slave nation and the continuing legacy of that heritage. (This legacy includes the impacts of racism, de jure and de facto segregation, the struggle for civil rights, the evolution of distinct African American cultures, cooperative economics, and the development of cultural practices and customs.)

Explore the impact of the African American experience in fulfilling the nation's continuing quest for freedom and justice.

Celebrate and examine African American history and culture.

Facilitate community organizations and individual identification, documentation, preservation, and interpretation of resources related to African American history and culture.

Communicate, collaborate, and cooperate with the community of African American museums and historical and cultural organizations.

Encourage communication, collaboration, and cooperation regarding African American heritage among American and worldwide historical and cultural institutions.

Actively and respectfully engage and involve those people and communities represented in, and served by, the museum.

Serve as a resource for public learning regarding African American history and culture.

Set of Primary Interpretive Themes

The social, political, and spiritual strengths brought to North America by enslaved persons from a wide variety of African societies enabled them to survive and adapt to the immense challenges of slavery, and create distinct African American cultures that continue to influence every aspect of American society.

The history of the United States as a slave nation from its inception, with substantial and direct connections between the institution of slavery and government, business, and society, created a persistent legacy of racism that impeded the realization of the American dream, and continues to challenge us today.

The African American struggle for full citizenship and equality directly and symbolically impacts the greater human quest for freedom and justice in the United States and around the world.

African American cultural expression across the full range of inventive, artistic, political/civic, spiritual, athletic, academic, and popular achievement profoundly influences American and global culture.

Since the arrival of Africans in America, African Americans have created vibrant communities based on family, extended kinship networks, church, and over time educational institutions, independent businesses, civic and government organizations, and voluntary associations — all of which demonstrate strength, resilience, and adaptation of the human spirit in the face of institutionalized oppression.

Olympic National Park

Set of Significance Statements

The Olympic Peninsula is an island-like ecosystem displaying all the ramifications of its isolation.

Olympic National Park is an important refugium for a great variety of plants and animals living within a dramatic climate gradient; many are unique to Olympic National Park.

Olympic National Park is one of the largest intact temperate forest ecosystems and one of the finest examples of temperate rain forest ecosystems in North America.

Olympic National Park has a large number of special-status species.

The extreme gradient of elevation, temperature, and precipitation from Olympic National Park's coastline to its mountain peaks has created a tremendous diversity of habitats and lifeforms that help us understand the diversity of the planet in a dramatically visible way.

Olympic National Park is an important place for process diversity — where complex systems can continue to function and interact.

Integrity of natural and cultural resources makes this place a great potential baseline for long term studies regarding dynamic natural processes.

Olympic National Park includes a great number of low-elevation glaciers and their associated terrains, accessible to a large metropolitan population.

Olympic National Park's resources are so outstanding that it has been internationally recognized as a world Heritage Site and Biosphere Reserve, attesting to its importance to all humankind as a benchmark for monitoring environmental change.

Olympic National Park is one of the largest unimpaired wildernesses in the National Park System in the contiguous United States: 95% of the park (825,000 acres) is wilderness. This relatively accessible, unimpaired, federally-designated wilderness (including mountains, forest, and seacoast) provides opportunities for people to connect with nature, and find solitude, inspiration, and renewal.

The park includes one of the longest strips of coastal wilderness in the 48 states.

The integrity of park resources provides outstanding opportunities for long-term research.

The quality, diversity, and magnitude of Olympic National Park's resources powerfully affect the human spirit, inspiring awe, wonder, majesty, and reverence.

Olympic National Park's diverse and complex ecosystems provides an internationally recognized living laboratory for scientists, educators, and visitors to learn, study, experiment, and discover.

Olympic National Park protects one of the largest intact sets of river systems in the 48 states. This is important for the perpetuation of anadromous fish and many other freshwater and terrestrial resources.

Olympic National Park has high-quality airshed and watershed — it has some of the cleanest air in the world. The park is a Class I airshed.

Olympic National Park supports the largest protected Roosevelt Elk population in the world.

The old growth temperate rain forest of Olympic National Park is an excellent examples of this endangered ecosystem.

Rescued from complete elimination from the American landscape Olympic National Park protects the last examples of old growth forest on such a scale as to provide visitors with a glimpse of the past into a forest world of remarkable dimensions, inhabited by a great variety of rare and unique creatures.

Olympic National Park preserves the core of a larger ecosystem and, as such, protects and sustains resources, cycles, and processes that enrich life far beyond park boundaries; yet the park is not an island whose values can be perpetuated without the stewardship of us all.

Olympic National Park is one of the last, best homes of the great migrating populations of anadromous fish that fueled an unprecedented array of human cultures over millennia. These populations of keystone species continue to nourish the health of human cultures, and aquatic and terrestrial ecosystems, throughout the Pacific Northwest.

Thousand of years of geographic isolation, along with extreme gradients of elevation and precipitation, have fostered an assemblage of plants and animals unique in the world, providing outstanding opportunities for research, discovery, and inspiration.

The park includes the traditional lands of eight American Indian tribes that have experienced little treaty dislocation and retain their ongoing connection between community and land.

The Olympic Peninsula was one of the last areas explored by Euro-Americans in the 48 states. This connects to the history of discovery, exploration, and homesteading in the Pacific Northwest.

Visible to much of the rapidly growing metropolitan population around Puget Sound, Olympic National Park is a daily reminder of the relevance of the national park idea in our increasingly crowded society.

Olympic National Park documents the continuing evolution of the preservation ethic in the United States, exemplified by current management issues in the national park such as habitat restoration, dam removal, goat removal, wolf reintroduction.

Set of Primary Interpretive Themes

The unique assemblage of plants, animals, and habitats in Olympic National Park exists as a result of geographic isolation of the peninsula through the millenia, and is internationally recognized as valuable to all peoples.

The integrity, diversity, and magnitude of Olympic National Park's relatively unimpaired wilderness ecosystems powerfully affect the human spirit — providing outstanding opportunities for exploration, research, introspection, and inspiration.

The Olympic Peninsula's rich cultural history reveals a dynamic interaction of people, place, and values — illustrating the ongoing struggle to balance diverse resource uses and their consequences.

Padre Island National Seashore

Set of Significance Statements

Padre Island National Seashore is the largest section of undeveloped barrier island in the world, protecting rare coastal prairie; a complex, dynamic dune system; and the Laguna Madre, a hypersaline lagoon environment.

The location of the island, ocean dynamics, biotic diversity and integrity, lack of development, and easy access make Padre Island an ideal place to study natural communities and species associated with barrier islands.

Padre Island National Seashore provides important habitat for marine and terrestrial plants and animals, including a number of rare, threatened, and endangered species.

There are seven species of sea turtles in the world, all of which are threatened and three of which are listed as critically endangered in the IUCN Red Book. Padre Island National Seashore is the only area on the Texas coast where nests from all five species of sea turtles that occur in the Gulf of Mexico have been documented. More Kemps Ridley sea turtle nests have been found at the National Seashore than anywhere else in the United States. The Gulf of Mexico, Laguna Madre, and the Mansfield Channel provide important habitat for these five species of sea turtles.

Situated along the Central Flyway, Padre Island is a globally important area for over 350 migratory, overwintering, and resident bird species.

With the longest stretch of undeveloped barrier island beach in the world, Padre Island National Seashore provides rare opportunities for beach recreation in an environment of isolation and solitude.

Padre Island National Seashore offers outstanding recreational fishing opportunities in the Laguna Madre and Gulf of Mexico.

Bird Island Basin in the Laguna Madre is internationally recognized as one of the premier windsurfing areas in the world.

The integrity of Padre Island National Seashore as a cultural landscape documents a continuum of human habitation from more than 2,500 years ago to today in a continually changing barrier island landscape that itself is only about 5,000 years old. Some of the richest and best-documented archival resources regarding Spanish exploration of North America document the history of the area that is now Padre Island National Seashore. Padre Island National Seashore includes important archeological resources relating to the era of early Spanish exploration — including three shipwrecks dating to 1554. The Novillo line camp and associated historic resources of Padre Island National Seashore include the last remaining structures relating to barrier island open-range cattle ranching in the United States.

Set of Primary Interpretive Themes

The unique combination of environments and conditions at Padre Island National Seashore (the largest section of undeveloped barrier island in the world; its location and associated ocean dynamics; rare coastal prairie; a complex, dynamic dune system; a hypersaline lagoon; high biotic diversity and integrity; etc.) provides rare opportunities to understand the complex and critical processes and interactions that sustain the living world.

The human history of Padre Island offers insights into the continuing evolution of human interaction with the rich, dynamic, and challenging resources of complex and fragile barrier island environments, providing opportunities to understand and appreciate the range of consequences, both personal and societal, of making choices in today's world.

The diversity and high quality of environments at Padre Island National Seashore offer a wide range of enjoyable activities including: carefree recreation in inspiring, undeveloped coastal settings; challenging opportunities for learning and study regarding rich and diverse cultural and natural resources; and active participation in preserving habitats and saving endangered species.

Petroglyph National Monument

Set of Significance Statements

Petroglyph National Monument contains one of the largest concentrations of petroglyphs in North America and represents an extensive record of peoples for whom we have few written records.

The monument has outstanding research potential because the petroglyphs are numerous, have retained their integrity, are an outstanding example of Rio Grande style, and are close to other associated archaeological resources.

Places in the monument have traditional and cultural importance to Southwestern American Indians and Atrisco Land Grant heirs.

The largely unexcavated Piedras Marcadas Pueblo ruin is one of the largest pueblos of its time period in the Rio Grande valley.

The monument's natural and cultural landscape (escarpment, volcanic cones, and surrounding open space) and long vistas are major elements that define Albuquerque's western horizon and provide opportunities to experience contrasts with a growing urban environment.

The geologic resources of Petroglyph National Monument (tectonic rifts, cinder cones and lava flows, and dramatic erosional features) facilitates both an understanding of the formation of the Rio Grande Rift and how natural landmarks have been recognized by and influenced a number of cultures.

Because of the historical significance of the land base in the proximity of a major urban area, Petroglyph National Monument provides a unique opportunity to interpret the divergent and convergent historical events and cultural viewpoints of the Puebloans and Europeans (Spanish) that led to conflict and resolution.

Set of Primary Interpretive Themes

The rich concentration of petroglyphs and the associated cultural landscape at Petroglyph National Monument, recognized as important by the native peoples of the mid Rio Grande Valley and others, offer opportunities to contemplate the meaning of cultural continuity in our world of accelerating change.

This geologically active area, formed by rifting, volcanism, and erosional forces including the Rio Grande and its tributaries, has attracted people for thousands of years and powerfully influenced their lifeways, traditions, and beliefs — exemplifying how landscapes shape and influence human societies.

The symbols connected to this place — petroglyphs, land grant deeds, Christian crosses, livestock brands, and inscriptions — provide opportunities to explore the ownership, control, and use of land, resources, identity, and ideas in the ongoing history of the American Southwest.

The continuity of the Atrisco Land Grant from 1692 to the present provides an opportunity to understand 300 years of land grant ownership in the face of an ever-changing urban landscape and continued use by the heirs of the original Spanish settlers.

Rocky Mountain National Park

Set of Significance Statements

Rocky Mountain National Park's resources possess unusually high quality and integrity.

Natural processes here operate to create an environment of outstanding scenic beauty where the ecosystems of the southern Rocky Mountains exist in unusually close proximity to one another.

Rocky Mountain National Park's vast expanse of spectacular mountain terrain at the crest of the continent beckons to people from around the world.

This scenic landscape has a long history of providing human populations along the Front Range of the Rocky Mountains with intimate wilderness experiences.

Set of Primary Interpretive Themes

Natural systems and processes operate here to create an environment of great scenic beauty and diverse flora and fauna providing outstanding opportunities for recreation, learning, and spiritual renewal.

Rocky Mountain National Park's spectacular mountain wilderness at the crest of the continent beckons to people from around the world and creates a sense of connection, memory, and affection that can strengthen the ethic of stewardship.

Rocky Mountain National Park serves as a biological benchmark of international significance aiding understanding of the interconnectedness of the Earth's resources and the importance of national parks as outdoor laboratories where the health of the planet can be assessed.

Human use of this land has evolved over time from an economy based on resource extraction to an economy based on tourism and recreation, presenting us with the continuing challenge of balancing human use with resource preservation.

The area that is now Rocky Mountain National Park was home to Indian peoples for thousands of years and, though they were removed to reservations, it continues to be a sacred place for Uintah and Ouray Ute and Northern Arapahoe peoples and is still important to their sense of cultural identity.

Additional Communication Responsibilities of Interpretation

Visitors to Rocky Mountain National Park will better enjoy their visit if we can help them become oriented to the park in ways that enhance their visit. The National Park Service is interested in reducing the number of accidents in national parks by providing visitors with up-to-date outdoor safety and appropriate wilderness use information.

As the United States' primary preservation organization, the National Park Service is responsible for providing for the protection, use, and enjoyment of those natural, scenic, and cultural resources that most clearly define our national character. The history of the National Park System and the mission of the National Park Service are important aspects of the interpretation & education program of national parks.

San Antonio Missions National Historical Park

Set of Significance Statements

San Antonio Missions National Historical Park contains the nation's most concentrated and diverse collection of Spanish colonial mission resources that document Spain's mission-centered colonial strategy in the European contest for the Americas:

- The mission served as a vocational education center, instructing Indian converts so that they would have a livelihood within Spanish frontier society.
- The mission served as an economic center, focusing on the contributions of its farmlands, ranches, and tradesmen to further Spain's development of the region.
- The mission served as a religious center designed to spread the tenets of the Roman Catholicism.
- The mission served as a defensive center, protecting Spain's interests in the Colonial Spanish Empire.

San Antonio Missions National Historical Park documents how culture and environment dictated the development, construction, and use of mission structures during the Spanish Colonial period and afterwards.

San Antonio Missions National Historical Park manages and protects critical components of the San Antonio River corridor — a key complex of natural and cultural resources and systems in south-central Texas.

Set of Primary Interpretive Themes

The Spanish throne utilized the powers and resources of church and state to expand its empire and out-compete its rivals in the European contest for the Americas by establishing missions with the objectives of religious conversion and acculturation of indigenous people.

While the more far-flung settlements to the north and east failed, the characteristics of the San Antonio River and a concentration of native peoples responsive to the benefits of the mission system enabled the San Antonio Missions to become a self-sustaining outpost on the frontier of New Spain

The San Antonio missions system accelerated the encounter, adaptation, and assimilation of cultures that created a dynamic, complex, and diverse community that continues to evolve today.

Tumacácori National Historical Park

Set of Significance Statements

Tumacácori National Historical Park represents a continuum of rich traditions and cultures influenced by mission life.

Tumacácori National Historical Park illustrates how many diverse groups interacted over time and continue to interact today.

The area's rare riparian resources sustained and influenced native ways of life and were factors in the mission system taking root here.

The missions of Tumacácori National Historical Park exemplify the work of Father Kino, other Jesuits, and Franciscan missionaries.

All three sites contain substantial original fabric — both visible and below the surface.

Guevavi is the first Jesuit cabacera in Arizona.

Set of Primary Interpretive Themes

The presence of water (reliable springs and intermittent streams) in arable valleys in the harsh Sonoran Desert set the stage for human survival: initial habitation, the missions that followed, and the communities that exist today.

Traditions and cultures of those who lived here — their conflicts and cooperative actions and the enduring common qualities of humanity are evident.

Tumacácori National Historical Park provides opportunities to personally discover and experience today's rich regional culture, which is a result of the interaction of many different cultures over time.

Tumacácori National Historical Park evokes strong memories and associations for those with historical or ancestral ties to the missions, community, and/or region.

Washita Battlefield National Historic Site

Set of Significance Statements

The attack at Washita was the first implementation of a strategic policy adopted by the U.S. Army to strike encampments of Plains Indians in winter when they were most vulnerable.

The attack at Washita was a milestone in the struggle of the Great Plains tribes to maintain the freedom of their traditional lifeways.

The attack at Washita greatly impacted two prominent individuals: Chief Black Kettle, widely known for his pursuit of peaceful co-existence with whites, lost his life; Lt. Col. George Custer, already known for his exploits during the Civil War, gained a reputation as an aggressive Indian fighter.

Washita has special significance for the Cheyenne people who regard the site as hallowed ground because of what transpired there.

The cultural landscape of the Washita site possesses a high degree of integrity.

The attacks at Sand Creek, Washita, and Little Bighorn document the escalation of hostilities between whites and Plains Indians resulting from the failures of the treaty system.

Set of Primary Interpretive Themes

The attack at Washita was a clash between two cultures whose beliefs were so different and incompatible that violent conflict was inevitable.

The attack at Washita was the first implementation of a strategic decision by the U.S. Army, who had been unsuccessful in engaging Indian combatants, to launch a "total war" campaign against the Southern Plains Indians by striking winter encampments when Indian communities were most vulnerable.

The attack at Washita was controversial at the time it occurred and remains controversial today: the United States military and many civilians hailed it as a victory in the struggle to reduce Indian raids on frontier settlements; Indians and many whites labeled the attack a massacre — unprovoked and unjust.

Chief Black Kettle's life was filled with irony: he was a major proponent for peace, signing three treaties between 1861 and 1867, yet he was attacked twice, at Sand Creek and Washita.

General Philip Sheridan felt that Lt. Col. George Custer's aggressiveness was key to the successful implementation of the Army's new strategy against the tribes of the Southern Plains; Custer's victory catapulted him into the public imagination as a great Indian fighter and, ironically, encouraged the headstrong behavior that led to his demise at Little Bighorn.

The attack at Washita and the resulting death of Chief Black Kettle were pivotal events in the evolving relationships between the Cheyenne people, white settlers, and the U.S. government.

The hallowed ground of Washita provides opportunities to understand the resiliency of the human spirit and the struggle of societies to maintain cultural identity.

Essential Tools for Interpreters

Interp Guide

The Philosophy and Practice of Connecting People to Heritage

This guide compellingly defines the profession of interpretation within the context of contemporary culture. It explores how cutting-edge interpretive philosophy and practice can help interpreters and managers provide services that accomplish the mission of interpretation: *Providing enhanced opportunities for visitors to explore their own intellectual and emotional connections to the natural and cultural resources that comprise shared heritage.* If you are a front-line interpreter, interpretive supervisor, or manager of heritage resources, this guide was written with you in mind. *January 2005 edition.*

CIP Guide

A Guide to Comprehensive Interpretive Planning

This guide describes how planners of the Office of Interpretation and Education, Intermountain Region (IMR), National Park Service approach comprehensively planning a park's interpretation & education program. It provides many insights into the planning process and is useful for anyone intending to conduct, or participate in, planning for interpretation. It also contains the detailed scripts used by IMR interpretation planners to organize and conduct comprehensive interpretive planning workshops, and contains other elements that are important to the process. These include a scope of work template, a project initiation checklist, a stakeholder invitation letter, sign-in sheets, agendas, workshop handouts, and more than 30 sets of significance statements and primary interpretive themes from a variety of parks. *February 2005 edition.*

Associated Electronic Templates. *CIP Guide* references four stand-alone electronic templates that are designed in Microsoft Word® XP format. These templates are available upon request and include the following files:

- Archive of the Comprehensive Interpretive Planning Process
- Foundational Information for Use Between Workshops
- CIP Component 1: Long-Range Interpretive Plan
- CIP Component 3: Interpretive Database

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Please direct inquiries and comments to the authors:

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CIP Guide

Great Trinity Forest Management Plan

RECREATION

Interp Guide

The Philosophy and Practive of Connecting People to Heritage

Interp Guide

The Philosophy and Practice of Connecting People to Heritage

Essential Tools for Interpreters
Office of Interpretation and Education, Intermountain Region

Welcome

We wrote this publication for interpretation professionals — front-line interpreters, supervisory interpreters, and managers of heritage resources.

This publication offers guidance that is applicable to the entire array of public and private organizations that provide natural and cultural heritage interpretation. These organizations include, but are not limited to, national, state, and local parks, monuments, historic sites, forests, preserves, nature centers, zoological gardens, aquaria, museums, and other places that interpret heritage resources. (*Park* is used throughout this guide to generically refer to any of these entities.)

This guide speaks to interpretation at your site. We relate interpretive philosophy to real issues that arise daily in the performance of interpretive work. We explore how cutting-edge interpretive philosophy and practice can help interpreters and managers provide interpretive services that accomplish the mission of interpretation: *providing enhanced opportunities for visitors to explore their own intellectual and emotional connections to the natural and cultural resources that comprise shared heritage.*

This guide describes what heritage resources are and why people care about them, and care for them. It describes professional interpretation and its role in enhancing visitor understanding and enjoyment of heritage resources. It explores why scholarship must be made relevant to diverse audiences to achieve the mission of interpretation, and how this can be accomplished.

It serves to deepen the reader's understanding of the National Park Service Interpretive Development Program and its application to daily interpretive operations.

Within this publication, we have included excerpts from a variety of other sources. We've designed this guide to express ideas derived from others while clearly attributing the original authors. We hope you find this formatting easy to follow and useful.

One category of these excerpts is dictionary definitions. We use standard definitions[1] to establish a common base of understanding from which we can all springboard together into more complex issues and nuance. Here's an example:

> **her•i•tage** \ **2 a** : something transmitted by or acquired from a predecessor : INHERITANCE, LEGACY **b** : TRADITION **3** : BIRTHRIGHT

A second category of excerpts includes the work of historians, scientists, and others who are experts within their disciplines. These excerpts are also treated with special formatting:

> We've used a light, vertical rule and indented text — as indicated by this paragraph's formatting — to indicate these excerpted sections. We've also included footnotes so that the reader can review the original works and read them within their fuller context.

Regarding footnotes that include Internet addresses: All of the links herein were working as of the date this guide was published. However, as these are external links beyond our control, there are no guarantees that they will still be operational at the time you attempt to access them.

We intend to update this publication periodically and would greatly appreciate your feedback regarding how to improve this guide's interpretive approach and content. Contact information is located inside the back cover, where you'll also find information about related publications in the *Essential Tools for Interpreters* series.

We dedicate this work to all of you whose interpretive energy and enthusiasm continues to enrich the lives of countless others.

Richard Kohen & Kim Sikoryak
Lakewood, Colorado
January 2005 ••

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[1] Note: Definitions are excerpted from the following source unless indicated otherwise: *Webster's Third New International Dictionary, Unabridged*, 1971.

Contents

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Heritage Resources

What are Heritage Resources?

her•i•tage \ **2 a** : something transmitted by or acquired from a predecessor : INHERITANCE, LEGACY **b :** TRADITION **3 :** BIRTHRIGHT

"You mean they took off from *that track*?" Steven asked, pointing.

"That's *weird*," said his five-year-old sister, Laura.

"Uh-huh. Planes at that time didn't have landing gear with wheels — and there were no airports, no runways. That long rail *was* the runway," Dad explained to wide eyes.

"I want to see the picture again," Laura said. Dad kneeled down and unfolded the brochure.

"It looks like a kite with propellers," Steven described. "It says they flew 852 feet in 59 seconds."

Dad glanced over at Mom. She was still taking in the scene, watching the birds chase breakfast insects across the warm sand. The morning's breeze remained steady. The sun was bright. Who'd have thought that Wright Brothers National Memorial was such a cool place? This was definitely going to be a great summer vacation. And it had just begun.

People, places, events, and things can move us. They awaken the imagination and speak to our wonderment. They stir us and quiet us, affecting us spiritually, emotionally, intellectually, and physically. They play a part in some of the most powerful and profound experiences of our lives.

As individuals, we assign power and honor, importance and significance to certain people, places, events, and things that are meaningful to us. As a society, we do the same. The people, places, events, and things with which we have some common connection, that possess significance to us communally — these are heritage resources.

Their greatest value is calculated not in dollars, but in importance: Heritage resources are among the best touchstones for exploring our personal and national identity and character. They rejuvenate our spirits, challenge and strengthen our beliefs, and provoke contemplation and discussion of our past, present, and future. They move us to become better stewards of each other and the world around us.

Perpetuating Heritage Opportunities

Organizations that interpret natural and cultural heritage provide a network of opportunities to explore self, society, and the world in which we live. They offer opportunities at local, state, regional, national, and international levels of importance. Parks, monuments, historic sites, forests, preserves, nature centers, zoos, aquaria, museums, and other places that interpret heritage resources do so because the resources they manage are inherently valuable to society.

Heritage preservation encompasses the activities that ensure perpetual access to these important resources, from generation to generation. Remembrances of people, places, events, and things are preserved as continuing links to our collective past. And natural systems and processes, plants, animals, and landscapes are also preserved as critical components of the world in which we live. Society assigns value to the assurance that substantially similar opportunities to experience heritage resources as we do today will be available for our descendants. The overarching reason for heritage preservation is to provide opportunities for people to enrich their lives and broaden their experience — to enjoy a more fulfilling existence.

Addressing this idea as it applies to America's national system of parks, and the government agency entrusted to administer it, the following recommendation was recently made.

The National Park Service has a twenty-first century responsibility of great importance. It is to proclaim anew the meaning and value of parks, conservation, and recreation; to expand the learning and research occurring in parks and share that knowledge broadly; and to encourage all Americans to experience these special places. As a people, our quality of life — our very health and well-being — depends in the most basic way on the protection of nature, the accessibility of open space and recreation opportunities, and the preservation of landmarks that illustrate our historic continuity. By caring for the parks and conveying the park ethic, we care for ourselves and act on behalf of the future. The larger purpose of this mission is to build a citizenry that is committed to conserving its heritage and its home on earth.[2] ••

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[2] ***Rethinking the National Parks for the 21st Century*** — *Conclusion;* The National Park System Advisory Board; http://www.nps.gov/policy/futurereport.htm (July 2001).

Interpretation Enhances Enjoyment of Heritage Resources

Interpretation

in·ter·pret \\ **1** : to explain or tell the meaning of : translate into intelligible or familiar language or terms : EXPOUND, ELUCIDATE, TRANSLATE **2** : to understand and appreciate in the light of individual belief, judgment, interest, or circumstance : CONSTRUE

in·ter·pre·ta·tion \\ **1** : the act or result of interpreting: as **a** : explanation of what is not immediately plain or explicit **b** : translation from one language into another **c** : explanation of actions, events, or statements by pointing out or suggesting inner relationships or motives or by relating particulars to general principles

"Wow. Look at those colors," she said as they soaked up the sun's last rays.

"Hmmm," he said, gesturing skyward. "And the pink edge on that cloud — it was gold a minute ago."

For just a moment, then, the sun seemed to widen before it disappeared beneath the canyon rim's silhouette. The couple's gaze returned to the turkey vultures quietly soaring over the forest-topped cliffs. She noticed the chilling of the air, and pulled her hat further down over her ears. The waning autumn dusk continued unabated as they walked back to their rental car on noisy, brittle leaves, a warm dinner on their minds.

Did these park visitors need any external assistance for them to be able to meaningfully experience some of the park's spectacular natural resources? In some ways, the answer is *no*. They required no assistance to enjoy watching the sun set in such a majestic landscape. Perhaps this is a universally experienced aesthetic, touching something fundamental within all of us. People the world over are attracted to transitions — such as a sunset. In this sense, no external assistance was needed for this couple to derive meaning from their experience of sharing the transition from day to dusk in a special place.

In other ways, the answer to the question is *yes* — assistance enhanced their experience. These visitors planned their trip using materials sent to them before their visit. They surfed the park's Website. They used a map to arrive at this location, or could have asked for and been provided with driving directions to the best west-facing overlook. They read about the geographic place names of the landscape, and by learning the name of that peak on the left, derived an even greater pleasure from their sunset-watching experience.

This *Wow!* experience may only satisfy them for a few minutes, followed by an inevitable growth in curiosity. How old is that fire scar on the hillside? Why do those trees only grow on the north side of the canyon? Why does that butte have three different names? How was this marvelous landscape formed?

Seeking answers and explanations, they may turn to read a wayside exhibit panel at the overlook. In the waning light, the text and graphic elements of the wayside exhibit prompt them to consider the canyon's rock strata visible from here, and a host of ideas about how and when those geologic layers were created. The couple engages an interpretive service that has been located in this spot for this exact purpose: The wayside exhibit was designed to answer typical visitor questions as they view the landscape from this special vantage point.

Their visit might also be enhanced by interpretive influences that aren't always immediately apparent. The idea of enhancing visitor enjoyment of natural resources played a role in park management deciding that there would be a road along the canyon rim, and that it would be curvy with low speed limits to provide ample time for visitors to contemplate the landscape. Interpretive philosophy played a role in deciding to include road pullouts and their locations. It played a role in the decision to place wayside exhibits in some of the pullouts, and played a role in deciding to *not* place them in other pullouts. Interpretation played a role in deciding what content to include in each exhibit. It played a role in managers deciding that the park should close one hour *after* sunset, allowing for sunset experiences like those had by this couple. All of these decisions are predicated on enhancing the experiences that occur here — opportunities for people to create their own meaningful connections with heritage resources. Interpretive philosophy plays important roles in many such aspects of park decision-making.

The Profession of Interpretation

pro•fess•sion \ **4 a :** a calling requiring specialized
knowledge and often long and intensive preparation including
instruction in skills and methods as well as in the scientific,
historical, or scholarly principles underlying such skills and
methods, maintaining by force of organization or concerted
opinion high standards of achievement and conduct, and
committing its members to continued study and to a kind of
work which has for its prime purpose the rendering of a public
service

For the situations described above and all others like them,
interpretation is the profession that offers enhanced
opportunities for visitors to explore their own intellectual and
emotional connections to the natural and cultural resources
that comprise shared heritage. This is the mission of
interpretation. This is the desired outcome. This is the goal.
This is what it's all about. This is why the profession exists.

Interpretation is a profession. It adheres to an organized
body of standards, best practices, traditions, skills and
competencies, and ethics. Interpretation provides critical
planning insight, context, and content that is vital to
enhancing interaction between visitors and resources at all
levels of planning.

Interpretation is conducted by interpreters, educators,
rangers, visitor use assistants, volunteers, docents, and others
that carry out the functions of a park's interpretation &
education program.

Interpretation Invites Introspection

Interpretation is predicated on the values of preserving and
interpreting natural and cultural heritage for the purpose of
public enrichment. The intent of all interpretive services is to
enhance opportunities for people to personally and
meaningfully connect with heritage resources. In the
exchange of ideas, people have an opportunity to grow and
become more than they are.

Interpretation encourages the individual to make up his or
her own mind about park resources. Interpreters facilitate
informed introspection. Visitors are encouraged to weigh one
perspective against another, one experience against another,
layer upon layer. *They* consider the advantages of one choice
over another, one behavior over another. *They* compare
potential actions and short- and long-term ramifications of
those actions. Visitors weigh the relative values of each, and
decide for themselves what meanings are personally relevant
to them. Such facilitation strengthens individuals and, by
extension, society. Through this kind of spiritual, emotional,
intellectual, and physical exploration of heritage resources,
lives are enriched, both in this generation and beyond.

Visitor Behavior and Resource Protection

Although the profession of interpretation values visitors'
opinions, and values visitors coming to their own conclusions
about what resources mean, interpretation must sometimes
counter the behavior that stems from visitor opinions in order
to protect resources from undue impairment. If a visitor wants
to walk off trail despite signs that say "Please stay on trail," or

if a visitor wants to climb on the ancient wall, or sit in that
historic chair roped off in the corner, or pick the pretty flower,
interpretation plays an important role in curbing such
behavior. This occurs not only in structured interpretive
services, but also as interpreters rove the park and intervene as
these kinds of incidents unfold in front of them. Helping
visitors understand *why* such regulations as "Please stay on
trail" exist can go a long way in modifying in-park behaviors
that work against the preservation of important heritage
resources. "Others should have the opportunity to enjoy that
flower, too." Interpreters help visitors see that it is selfish for
them to enjoy a resource in a way that reduces its integrity to
a degree that denies that same opportunity to others. First and
foremost for the interpreter is the necessity to preserve
heritage resources so that *all* people are able to enjoy
meaningful experiences with them.

Interpretation or Information?

in•for•ma•tion \ **2 :** something received or obtained through
informing: as **a :** knowledge communicated by others or
obtained from investigation, study, or instruction

Informational services are distinctly different from
interpretive services, but are critical components of an
interpreter's duties. It is commonly understood that when
someone refers to a park's interpretation & education
program, such a reference includes both interpretive services
and informational services.

Informational services involve the dissemination of facts
with little analysis or value-connected investigation. For
instance, orientation or way finding (directing a visitor to a
specific area of the park) or providing safety information
(Watch out for snakes!) are simple examples of informational
communication. The desired outcome of this communication
is to inform visitors regarding guidelines for a safe visit and
avoiding negative impacts on resources, as well as
familiarizing visitors with choices and opportunities available
during their visit. "The best overlook for that cliff dwelling is
Juniper Point."

*Note: Please see the chapter "Overview of a Park's Interpretation &
Education Program" for more information on this subject.*

Interpretation or Advocacy?

ad•vo•cate \ **2 :** one that argues for, defends, maintains, or
recommends a cause or proposal

Advocacy is distinctly different from interpretation. Unlike
interpretation, the motive of advocacy is to bring about or
cause a specific course of action to be taken, or conclusion to
be arrived at by visitors. Advocacy seeks to sway the opinions
of visitors.

For example, an interpreter stationed at a frontier fort who
fails to tell visitors about the United States government's role
in various treaties will probably find himself or herself telling
only part of the story, and in so doing, advocating one

perspective of the fort's history (such as that of the U.S. Army) over another (such as that of various American Indian nations and tribes).

An interpreter-turned-advocate takes unethical advantage of his or her position and aligns himself or herself with one idea or policy over another. This betrayal of public trust as an impartial servant and/or member of the profession of interpretation (by the nature of the position) should not be mistaken for professional interpretation.

Interpretation or Debate?

> **de•bate** \ **2 a :** a contention by means of words or arguments : strife in argument : CONTROVERSY; *specif* : the formal discussion, argumentation, and resolution of a motion before a legislative assembly or other public deliberative body according to the rules of parliamentary procedure **3 b** (1) : a regulated discussion of a proposition between two matched sides as a test of forensic ability (2) : a course of study of the methods and techniques of such discussion often taught in schools and colleges

Debating is distinctly different from interpretation. In forensic debate, there are two sides. Each side attempts to prove (to an audience) the validity of their position while invalidating the position of the other side. The desired outcome of debaters is for their side in the argument to *win*, to be judged correct, to be considered more valid, and for the other side to *lose*.

To accomplish this goal, debaters craft communication strategies aimed at bolstering their own arguments and discrediting the arguments of the opposition. They craft *messages* tailored to this end. They *make points*. They use information that helps their *case* while consciously choosing to lead audiences away from information that may negatively impact their case.

Professional interpretation does none of these things. Instead, it exemplifies the complexity of real life and is, therefore, multi-faceted rather than two-sided. Interpretation acknowledges multiple perspectives — the idea that there are often more than two valid ideas or meanings associated with a particular resource. All of these ideas, as long as they have sound, scholarly support, deserve to be presented to and explored by the public. (This does not imply equal time, but does imply equal accessibility and inclusion.)

Interpretation does not *make points* or *convey messages* to achieve a predetermined outcome of winning, or even of persuading. If it did this, interpretation would essentially be attempting to drive the round peg of *our message* into the square hole of the public's brain. No matter how hard this is tried, the reality is that the sender of communication cannot dictate or guarantee how it will be received, or what actions may follow its reception. (Even if it could be done, this would no longer be interpretation; it would be brainwashing.) Interpretation, and assignment of personal meaning, can only occur within the receiver, by the receiver. While it is certainly true that some visitors will find elements of a given

interpretive service to be persuasive (for them), this is very different from the interpreter *intending* to persuade the visitor to change his or her mind to match the interpreter's agenda.

Interpretation or Lobbying?

> **lob•by** \ **1 :** to conduct activities (as engaging in personal contacts or the dissemination of information) with the objective of influencing public officials and esp. members of a legislative body with regard to legislation and other policy decisions

Lobbying is distinctly different from interpretation. Lobbying seeks to affect change through political support or opposition. While some organizations are free to engage in lobbying and, in fact, properly include this in their mission, it should be clearly recognized that lobbying activities are distinctly different from interpretive activities — which seek to promote a safe environment for exploring meanings.

Lobbying has specific import for employees of the federal government. Within the federal government, interpreters and all other civil servants are barred from engaging in lobbying while on duty; federal law prohibits the use of appropriated funds to lobby Congress.

Interpretation or Public Relations?

> **public relations** \ **1 :** the promotion of rapport and goodwill between a person, firm, or institution and other persons, special publics, or the community at large through the distribution of interpretive material, the development of neighborly interchange, and the assessment of public reaction **3 a :** the art or science of developing reciprocal understanding and goodwill

Public relations work is distinctly different from interpretation. Public relations, public affairs, and public information are functions that are based on direction provided by a managerial hierarchy. The manager intends to establish goodwill among stakeholders of the site's resources. The manager intends the public to better understand why the organization conducts its mission as it does, the complexity of specific issues, and the steps being considered to address them.

Both public relations and interpretation are efforts to inform the citizenry, providing information needed by the public to arrive at informed opinions about resource management. However, public relations work focuses on management's agenda rather than on unfettered explorations of resource-related ideas. While both interpretation and public relations help citizens arrive at their own informed decisions, the rationale and guidelines directing public relations work are significantly different from those of the profession of interpretation.

Interpretation or Instruction?

in•struct \ **1** : to give special knowledge or information to: as **a** : to train in some special field : give skill or knowledge in some art or field of specialization : educate in respect to a particular subject or area of knowledge **b** : to provide with information about something : APPRISE

Instruction, teaching, and classroom education are distinctly different from interpretation. Providing instruction, and lecturing, teaching, and educating, are all curriculum-based endeavors that are designed to achieve the spirit and intent of the curriculum being taught.

Although all learning, including interpretation, has similar elements — such as the necessity to analyze, consider, and conclude, and using values in making judgments — interpretation is not based on presenting a curriculum that is designed *to be learned*. Instead, interpretation relies on the history of an individual visitor's experiences, in conjunction with their contemporary experiences with heritage resources, to provoke visitors to consider a broad range of ideas and perspectives about the resources, and to arrive at their own conclusions about them. Interpretation is not academically driven. However, the most effective learning and educational experiences often result from applying an interpretive approach to the presentation of a curriculum. A park's interpretation & education program distinguishes between interpretive and curriculum-based services on the basis of these differences as well as the different planning and logistical considerations that they require.

Recreational Demonstrations

Another kind of instruction — one that is usually *not* curriculum-based — is the demonstration of recreational activities and skills (such as snowshoeing, fishing, and backpacking). When simple technical instruction is the central intent of such a service, the service is not designed to be interpretive — it is instructional in nature. When the instruction provides a framework within which interpretive opportunities are intended to be provided, the service *is* interpretive. ••

Planning a Park's
Interpretation & Education Program

Context for Planning a Park's Interpretation & Education Program

A park's interpretation & education program exists within a context much larger than the park itself. The contextual framework within which a park's interpretation & education program plans and operates might be diagrammed like this:

Profession of Interpretation
Nation's Constitution and Civil Law
Interpreting Organization
THE PARK
Foundational Information for Planning and Management
Management Planning
Program Planning
Implementation Planning
Individual Service Planning
Planning Tasks for Specific Presentations of an Interpretive or Informational Service

Profession of Interpretation
The profession of interpretation is larger than any single organization, including any country or its government. It is characterized by its mission, ethics, standards, and practices. The interpretation & education program of any organization that interprets heritage resources is — in large measure — conducted within the context established by the profession at large. This is not to imply that interpretation is above the law — it just has standards and practices that extend beyond political boundaries.

Nation's Constitution and Civil Law
In practice, the profession is influenced by the majority worldview of any society in which it is conducted. A nation's constitution, along with the body of laws that flow from it,

embody its collective ideals and philosophy, and the pragmatic application of them. These things form the actual context within which interpretation operates. For instance, in the United States, the First Amendment to the Constitution provides guarantees that enable candid public discussions of ideas without fear of government reprisal — guarantees that also enable candid exchanges regarding resource meanings and their management.

Interpreting Organization
The interpretation function of an organization that manages heritage resources flows from the combination of the profession of interpretation at large, extant social architecture, and the organization's mission, policies, procedures, and traditions. For instance, the National Park Service is an interpreting organization.

The Park
Management activities of the park occur under the umbrella of the interpreting organization. The interpretation function of the park is directed by the park's mission, mandates, legislation, types of resources, their locations, and more.

Foundational Information for Planning and Management
All park planning stands upon the park's critical, foundational information. Against it, all park decisions will be measured. This information includes the park's purpose, significance, fundamental resources and values, primary interpretive themes, mission, and mission goals. This information is developed with input from stakeholders and staff from each of the park's programs. Interpreters, by virtue of the work they do, are especially well-versed in discussing heritage resources with others and helping the workgroup arrive at consensus content for this critical park foundation.

Management Planning
Based on the foundational information for planning and management, the park's management plan defines the overall vision of how the park will be managed. It broadly describes desired future conditions for resources and visitor enjoyment, addressing these topics in a parkwide, comprehensive, multidisciplinary way. The management plan outlines how

the interpretation & education program fits into the larger park management picture. Interpreters correctly view their participation in this planning process as their most influential opportunity to help strategize a management approach that best enhances visitor enjoyment of resources while preserving the integrity of those resources in perpetuity. The management plan is the most expansive and far-reaching aspect of interpretation planning since all other levels beneath it are directed by its guidance.

Program Planning

Based on the park's management plan, each program plan describes how its subject program (function) will successfully implement the vision for park operations, visitor enjoyment, and resource preservation. Each plan provides direction for all management decisions for that program.

For a park's interpretation & education program, the program plan is often called the *Comprehensive Interpretive Plan* (CIP). All interpretive activities are based on it and coordinated by it. This plan defines what the program will accomplish and how it will be operated during the next five years or so. Its most important feature is the desired future interpretation & education program, which describes primary interpretive themes, informational topics, audiences, and the services that will best enable those audiences to meaningfully explore park resources.

Implementation Planning

Program plans, such as a park's CIP, are often reinforced by implementation plans that provide additional detail about the program. For the interpretation & education program, implementation plans usually address media for which planning in sets is effective (such as a plan for a set of exhibits or publications) or interpretive facilities or infrastructure (such as a visitor center rehabilitation plan or visitor transportation plan). Implementation plans may also include audience-specific plans, such as a curriculum-based education plan.

Individual Service Planning

Like implementation plans, individual service plans (ISPs) provide additional direction and detail for the program. However, the scale of ISPs is smaller and of a different character than implementation plans. Each ISP describes one type of interpretive service, its locations, primary interpretive theme(s) or informational topic(s), and audience(s) addressed. It also outlines logistical and operational concerns for the service type. ISPs are generated for services as varied as evening programs, cultural demonstrations, site bulletins, bulletin boards, information desk duties, and classroom activities. These concise plans (often a single page) are especially useful to the individual interpreter assigned to present a particular service.

Planning Tasks for Specific Presentations of an Interpretive or Informational Service

The interpreter responsible for presenting a specific interpretive service (such as next Wednesday's guided hike) must make preparations to successfully achieve the desired outcomes of providing that service. Planning tasks are wide ranging and can include such individual actions as writing the outline for an interpretive talk, designing a page on the park's Website, writing a fourth-grade teacher's guide to accompany

a traveling trunk, conducting interviews to prepare an illustrated program, and much more. This is the individual level of interpretation planning — the level that ultimately implements the CIP and the parkwide vision for visitor enjoyment that is envisioned in the management plan. ••

— Context in which the park and its programs are planned and managed —

Tangible and Intangible Heritage Resources of the Park

Foundational Information for Planning and Management

Management Planning

Program Planning
(Comprehensive Interpretive Plan)

Component 1	Component 2	Component 3
Long-Range Interpretive Plan	**Annual Implementation Plans**	**Interpretive Database**
Includes the desired future interpretation & education program.	Generated annually from the LRIP.	Finding aid (electronic and/or printed) for operational information.

Implementation Planning
(media, infrastructure/facility, or audience-specific plans)

Examples

Audiovisual Plan
Education Plan
Museum Exhibit Plan
Publications Plan
Transportation Plan
Visitor Center Rehabilitation Plan
Wayside Exhibit Plan

Individual Service Plans
(developed at this level but stored or referenced in CIP above)

Planning Tasks for Specific Presentations of an Interpretive or Informational Service

Personal Interpretive and Informational Services (presented in person)	**Non-personal Interpretive & Informational Services** (media)
Examples	*Examples*
Outlining a specific interpretive talk.	Selecting slides to use in updating an automated slide show.
Reviewing information updates for sales desk duties.	Designing a specific museum exhibit.
Conducting research for a specific interpretive cultural demonstration.	Writing or editing a specific site bulletin.
Preparing for an interactive Web broadcast or event.	Writing teacher's guides or ordering replicas to accompany a traveling trunk.

Presentation of Services

Visitors explore their own intellectual & emotional connections to natural & cultural resources that comprise shared heritage.

Note: Please see the publication **CIP Guide** *(part of the* Essential Tools for Interpreters *series) for more information on the process & outcome of comprehensively planning a park's interpretation & education program.*

Overview of a Park's
Interpretation & Education Program

Context for Park Interpretive Operations

A park's interpretation & education program operates within a context much larger than the park itself. The contextual framework within which a park's interpretation & education program operates might be diagrammed like this:

```
Profession of Interpretation

    Nation's Constitution and Civil Law

        Interpreting Organization

            THE PARK

        Resources              Visitors

    Tangible and Intangible    People Who Interact with
    Heritage Resources         the Park's Resources

        Interpretation & Education Program

        Interpretive Services

        • Thematic Interpretation for the General Public

        • Thematic Interpretation for Curriculum-based Visitors

        Informational Services

        • Services for the General Public

                - Orientation Information
                - Visitor Safety Information
                - Resource Preservation Information
                - Public Relations Information

        • Services for Curriculum-based Visitors

                - Orientation Information
                - Visitor Safety Information
                - Resource Preservation Information
                - Public Relations Information
```

Note: The relationships of professionalism, law, and the role of the interpreting organization are identical to that in the previous chapter, "Planning a Park's Interpretation & Education Program" — and so are not described below.

The Park
Management activities of the park occur under the umbrella of the interpreting organization. The interpretation function of the park is also directed by the park's mission, mandates, legislation, types of resources, their locations, and more.

Tangible and Intangible Heritage Resources. The park possesses resources that are valuable to the public, and are interpreted to the public. Interpreters must possess an in-depth understanding of park resources as a prerequisite to designing and presenting services.

People Who Interact with the Park's Resources. People visit the park, either physically or virtually, to experience something meaningful to them. Interpreters must possess an in-depth understanding of the needs and interests of park visitors. Considering audience characteristics when designing and presenting interpretive services is a critical component of effective communication.

Interpretation & Education Program
The park's interpretation & education program is usually thought of as serving two overlapping — yet distinct — audiences, and thus the name "interpretation & education program." In general terms, *interpretation* is habitually used as a reference to those aspects of the park program that serve the general public. These visitors are usually experiencing the park as a setting for casual fun. Many visitors are vacationing and visit the park in small, family groups.

Education is habitually used as a reference to students or others who experience the park as part of a formal, educational curriculum. These visitors tend to experience the park in large groups that are directed by leaders or teachers. These visits tend to be scheduled in advance. Their reason for visiting is to achieve specific educational objectives via experiences with the park's heritage resources.

These audience-based distinctions help park staffs decide what kinds of services most effectively meet the needs of both types of visitors. It should be noted that both audiences receive services that are thoroughly grounded in interpretive philosophy.

Interpretive Services and Informational Services

A park's visitors are most profitably categorized into these two types of audiences (general audience and curriculum-based audience). Each of these is generally provided with two categories of services: *interpretive* services and *informational* services. Both types of services play important roles in enhancing visitor enjoyment of the park's heritage resources while ensuring the perpetual integrity of these resources for the benefit of future generations.

Interpretive Services

A Framework for Thematic Interpretation

Interpretive services are thematic. They rely on the format of *story* to provide opportunities for people to explore their own intellectual and emotional connections to the natural and cultural resources that comprise shared heritage. In this way, a park's interpretive services enhance visitor understanding, enjoyment, and appreciation of heritage.

Thematic interpretation is a philosophy, framework, and process. It embodies the mission of interpretation and the context in which the mission is pursued. It entails a progressive flow of ideas. Each element in the framework connects to the next; lower levels nest within higher levels.

— Context in which the park and its programs are planned and managed —

Park Resources

Resource Importance
(Statements of Significance)

Overarching Stories
(Primary Interpretive Themes)

Specific Stories
(Interpretive Subthemes)

Interpretive Service Design

Interpretive Service Presentation

Enhanced Visitor Enjoyment via Interpretive Opportunities

Park Resources

The resources themselves comprise the anchor to which all other levels in the framework are tethered. Park resources are always the initial level in thematic interpretation. These heritage resources (natural and cultural) help us remember, consider, affirm, and improve who we are — as individuals and as a society. Important people, places, events, and things facilitate our unquenchable exploration of meanings, ideas, beliefs, and values. Heritage resources possess a variety of characteristics: Some are tangible, some are intangible, and to some are ascribed meanings that tend to have a cross-cultural universality to them. Characteristics are assigned to these resources by individuals and groups. Characteristics and meanings may differ markedly among individuals or groups.

Tangible Characteristics. Most heritage resources have physical characteristics. They can be experienced through our senses: We can see, touch, hear, taste, and/or smell them. For example, trees, canyon walls, historic buildings, or ancient artifacts are examples of tangible resources.

Intangible Characteristics. All heritage resources are ascribed with intellectual, emotional, and spiritual characteristics. They are most often expressed as ideas, meanings, beliefs, and values. Natural processes (such as erosion, the water cycle, and wildland fire) and human activities (such as copper mining, architectural design, and religious traditions) are examples of intangible resources. They all have tangible manifestations (or we could not experience them in any shared way) but are especially important for the *whys* and *hows* behind their physical aspects. Their tangibility is the entrance into the world of the *whys* and *hows* that they represent.

Universal Concepts. Some intangibles are understood beyond cultural boundaries, almost at an innate level. These *universal concepts* are ideas to which we can all relate, although the meanings we independently assign to them may vary greatly. For instance, life, learning, cooperation, happiness, freedom, nature, and morality are all examples of universal concepts.

Note: Please see the section "Universal Concepts are Essential Elements of All Themes" below for more information.

Natural and Cultural Resources. As people study the world around us, and develop new methods and disciplines, it has often been useful to categorize subject matter more and more narrowly. Specialization facilitates studying specific aspects of the world in greater depth. It occurs in academic and technical disciplines, and also occurs in the management of parks and other special places. This is often the reasoning behind dividing heritage resources into the categories of *natural resources* and *cultural resources*.

In the quest for increased knowledge, it has been habitual to identify *natural resources* as resources primarily significant for their lack of disturbance by people. *Cultural resources* are described as resources that are primarily significant for their associations with human action and manipulation. It is important for interpreters to remember, however, that no cultural resource is divorced from the natural world — and no natural resource is free of culturally associated ideas, meanings, beliefs, and values ascribed to it by people.

Dividing resources into strictly *natural* and *cultural* categories is detrimental to a holistic interpretive exploration of what resources in parks mean, to whom, why, and how these meanings change or endure. Professional interpreters take care to reintegrate resource knowledge to best facilitate visitors' exploration of resources and the meanings they hold. To facilitate only a comprehension of the pieces, devoid of the context of the greater whole, is to limit opportunities for people to explore deeper and more meaningful connections to shared heritage.

Resource Importance — Statements of Significance

Significance is usually rooted in enduring resource

characteristics. The significance of places and things are embedded in their tangible and intangible characteristics: elements that are so attractive, interesting, and engaging that people choose to experience them time and again. At the same time, it's true that a cultural context always plays a role when societal values are described or acted upon. Accordingly, some aspects of the significance that society places on a site may evolve over time as a result of discoveries or other updates to knowledge about the place, events, people, and things, or if the values of society change in relation to the site's specific meanings, as represented by its resources. Nevertheless, such a place usually embodies a core importance that endures through time.

Describing Significance. The reasons for designating certain places as especially important to society can be gathered and described through public testimony or other initial studies or assessments of the resources' potential value to society. Thereafter, the characteristics of the resources are described for managerial and operational purposes.

The heritage resources of the park must be described in such a way that a common understanding (consensus) of the significance of these resources can be reached among those who have a stake in the resources of the place. This is crucial if responsible management of the resources is to occur. Almost all management actions, across all park functions, are derived from this common understanding and the mission to perpetuate the associated attributes of the resources.

Every organization that offers heritage interpretation describes, in some way, the importance of the places, events, people, and things that relate to their park. Significance descriptions can often be found in enabling legislation, a charter, mission statement, foundational statement, general management plan, or master plan. This description is most useful when it is more than just a resource list — when it includes relevant context that makes the items on such a list meaningful to the reader.

Such a description of resources is characteristically formatted as a set of *significance statements*. Significance statements, taken together as a whole, serve to describe the distinctiveness of the combined resources of the park, including natural, cultural, inspirational, scientific, historic, recreational, and other aspects. They include tangible characteristics and intangible meanings and ideas commonly ascribed to them. In most organizations, the mission of the organization and the set of significance statements combine to focus management actions and operations on the preservation and enjoyment of those attributes that most directly contribute to the importance of the place.

Overarching Stories — Primary Interpretive Themes

Attaching meanings to places and things is a fundamental human trait. We ascribe special significance to places, events, people, and things that rejuvenate our spirits, challenge and strengthen our beliefs, and provoke contemplation and discussion of our past, present, and future. Such resources provide opportunities to explore our shared heritage and help us define our character as individuals, communities, and societies.

Story is the communication tool most effective for facilitating an exploration of resource meanings. Societies depend on the power of story to explore, clarify, and share

ideas, meanings, beliefs, and values that collectively constitute culture. Story is at the heart of human interaction and, consequently, at the heart of heritage interpretation.

Parks develop a set of overarching stories to organize the largest-scale ideas and meanings related to the park's resources. These stories are called *primary interpretive themes*. Each is written as a story abstract — an encapsulation of the actual, complex, specific stories of the place.

When developing primary interpretive themes, the writers should take care to assemble the ideas, meanings, beliefs, and values that seem to best fit together as related groups of thought, anchored to the specific resources of the park. The set is developed to fully capture, and express in story format, the content of the park's entire set of significance statements. The set is complete when it provides opportunities for people to explore and relate to *all* of the significance statements.

The set is usually comprised of a handful of primary interpretive themes — commonly three to five. Primary interpretive themes should be few enough in number to maintain focus for the park's interpretation & education program (including its management, practical implementation, and tracking needs) while numerous enough to compellingly represent the full range of park significance.

Characteristics Common to All Themes. Characteristics that are common to both primary interpretive themes and subthemes (*see "Specific Stories — Interpretive Subthemes" below*) include:

- Each is based on the significance of park resources.

- Each is the essence of a story used to help visitors explore the multiple meanings of resources. Neither primary interpretive themes nor subthemes make up the actual stories themselves. Rather, themes are abstracts, encapsulations of the actual stories, the details of which form the content of the resulting interpretive services.

- Each connects resources to larger ideas, meanings, beliefs, and values.

- Each incorporates universal concepts: large ideas that mean something to everyone, though not necessarily the same thing to everyone.

- Each provides opportunities for people to explore the meanings of the place and its resources without telling people what resources *should* mean to them.

- Each is best stated as a single sentence that includes tangible and intangible elements. Single-sentence structure forces theme writers to focus their ideas. Structuring themes as complete sentences ensures a more coherent development of related ideas. Within the sentence structure itself, content often tends to progress from tangible resources to intangible resources to universal concepts, moving from specific to general (this is traditional story format).

- An interpretive theme is never merely stated as a topic. While topics can be useful in organizing a body of work, topics alone do not provide sufficient interpretive focus. Since topics are written in relatively few words — such as geology, Southwest history, wildlife, or architecture — their meanings are too

general and ambiguous to be useful as stand-alone content guides to interpreters, supervisors, or managers.

Universal Concepts are Essential Elements of All Themes.
Universal concepts are powerful: In just a word — love, family, war, time, honor, sacrifice — many different meanings are instantly thought of, felt, and experienced by visitors. Using universal concepts in both primary interpretive themes and subthemes is essential to effective interpretation, as this aids in the presentation of multiple perspectives and their relevance to visitors. Universal concepts enable a wide range of people with diverse life experiences to find personal paths of connection to the stories of the place and its extraordinary resources. People become engaged in the place, in the program, in the exhibit. They can relate the resources to important aspects of their own lives.

It should be noted that mechanically including universal concepts in an interpretive theme does not, in itself, guarantee that the theme will provide adequate guidance. Simply using words that convey universal concepts without appropriate context is too broad an approach to be useful. For instance, consider this interpretive theme:

- The swamp is teaming with life.

This interpretive theme isn't especially useful. Relying solely on the use of the word "life" as a universal concept does not provide adequate context to understand the idea the writer intends to explore. Here's a revised version:

- The swamp contains an unusually rich diversity of plants and animals interacting in one of nature's most vulnerable habitats, offering opportunities to consider the critical roles that water plays in the living systems upon which we all depend.

The revised statement clearly focuses on some specific ideas, while doing it in an inclusive way. It is both focused *and* serves as a useful umbrella under which multiple perspectives can be profitably explored. Although the word "life" is absent, the idea not only remains, but has taken understandable form. This theme statement provides a much clearer presentation of the author's thoughts.

Let's look at another statement, a rough draft of a primary interpretive theme:

- Residents sacrificed their homes and lands for the creation of a national park near a majority of the United States population.

The universal concept of sacrifice is very powerful, but is used in the statement without much explanatory detail or context. Such ambiguity may represent a partially-formed understanding of the park's underlying significance. It may also be shorthand for an in-depth understanding, but it's almost always best to be more specific in writing a theme upon which many different services will be founded. Specificity leads to clarity in theme writing. A more coherent expression of this idea occurs in this revised version:

- Established at the height of the Great Depression, and created through the displacement and disruption of many individuals and communities, Shenandoah

National Park is an outstanding example of how people collectively struggle to balance the rights of individuals with the needs of society as a whole.

Although the universal concept of sacrifice is clearly represented in this version, the word "sacrifice" is not necessary. Instead, the concept is developed more fully to add detail and context, and to better connect it to the resources of the place. This creates a much richer opportunity for dialog about all of the ideas, meanings, beliefs, and values related to this universal concept, and the park resources that make this one of the best places in the nation to discuss these particular ideas.

Identifying universal concepts, and including appropriate context with them to enhance understanding, is not as difficult as it may sometimes seem. Examples abound in daily park operations.

Imagine this scene. A visitor is crouching down in front of an exhibit in your visitor center. He wants to see something up close. He looks at the object through the magnifying glass suspended in front of the object in the case. The object is a chunk of amber encasing a beautifully-preserved mosquito. For any person, of any belief system, seeing something that is delicate and ancient, encased in amber or rock, or transformed into something akin to rock itself, inspires wonderment. There's something inherently intriguing about seeing a living creature transformed in such a way. There are real universal concepts in play here — the workings of nature, processes, transformation, change through time, individual aesthetics, and more. The park staff, knowing this, set up the exhibit to capitalize on the universals inherent in this seemingly simple object. In this way, the staff prompts such an experience without needing to intervene in the interpretive moment.

Specific Stories — Interpretive Subthemes
Subthemes flow from primary interpretive themes. Each subtheme focuses on a part of a primary interpretive theme, providing more narrow and specific guidance for the development of an interpretive service. Subthemes represent in-depth treatment of primary interpretive themes. Unlike the foundational character of the set of primary interpretive themes, subthemes are developed as needed; every interpretive service is guided by a subtheme. There is no limit to the number of useful subthemes that can be derived from a primary interpretive theme. Like primary interpretive themes, a good practice is to write each subtheme as a one-sentence abstract that guides the development of an interpretive service, via which a particular story will be presented.

A subtheme, because of its narrower scope, provides an ideal focus for exploring ideas via a given interpretive service. Since effective storytelling usually moves from the specific to the general, interpreters routinely use subthemes to help visitors connect specific aspects of resources to larger ideas. Subthemes enable each interpretive service to achieve greater depth and interest. They help the interpreter assist visitors in exploring more subtle and complex aspects of park resources.

Note: *Please see the figures "Significance Statements and Primary Interpretive Themes" and "Developing Subthemes and Services from a Primary Interpretive Theme" below for more information. Also see the publication* **CIP Guide** *(part of the* Essential Tools for Interpreters *series) for more detailed information about writing and using themes.*

Significance Statements and Primary Interpretive Themes

Tangible and Intangible Heritage Resources of Hawai'i Volcanoes National Park

Set of Significance Statements

- Hawai'i Volcanoes National Park features Mauna Loa and Kilauea, two of the most active volcanoes in the world.

- Mauna Loa — measured from its base deep beneath the surface of the sea to its peak — contains more material by volume than any other mountain on Earth.

- The unusually high degree of approachability to the park's active volcanism affords opportunities for fundamental and detailed research not duplicated (or even approached) in any other park in the world, offering relatively safe experiences with lava flows, fountains, and other products of active volcanism.

- The long history and collaborative nature of the research performed by the USGS Hawai'i Volcano Observatory and others at Hawai'i Volcanoes National Park have made Mauna Loa and Kilauea among the most studied and best understood volcanoes in the world.

- Hawai'i Volcanoes National Park provides critical living space in a wide variety of ecological zones for the highly endemic native biota, much of which is threatened or endangered, requiring active management of native and non-native species.

- The diversity and importance of the cultural resources in Hawai'i Volcanoes National Park — and the protection of natural features and processes afforded by national park status — combine to make Hawai'i Volcanoes critically important to the perpetuation of traditional native Hawaiian religion and culture.

- Hawai'i Volcanoes National Park encompasses the largest expanse of Hawaiian natural environment managed as wilderness, with the associated wilderness values of natural sounds, lack of mechanization and development, natural darkness, and opportunities for solitude.

- The park's resources are so rare, valuable, and inspirational to all the people of the world that the United Nations has declared the park an International Biosphere Reserve and a World Heritage Site.

- Hawai'i Volcanoes National Park protects the most extensive tract of protected montane tropical rain forest in the National Park Service.

- The structural complexity and isolation of the Hawaiian Islands and their active volcanic setting makes them a world-class living laboratory of biogeography and evolution. The protected status of Hawai'i Volcanoes National Park lands offers important opportunities for this work to continue.

Set of Primary Interpretive Themes

A The approachable, active volcanoes of Hawai'i Volcanoes National Park allow first-hand discovery of and connection with one of the most fundamental forces of our world — in both its creative and destructive roles.

B The journeys of the Hawaiian people, who continue to inhabit these rich and diverse lands, include cultural clashes, adaptations, and assimilations that provide enduring lessons about human resourcefulness, interdependence, and respect for the life of the land.

C In Hawai'i, active volcanism created an isolated home for a few immigrant species that gave rise to a rich yet fragile endemic biota; due to the accelerating change brought about by human actions, much of that unique heritage continues to be lost to extinction, challenging all of us to learn from the past and work together to preserve the remaining native plants and animals.

D Kilauea, the home of Pele, is sacred to many Native Hawaiians: it is a place of birth and the well-spring of many spirits and forces; the active volcanism, the features of the terrain, and the plants and animals that live there are all important to Native Hawaiian sense of identity, unity, and continuity.

E Hawai'i Volcanoes National Park provides an opportunity for people to experience the values of Hawai'i's diverse wilderness; the park's designation as a World Heritage Site and International Biosphere Reserve attests to its importance as a benchmark for monitoring environmental change.

Note: This information is extracted from the park's Long-Range Interpretive Plan: First Draft *(National Park Service, Hawai'i Volcanoes National Park, August 1999), pp. 2-5.*

Developing Subthemes and Services from a Primary Interpretive Theme

Tangible and Intangible Heritage Resources of Hawai'i Volcanoes National Park

Set of Significance Statements

Hawai'i Volcanoes National Park features Mauna Loa and Kilauea, two of the most active volcanoes in the world.

Mauna Loa — measured from its base deep beneath the surface of the sea to its peak — contains more material by volume than any other mountain on Earth.

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C In Hawai'i, active volcanism created an isolated home for a few immigrant species that gave rise to a rich yet fragile endemic biota; due to the accelerating change brought about by human actions, much of that unique heritage continues to be lost to extinction, challenging all of us to learn from the past and work together to preserve the remaining native plants and animals.

D Kilauea, the home of Pele, is sacred to many Native Hawaiians: it is a place of birth and the well-spring of many spirits and forces; the active volcanism, the features of the terrain, and the plants and animals that live there are all important to Native Hawaiian sense of identity, unity, and continuity.

E Hawai'i Volcanoes National Park provides an opportunity for people to experience the values of Hawai'i's diverse wilderness; the park's designation as a World Heritage Site and International Biosphere Reserve attests to its importance as a benchmark for monitoring environmental change.

Subtheme
The unusually high approachability to the park's active volcanism not only affords opportunities for personal exploration, but for fundamental and detailed research that benefits us all.

Subtheme
Landforms created by the volcanic activity of Kilauea and Mauna Loa sensationally demonstrate the role of volcanism in shaping and reshaping Earth's surface, and deepens our understanding of other planetary bodies.

Subtheme
Earthquakes, tsunamis, ash and debris fallout from eruptions — consequences of volcanic activity — have at times been disastrous for humans, but have also provided opportunities for people to thrive.

Subtheme
A civilization-enriching aspect of science is developing and testing new ideas: Mauna Loa and Kilauea exemplify the theory that volcanic activity above a fixed hot spot in the Earth's interior built the Hawaiian Islands, a relatively new idea.

Interpretive Service
A subtheme like this might best lend itself to an *interactive computer station* that graphically demonstrates how fundamental volcanic research benefits other scientific inquiries with which visitors are familiar, such as studies into dynamic global change like plate tectonics or climate patterns like the El Niño / La Niña effect.

Interpretive Service
A subtheme like this might best lend itself to an *illustrated program* that shows varying landscapes of Earth, and then shows landscapes of other planets and moons (as mapped and photographed by NASA). Inspiring music might accompany the imagery, followed by an interpreter-led discussion about geomorphological similarities and differences in these landscapes.

Interpretive Service
A subtheme like this might best lend itself to a *guided hike* across the flank of Kilauea, on a trail that passes places of agricultural significance to Native Hawaiians. The interpreter might draw visitors' attention to plant species that thrive in this environment, then discuss the connections of Hawaiians to these species — and how volcanic activity has created an environment more conducive to their success.

Interpretive Service
A subtheme like this might best lend itself to a scheduled *interpretive talk*. Starting with the idea that the Hawaiian Islands are probably the best example on Earth of hot-spot volcanism, the interpreter might expand into procedures of scientific inquiry (hypotheses, testing, improved hypotheses), and end by asking about the range of impacts science has had on societies.

Note: This information is adapted from the park's Long-Range Interpretive Plan: First Draft *(National Park Service, Hawai'i Volcanoes National Park, August 1999).*

Interpretive Service Design

Each specific story abstract lends itself to specific kinds of expression (interpretive services) that will best facilitate visitors' exploration of the park's resources and their many meanings. Intentionally developing an interpretive service to expand upon a well-crafted subtheme prevents the desired outcome of the service from being overshadowed or deflected by interpretive medium, technique, or personal style. After all, interpretation isn't about the gadget or the interpreter. Interpretation is about resources and meanings and enhanced visitor enjoyment.

Ideas for subthemes and specific interpretive services flow from an interpreter's familiarity with resources and visitors. Where are specific resources located? What is their condition; is there a carrying capacity issue? What are the needs and interests of the audience? Will educational objectives need to be taken into account to design the interpretive service? Is the service going to be provided by an interpreter, or a classroom teacher, or will it be a type of media? What facilities and/or staff will be needed for this service? What interpretive techniques will most effectively facilitate an exploration of the meanings of park resources? How can multiple perspectives best be woven into this service? Such questions are typically considered as an interpretive service is developed from a subtheme.

Interpretive Service Presentation

The interpretive service is presented, delivered, or otherwise made available to visitors. If the service will be presented in person, some questions arise even as the interpreter customizes the service on the fly. Where is the audience's attention? Did that story seem to make sense to them? Was the interpretive prop effective? The usefulness of feedback from the audience cannot be overstated. And for both personal and non-personal interpretive services, pre-evaluation, formative evaluation, and summative evaluation are requisite tools to gain knowledge of the audience and ensure increased effectiveness of services over time.

Enhanced Visitor Enjoyment via Interpretive Opportunities

The thematic interpretation framework always culminates with interpretive opportunities that facilitate visitors exploring their own intellectual and emotional connections to the natural and cultural resources that comprise shared heritage. Enhancement of interpretive opportunities occurs at the conjunction of visitors, resources, and services.

Thematic interpretation, an outgrowth of the most fundamental of human communication systems (storytelling), appears to be the most effective method for successfully, consistently, and systematically facilitating these connections. Every interpretive service is based on a subtheme and guided by the strategic decision to tell a story that provides multiple opportunities for diverse audiences to explore meanings in park resources. Every subtheme is derived directly from a primary interpretive theme. The set of primary interpretive themes is derived from the set of significance statements, which describe the enduring importance of the park's heritage resources. This unbroken chain of content development is the hallmark of thematic interpretation.

Thematic interpretation guides us away from trivia ("Name two frogs..."), issue advocacy ("Three reasons why you should believe that wolves are wonderful and cows are evil..."), and shameless aggrandizement and self-promotion ("It's about us, love our organization, give us money..."). Thematic interpretation celebrates parks as places for intellectual, emotional, spiritual, and physical exploration and expression — forums for sharing experiences of self and community (in the broadest sense).

Developing Interpretive Services

Most interpreters develop an interpretive service via a structure similar to the one diagrammed below. That's not to say that every step is repeated in exactly the same way for every service. For instance, research and evaluation are likely to occur in *several* places. The more important idea is that all of these steps routinely occur in the development of an interpretive service.

— *Context in which the park and its programs operate* —

Comprehensive Interpretive Plan

Work is Assigned to an Interpreter

Interpreter Reviews Individual Service Plan

Interpreter Generates Idea and Investigates Links

Interpreter Writes Subtheme

Interpreter Selects Methods

Interpreter Cohesively Organizes Links & Methods

Interpreter Conducts Research

Interpreter Refines and Finalizes Content

Interpreter Provides Service

Enhanced Visitor Enjoyment via Interpretive Opportunities

Comprehensive Interpretive Plan

The interpretive manager, other park staff, and stakeholders develop the park's CIP. It directs the development of all interpretive and informational services via various components that:

- Describe park resources in story format via the set of *primary interpretive themes*.

- Describe *informational topics* of orientation, visitor safety, resource preservation, and public relations information.

- Describe *audiences* of the interpretation & education program.

- Describe the most effective ways to facilitate these audiences in an exploration of each primary interpretive theme and informational topic by specifying interpretive and informational *services*

and their locations for each combination of primary interpretive theme (or informational topic) and audience.

- Describe in *individual service plans* (ISPs) the operational details of each interpretive or informational service in the park's interpretation & education program.

Work is Assigned to an Interpreter

The interpretive manager assigns a front-line interpreter (either directly, or through a supervisory interpreter) to perform a specific service.

Interpreter Reviews Individual Service Plan

The front-line interpreter reviews the ISP for this service, which often includes the following information.

- Primary interpretive theme(s)
- Audience(s)
- Interpretive service type
- Service location(s)
- Management's intent for providing this service
- Operational details
- Record-keeping requirements (for evaluation and reporting purposes)

Interpreter Generates Idea and Investigates Links

The interpreter generates a core idea for the service and investigates links between tangible resources, intangible meanings, and universal concepts that relate to the primary interpretive theme on the ISP. A *link* is a designed connection between these tangible, intangible, and universal elements.

Interpreter Writes Subtheme

The interpreter writes a subtheme specifically for this service, and includes tangibles, intangibles, and universal concepts.

Interpreter Selects Methods

The interpreter selects methods that develop links into opportunities for connections to meanings, guided by the subtheme.

Interpreter Cohesively Organizes Links and Methods

The interpreter organizes the links and methods per the subtheme, creating the first viable service outline.

Interpreter Conducts Research

The interpreter gathers additional information, considers multiple points of view, seeks answers to questions, and verifies knowledge by conducting research — and consults appropriate park staff (and others as needed) to ensure that the service's content is acceptable.

Interpreter Refines and Finalizes Content

The interpreter revises, refines, and finalizes the service.

Interpreter Provides Service

The interpreter presents, publishes, posts, prints, or otherwise delivers the interpretive service, or transmits it to others for design, layout, fabrication, and installation or distribution.

Enhanced Visitor Enjoyment via Interpretive Opportunities

The development framework always culminates with interpretive opportunities that facilitate visitors exploring their own intellectual and emotional connections to the natural and cultural resources that comprise shared heritage. Enhancement of interpretive opportunities occurs at the conjunction of visitors, resources, and interpretive services.[3]

Analyzing the Effectiveness of an Interpretive Service

Ideally, evaluation is an ongoing effort — both for individual services and the program as a whole. Such evaluation is often organized as pre-evaluation, formative evaluation, and summative evaluation.

Front-end or *pre-evaluation* occurs before design of the interpretive service begins. It assesses the expectations and preferences of the intended audience. *Formative evaluation* occurs during the development of the interpretive service. It provides opportunities for visitors to influence the style and direction of the service. *Summative evaluation* occurs after the service has been delivered or made available. It allows visitors to critique the service, suggesting opportunities for improvement.

Informational Services

A Framework for Informational Services

In addition to interpretive services that provide thematic opportunities for visitors to enhance their experience, there are several types of *informational services* for which a park's interpretation & education program is usually responsible. Informational services create an environment in which enjoyment and appreciation of heritage can be enhanced for the visitor.

Most interpreters develop an informational service within a progressive flow of ideas. Each element in the framework connects to the next; lower levels nest within higher levels. (*Please see the diagram on the next page.*)

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[3] Please see the following source for more information: ***Interpretive Development Program*** — *The Process Model;* National Park Service; http://www.nps.gov/idp/interp/101/processmodel.pdf (December 2002).

Park Resources

Resource Importance
(Statements of Significance)

**Management Decisions and
Operational Issues, Topics, and Data**

| **Orientation Information** | **Visitor Safety Information** | **Resource Preservation Information** | **Public Relations Information** |

Service Content Idea

Informational Service Design

Informational Service Presentation

Enhanced Visitor Enjoyment via Informational Opportunities

Note: The relationship of park resources and resource importance are identical to the "Interpretive Services" section earlier in this chapter — and so are not described below.

Management Decisions and Operational Issues, Topics, and Data

This part of the framework is rather straightforward in that it represents the positions, concerns, challenges, and positive contributions of park management — and the communication of these ideas to the public.

The four topic areas below this layer categorize this information, and help guide its formulation and transmission to the public via informational services.

Orientation Information

Providing orientation information is part of the interpreter's job. This duty usually addresses information such as where the site is located, hours of operation, fees, rules and restrictions, way-finding on site, where to lodge, trip-planning queries, and more. This basic information can play an important role in visitors' enjoyment of their park experience. Effective orientation services can set the stage for learning, growth, enjoyment, and satisfaction. Poorly crafted services, inadequate customer service, or the absence of essential orientation information services can result in a frustrating, unsatisfying park experience.

Visitor Safety Information

Providing visitor safety information is part of the interpreter's job. This duty is focused on helping visitors help themselves in designing an experience that is as safe as possible for them. A site bulletin that addresses lightning hazards on summer afternoons, a poster on a campground bulletin board that informs visitors how to stay hydrated, rules on the park Website stating the need for visitors to keep arms and legs inside the train's passenger car, and discussions with visitors at the information desk about how to safely store food while in the backcountry — all of these are examples of this kind of information. So are signs cautioning visitors about

leaving valuable possessions in their vehicles while they're hiking.

Visitor safety information is often communicated in tandem with resource preservation information. For example, the sign that reads, "Do not climb on fragile rock walls" is designed to protect visitors from falls and scrapes while also preserving resources from needlessly accelerated degradation and expensive repair work. Effective visitor-safety services can set the stage for learning, growth, enjoyment, and satisfaction. Poorly crafted services, inadequate customer service, or the absence of essential safety information services, can lead to increased risks and injuries — and park memories that are more painful than pleasant.

Resource Preservation Information

Providing resource preservation information is also part of the interpreter's job. This duty focuses on preserving the integrity of resources while providing visitor access to them. It often includes behavioral suggestions for visitors. Signs that ask visitors to stay on the trail, or warn about fines levied for graffiti, or asking visitors to report sightings of specific animals, are simple examples of this kind of information.

Providing information to visitors about why the park manages and preserves resources in the ways that it does is often more complex. Because of the greater potential depth of this subject matter, services for this type of information may vary widely. Helping the public understand what preservation practices are used, and why, and how choices are made, and why one organization does it differently than another — information about these subjects is communicated via many different types of services (such as informational talks, demonstrations by craftsmen, hands-on activities, brochures, or Website).

As mentioned above, resource preservation information is often communicated in tandem with visitor safety information. "Don't feed the wildlife" signs help maintain the balance of natural processes being preserved in the park while also protecting visitors from bites and disease. Effective resource preservation services can set the stage for learning, growth, enjoyment, and satisfaction. Poorly crafted services, inadequate customer service, or the absence of essential resource preservation information can adversely affect visitor experiences and severely damage resources that perpetuate our common heritage.

Public Relations Information

Public relations work may not be an official job of all interpreters but is an inevitable part of any direct contact with the public. It often includes providing information about the organization, its mission, this park and how it relates to the rest of the system (if applicable), management goals and actions, why certain resource-preservation decisions have been made instead of alternatives, and more. This information can support the growth of understanding among a constituency and be valuable in management's desire to have a particular issue understood or supported. Effective public relations services can set the stage for mutual understanding and sharing, growth, enjoyment, and satisfaction. Poorly crafted services, inadequate customer service, or the absence of essential public relations information services can lead to confusion, misunderstanding, and unnecessary conflict.

When conducting this work, interpreters must keep in mind the difference between interpretation and public relations, and perform these duties accordingly.

Note: Please see the section "Interpretation or Public Relations?" in the "Interpretation Enhances Enjoyment of Heritage Resources" chapter for more information.

Service Content Idea

The content idea in this framework is analogous to the subtheme row in the interpretive services framework. The *content idea* leads to the generation of the actual outline and substance of the specific service.

Informational Service Presentation

The informational service is presented, delivered, or otherwise made available to visitors.

Enhanced Visitor Enjoyment via Informational Opportunities

The framework always culminates with *informational* opportunities that create an environment in which enjoyment and appreciation of heritage can be enhanced for the visitor. Enhancement of informational opportunities occurs at the conjunction of visitors, resources, and informational services.

Every informational service is based on a content idea and guided by the strategic decision to communicate information that provides multiple opportunities for diverse audiences to understand past, present, or potential future management actions and operational issues, topics, and/or data. These often relate to both visitors and resources in a variety of ways.

Developing Informational Services

This publication addresses informational services developed and presented by the staff of a park's interpretation & education program. Although other information work may be produced within a park by its public relations office or others, the structure below represents the process that interpreters often use to develop and present informational services. This diagram illustrates the steps that routinely occur in such a process.

> — Context in which the park and its programs operate —
>
> **Comprehensive Interpretive Plan**
>
> **Work is Assigned to an Interpreter**
>
> **Interpreter Reviews Individual Service Plan**
>
> **Interpreter Conducts Research**
>
> **Interpreter Cohesively Organizes Information**
>
> **Interpreter Refines and Finalizes Content**
>
> **Interpreter Provides Service**
>
> **Enhanced Visitor Enjoyment via Informational Opportunities**

Note: The relationship of the CIP and work assignment are identical to the "Developing Interpretive Services" section earlier in this chapter — and so are not described below.

Interpreter Reviews Individual Service Plan

The front-line interpreter reviews the ISP for this service, which often includes the following information.

- Informational topic(s)
- Audience(s)
- Informational service type
- Service location(s)
- Management's intent for providing this service
- Operational details
- Record-keeping requirements (for evaluation and reporting purposes)

Interpreter Conducts Research

The interpreter gathers additional information, considers multiple points of view, seeks answers to questions, and verifies knowledge by conducting research — and consults appropriate park staff (and others as needed) to ensure that the service's content is acceptable.

Interpreter Cohesively Organizes Information

The interpreter organizes the information, creating the first viable outline.

Interpreter Refines and Finalizes Content

The interpreter revises, refines, and finalizes the service.

Interpreter Provides Service

The interpreter presents, publishes, posts, prints, or otherwise delivers the informational service, or transmits it to others for design, layout, fabrication, and installation or distribution.

Enhanced Visitor Enjoyment via Informational Opportunities

The development framework culminates with informational opportunities that create an environment in which enjoyment and appreciation of heritage can be enhanced for the visitor. Enhancement of informational opportunities occurs at the conjunction of visitors, resources, and informational services. As with interpretive services, informational services should be regularly evaluated to improve effectiveness.[4] ••

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[4] *Interpretive Development Program* — *The Process Model,* loc. cit.

The Interpreter's Worldview

Worldview Matters

view \ *noun* **2** : a formal examination : INSPECTION : SURVEY **3** : mode or manner of looking at or regarding something : CONCEPTION, GRASP **10** : intellectual makeup : spiritual and cultural nature **syn** see OPINION

view \ *verb* **1 a** : to examine carefully or officially : INSPECT **b** *archaic* : EXPLORE **2** : to look at attentively : SCRUTINIZE, OBSERVE **3** : to consider esp. with earnest attention or with an attempt at wide or overall comprehension : take under consideration **syn** see SEE

world \ **1 a** : the earthly state of human existence : this present life **b** : a future state of existence : the life after death – usu. used with a qualifier **3** : individual experience of or concern with life on earth : the sum of the affairs which affect the individual : course of life : CAREER **11** : human society : the scene of the customs, practices, and interests of men as social beings : public or social affairs and occupations : social or business life, manners, and usages

Watching ocean waves crash against a rocky headland can often be a breathtaking experience for the watcher. Such connections between people and landscape seem to be innate, the individual needing little external assistance to derive personal meaning from the experience. Other types of heritage resources are not so universally appealing, nor their value so immediately and easily discernable. For instance, it might be difficult for visitors to understand why our government funds the perpetual curation of a common pillowcase — that is, until interpretation reveals to visitors that this is the very bedding upon which President Lincoln was laid following the assassination event at Ford's Theater. It's not a common pillowcase after all: The event and personages that were involved have forever altered its importance in societal memory. The profession of interpretation facilitates such connections between people and heritage resources. The interpretation & education program of a park, the individual interpreter, and the perspective from which he or she interprets the resources all play a part in every facilitated interpretive experience.

Everything an interpreter thinks, feels, believes, and does is rooted in how he or she views the world. Conception of self, relationship of self to all else, and a thousand internally-answered whys are woven together to form the fabric of a person's worldview. A thousand daily actions spring forth from it, including how an interpreter chooses to interact with visitors. This is true of both personally-delivered services

(such as walks, talks, conversations at information desks, etc.) and media services (brochures, Web sites, films, exhibits). The interpreter's individual worldview sets the parameters for how he or she approaches the work.

That's not to say that a person doesn't distinguish between a personal and professional persona. A professional interpreter certainly does this. However, neither of these personas is devoid of the inescapable influence of that interpreter's worldview. And depending on the characteristics of an individual's worldview, their interpretive efforts will either be more or less effective.

In general, two predominant perspectives operate within the population of interpreters. One worldview is premised on the perceived existence of an *inherent inequality* among individuals; the other on an *inherent equality*. The subject is that simple, and that complex. These worldviews apply to individuals as well as the societal structures they create.

The Authoritarian Worldview

au•thor•i•tar•i•an \ **1** : of, relating to, or favoring a principle of often blind submission to authority as opposed to individual freedom of thought and action **2** : of, relating to, or favoring a political system that concentrates power in the hands of a leader or a small autocratic elite not constitutionally responsible to the body of the people – opposed to *democratic*

des•pot \ **2 a** : a rule with absolute or virtually absolute power and authority : AUTOCRAT **b** : a ruler exercising absolute power abusively, oppressively, or tyrannically : TYRANT **3 a** : a person having recognized and complete governance or authority and usu. domineering or oppressive

elite \ **1** : the choice part or segment : FLOWER, CREAM, ARISTOCRACY: as **a** : a segment or group regarded as socially superior **c** : a minority group or stratum that exerts influence, authority, or decisive power

in•equality \ **1 b** : social disparity

The authoritarian perspective on life and relationships is characterized by an acceptance and perpetuation of social inequality. This worldview empowers a small minority of individuals, disempowering the general populace. The enacted values are the values necessary to keep this framework in place regardless of the abridgement of fundamental human rights for citizens. Monarchs, oligarchs, aristocrats, autocrats, elitists, theocrats, despots, tyrants,

dictators, fascists, and presidents-for-life all represent authoritarian social structures.

People who view the world through an authoritarian lens tend to place themselves in the empowered minority, the elite. The elite believe the public isn't smart enough, educated enough, or experienced enough to decide important social matters. They believe the values of the populace are not the same as their own, and they are correct in this. They believe the populace would make decisions that differ from the ones they would make: The basis for elite decision-making is to maintain elite social status whereas popular decision-making often has different goals in mind. The elite may concede some small points now and then, and may allow the public to make some few decisions to maintain their illusion of empowerment, but only when those decisions won't meaningfully conflict with the elite's ongoing exercise of power.

They believe there is little need to provide the public with relevant information about any public policy since citizens are generally not empowered to be decision makers. The only information that needs to be transmitted to the citizenry is the information that helps them adopt the perspectives of the elite, as this creates a climate best suited to the retention of power, prestige, and social status. Dissent from, and controversy about, elitist positions are to be avoided at all costs.

The elite believe others are incapable of attaining the successes they have attained. They believe in populating the social governance structure with people that agree with them and who promote and perpetuate the prestige of those in power. Few, if any, checks and balances are built into the system. This ensures that those citizens willing to question the position or status of the elites have little means to effectively do so.

Interpretive Manifestation of the Authoritarian Worldview

Some interpreters tend to look down on visitors, embracing their own views as "right" while seeing visitors' views as "wrong." They tend to value their own connections to heritage resources over the connections visitors have to those resources. They tend to validate only their own way of connecting to resources. They tend to be disrespectful and arrogant in their approach to the work — often through passive-aggressive behavior — and interpret from a position of authority.

For instance, an interpreter might possess an intense passion related to a specific resource issue, such as the reintroduction of wolves on park lands. This emotionally charged interest may be so personally important to the interpreter, that he allows this interest to overly influence his approach to the work. In these situations, the mission of the agency or organization, the park, and the mission of interpretation become overshadowed by the pursuit of a personal agenda. He becomes an advocate rather than an interpreter.

His internal authoritarian worldview, consciously or unconsciously, causes the interpreter to decide that *it's for the best* if visitors adopt his perspective rather than drawing their own, independent conclusions about proposed wolf reintroduction in the park. The interpreter reasons within himself that anyone who feels differently about this issue must be uninformed on the topic. If visitors only knew what the interpreter knows, they would surely come to the same conclusions about the importance of using park lands to reestablish wolf populations.

The interpreter is now functioning as if he has been imbued with some special social status. He feels that he is *above* visitors in regards to some social, ethical, moral, or other standard. His primary motivation is to change the minds of visitors, to convince them to arrive at a predetermined conclusion. He's betraying the trust that visitors place in him as an interpreter. The information provided to visitors becomes skewed, slanted, and incomplete. Visitor opportunities for exploring meanings of park resources are narrowed by the interpreter for the purpose of better framing his own arguments. This mindset causes him to present and argue a case rather than interpret.

This elitism can apply to organizations as well as individual interpreters — the underlying sentiments, causes, and rationales are the same. This perspective illustrates an institutional arrogance that *we* (the organization) know the truth and that our job is to *educate* or *correct* the uninformed and uneducated public. The attitude of the organization is that *we* are right and the public is wrong, and our job is to *make* the public right, to persuade them to agree with us.

The Democratic Worldview

dem•o•crat•ic \ **1 b** : of, relating to, or favoring a political system in which the supreme power is held and exercised by the people – opposed to *authoritarian* **3** : relating or appealing to or having the characteristics of the broad masses of the people **4** : favoring or disposed to favor social equality : disregarding or overcoming class distinctions : not snobbish or socially exclusive **5** : favoring the assessment of individuals upon their own merits and capacities : emphasizing the individual's potentiality for development

equal \ **1 b** : like, as great as, or the same as another or others in degree, worth, quality, nature, ability, or status; *specif* : receiving or entitled to the same treatment or privileges any other individual has or is entitled to **c** : like, as great, or the same for each member of a group or class : uniform in quantity or quality, measure or degree

Individuals naturally tend to place higher value on serving their own needs first, and the needs of those close to them (such as family members), before serving the needs of strangers. Anyone who has raised, or been around, young children can attest to this. Social equality is difficult to achieve. It's difficult to maintain. It must be taught, modeled, learned, internalized, and practiced to be perpetuated. Yet equality remains an enduring ideal, and the fundamental underpinning of a free society.

Social equality is the antithetical perspective to the authoritarian worldview. A democratic worldview and societal structure requires the individual to widen perspective and consideration beyond self and family. It inherently requires compromise on the part of the individual. It requires the development of social consensus — a public that decides which ideas best represent a compromise that is acceptable to a majority of the group, but with which everyone in the

group does not necessarily fully agree. Compromise and consensus are necessities for achieving improved conditions and opportunities for the entire citizenry.

A democratic society requires that public policy codify key values held in common. These values comprise the law of the land. It requires the law to place an equality of value on each citizen under the law, and the opportunities afforded them within this structure.

A democratic society requires an informed citizenry that strives to achieve the ideals of democracy, of equality. Citizens are entrusted with the responsibility of public policy decision-making. This responsibility is enacted through citizen participation in free elections, and citizen participation in holding elective offices to serve the populace. A bond of trust must exist among citizens — trust that governmental decisions are generally made on the basis of best benefit to the democracy. Sympathetic to natural human tendencies, checks and balances are built into the system to ensure this trust. Lastly, relevant information must be available to decision makers (citizens) as a precursor to decision-making.

A democratic worldview espouses these principles. A core belief is that people are happiest and society works best when individuals are guaranteed the greatest freedom in their quest for personal enrichment consistent with the preservation of our shared natural and cultural heritage. The challenge is to balance the individual's drive to succeed with the equitable and sustainable use of resources necessary to assure the same opportunities to others, including our descendents. It's all about the inseparable ideas of equality and mutual trust.

Authoritarian Worldview vs. Democratic Worldview

These philosophies are at work behind the scenes, influencing societal structures and relationships between people. At the societal level, these philosophies lead to two very different systems of governance and social interaction: The authoritarian worldview is based on inequality and the maintenance of special status. It is necessarily oppressive. The democratic worldview is based on equality, individual liberty, consensus, and trust. It necessarily focuses on individual liberty as long as public consensus is not substantially violated or the rights of others inequitably abridged. Special status and oppression are prerequisites to authoritarian rule. Equality of opportunity and freedom are prerequisites to the democratic idea. Any attempt to significantly blend these two

worldviews produces instability because such a societal system is internally inconsistent.

At an individual level, these two philosophies-in-opposition also give rise to two perspectives on how people approach and treat each other, personally. An interpreter can choose to believe that she possesses a position of some higher status than visitors that naturally leads her to try to persuade visitors to arrive at the same conclusions as the interpreter, and adopt the same perspective toward the resource. This is the authoritarian, elitist model at work — an inherent inequality applied to personal interactions.

Or, an interpreter can choose to trust visitors to arrive at their own conclusions and make decisions (rooted in visitors' value systems) that best benefit the society at large, premised on visitors receiving relevant information about the resource and meaningful opportunities for connection.

This is the democratic model at work. Interpretation conducted by agencies of a democratic government, or by organizations operating within the context of a democratic society, inherently places trust in the individuals that comprise the populace — its citizens.

Professional Interpreters Employ the Democratic Worldview

Society functions best if citizens continually strive to better understand different worldviews, including their own. The fabric of society is strengthened as individual citizens seek to more deeply understand their own motivations, and the consequences of their own actions. Considering why any of us think or act as we do is especially important for interpreters, who serve as guides for other citizens in their quest to experience heritage resources in meaningful ways. The interpreter's worldview inevitably influences interpretive work, and how it facilitates these experiences for others.

In America, we live and work in a representative democracy. Our institutions, governmental agencies, and private-sector organizations and businesses all operate within this overarching philosophical framework. Our society is continuously engaged in striving to achieve the ideals of equality. And professional interpreters operate from this democratic worldview. The remainder of this publication describes the daily complexities associated with interpreters supporting, enriching, and working within the context of, a free society. ••

Visitors and Multiple Perspectives

Audiences and Visitors

au·di·ence \ **3 a** : a group or assembly of listeners **b** : a group or assembly of spectators **c** : those attending a stage or film production or viewing a televised program **d** : the public reached by books, newspapers, magazines, or other similar media

vis·it \ **4 a** : to go to see or sojourn at (a place) for a particular purpose (as for business, pleasure, or sight-seeing)

vis·i·tor \ **e** : one that goes to or stays at a place for a particular purpose (as business or sightseeing) : TOURIST, TRAVELER

Organizations that facilitate people making connections with heritage resources refer to the people they serve as *audiences* and/or *visitors*. Although these terms are generally used interchangeably, *audience* tends to be used more often in conjunction with the performance of personal interpretive services, such as an interpretive talk. *Visitors* tends to be the more inclusive term overall. Generally speaking, *visitors* includes everyone who experiences heritage resources, whether they do that in person or remotely via the Internet, a brochure, an article, a film, distance learning materials, or through a curriculum.

Audiences Have Discernable Characteristics

Audience characteristics need to be taken into account in the design and presentation of interpretive services. This consideration enhances the effectiveness of communication between interpretive service and visitor. It helps ensure that the interpretive efforts of the park can most effectively facilitate visitors' explorations of the meanings of park resources. Factors to consider include the life experiences of the individual visitor or group of visitors, levels of education, learning styles, languages, socioeconomic status, cultural traditions, time available for interaction, and more.

Imagine this example of the kind of audience-based customization that occurs for a specific, personally-delivered interpretive service. "Good morning. Old Town Interpretation Office. This is Linda," the interpreter answers the telephone. After a brief discussion, Linda summarizes the conversation. "Hmm. A busload of visitors are on their way to the park. It's a tour group of 43 people. They'll arrive around 10:30 this morning. You want us to orient them and given them a short talk about the park's cultural resources. Well, we're slow this

morning; we can do that. What else can you tell me about them? You'll get back to me? Okay. Thanks for the call. Bye." Linda starts thinking about the 20-minute talk she'll deliver to these visitors. She'll combine the usual several minutes of orientation with the talk she does on the weekend walking tours. That should work just fine.

"Old Town Interpretation Office. This is Linda," she answers 15 minutes later. It's the same tour organizer. "You have an update on the 10:30 group? What's that? They're a group of *college professors*. Okay, thanks again." With this new information, she updates the content outline in her mind. She chooses to include some slightly different information, replacing some of the original content. She's also revising (and rehearsing in her mind) the vocabulary she'll use for certain portions of the talk.

"Good morning. Old Town Interpretation. You have another update? The group doesn't teach a variety of subjects. It turns out they're all *history* professors. Okay. Thanks." The new information again causes her to update the content outline in her mind. She'll talk a little more about the house on the corner where one of the historic events occurred.

It's now 10:00 in the morning, and the bus should arrive soon. "Hi. Old Town Interpretation Office. You have one last update? Uh-huh. The group is composed of college professors, who teach *American* history, and they all teach *masters program* students. Well, that explains why they're coming to this district instead of the other. Okay, glad you called. I'll let you know how it goes. Bye."

Again, the updated information is useful (and better late than never). The interpreter now has a much better grasp of the audience for which she'll be giving this talk. She can now more carefully craft the interpretive talk to maximize its effectiveness and usefulness for the audience. She can now more finely hone the style of communication she'll use, and the approach to the subject matter. Her concept of what would be the best presentation style has shifted throughout the morning's calls, and the content has shifted, too — not based on telling the group what an average cross-section of the general audience wants to hear, but choosing different aspects of the park's resources, different terms, different sets of resource-based information and perspectives to convey to the group. Opportunities for visitor understanding and appreciation of park resources are likely to have increased by virtue of these additions to her knowledge of the group — and the interpreter's skill in using this information in the design and presentation of her talk.

Sometimes events unfold just like this example. Sometimes this kind of information is gathered by purposefully chatting with individuals in the visitor group immediately before presenting an interpretive talk. Sometimes visitor survey data provides useful insights into audience characteristics. Regardless of how it happens, considering audience characteristics is a necessary step in ensuring that intended communication actually occurs, that the interpretive service is relevant to as great a percentage of the audience as possible, and that opportunities for personal connection to heritage resources are maximized.

Most interpretive services are designed and presented to the *general audience*, assuming that the group is the same as (or identifies with) the majority culture of the society. The basis for categorizing interpretive audiences — either for strategic, programmatic purposes, or for the purposes of a specific interpretive service, such as a talk — lies in the degree to which a particular audience requires communication in a way distinct from that of the general park audience to maximize effective communication. A pragmatic balance must be considered between communicating more effectively with multiple specific audiences, and communicating more effectively with the general audience. The limited resources available to the park's interpretation & education program are always an important, real-life factor in such considerations.

Visitors Have Rights

Visitors to American places that interpret heritage resources do so within the context of our representational democracy. The democratic social philosophy that defines American ideals, premised upon an inherent equality among individuals, naturally extends *rights* to visitors. (This is especially true for government agencies that conduct interpretation.) Visitor rights guide the interaction between interpreters and visitors. It is incumbent upon interpreters to perform their duties based on an understanding that all visitors have the right to:

- have their privacy and independence respected;
- retain and express their own values;
- be treated with courtesy and consideration; and
- receive accurate and balanced information.[5]

Respecting Visitor Privacy and Independence. Imagine this scene. Two parents with their three children are visiting a state park. They're enjoying a picnic lunch under some large shade trees next to the visitor center. A veteran interpreter (Paul) is training a new seasonal interpreter (Jeanette). They're conducting roving interpretation, and notice the family at the picnic table. Without making eye contact or receiving any other sign that the family would enjoy visiting with them, Paul makes a beeline for the family (and Jeanette follows).

The veteran interpreter arrives at the table, puts his foot up on the end of the bench, and leans forward with his tie dangling precariously over the potato salad. Jeanette keenly observes how Paul greets and engages the family. She

watches the family members' body language as they lean away from Paul and glance askance at each other.

Paul provides them with some information that they're not really interested in hearing. The veteran interpreter doesn't notice that the family members aren't clearly responding to what he's saying — he's just going through his routine greeting talk, believing that this is another good and useful interpretive contact.

Jeanette is trying not to look too embarrassed. Thankfully only a few more minutes pass before the interpreters depart. The family is relieved to be free of the interruption, although they do have a new topic to discuss once the interpreters are out of earshot: They confide in each other how rude that ranger was.

Paul never noticed his overbearing encroachment on the family's space and time together. He unwittingly provided Jeanette with a fine example of what *not* to do as a roving interpreter. When the privacy and independence of visitors is not respected by interpreters, an interpretive contact can be a negative experience rather than a positive one. Visitors have rights. Interpreters need to respect them.

Presenting Accurate and Balanced Information while Courteously Respecting Visitor Values. Imagine this scene. Miguel interprets at the historic home of a well-respected, famous politician. In the middle of his interpretive tour, he asks if anyone has questions or comments. One visitor, Steve, speaks up and says this politician lacked integrity. Steve is stating an opinion with which the majority of the audience initially disagrees. Miguel can see this as it plays across their faces.

Miguel acknowledges Steve's opinion with a polite nod and a smile, and asks him why he feels this way. Steve responds that the author of the book he just read contended that the politician wasn't really responsible for the things he's noted for doing; it was others who did the real work and the politician unfairly claimed the credit, just like all politicians do.

Miguel pauses, then cites two additional opinions from newspaper editorials written at the time of the event. The articles not only vary some from Steve's author's account, but also vary from the generally accepted account that was presented earlier in the interpretive tour. The articles also cast some doubt onto the matter regarding who really did what, when, and why. Some of the visitors' body language reveals their contemplation of these additional perspectives.

Miguel then says, "You can see that, although most of the contemporary writing of the time stated that [the politician] actually did these things, one account points to his staff, and other accounts point to politicians from another state. We'll never know for sure since the official records themselves are rather ambiguous, but most historians tend to think that the event, as most commonly reported, is the most accurate version. Consider this variety of opinion as we look at the documents in this next room, his study. The political cartoons on the desk are especially interesting...." And the tour continues.

The interpreter initially presented the perspective that most historians think is accurate. Later, other perspectives were interjected into the tour, some of these coming from the visitors themselves. The interpreter designed the interpretive

service this way so that he could more effectively engage the visitors in the story and provide additional depth based on their interests and opinions. Steve's viewpoint was acknowledged, responded to in a respectful manner, courteously considered by the group, and then additional perspectives were also brought into play. The interpreter presented accurate and balanced information from multiple perspectives while enabling visitors to express and retain their own values, and did it all with the courtesy that visitors should expect of interpreters. The interpreter restated the view that most historians think is accurate, the one that has the best scholarly support. And the tour continued as the group mulled over these various accounts. This is an example of responsible interpretation.

Visitor Motivation. Another important tenet regarding visitors describes their motivation in simple terms: Visitors are motivated to visit heritage sites — to pursue park experiences — in order to find something of value for themselves. And the design and presentation of interpretive services sometimes play a significant role in aiding, or hindering, this pursuit.

The Democratic Worldview and Multiple Perspectives

> **mul•ti•ple** \ **1** : consisting of, including, or involving more than one **2** : MANY, MANIFOLD, SEVERAL **5** : having numerous aspects or functions : VARIOUS, COMPLEX
>
> **per•spec•tive** \ **2 a** : the interrelation in which parts of a subject are mentally viewed : the aspect of an object of thought from a particular standpoint : CONFIGURATION — **in perspective 1** : as viewed in the mind : in prospect : ANTICIPATED **2 a** : represented according to the principles or perspective **b** : viewed with a proper pattern of relationships as to value, importance, or other basic quality
>
> **point of view** \ **1 a** (1) : a particular position (as in space, time, development) from which something is considered or evaluated : STANDPOINT, VIEWPOINT (2) : a particular manner of considering or evaluating something **b** : a particular reasoned mental attitude toward or opinion about something
>
> **view•point** \ **1** : an attitude of mind from which something is considered **2** : a position from which something is observed

In a pluralistic, free society, interpreters have a responsibility to present subject matter from a variety of perspectives. The reasons for doing this are to aid in accuracy and increase the relevance of the resources to diverse audiences. The inclusion of multiple perspectives in the design and presentation of interpretive services respects the very idea of a pluralistic society. It provides visitors with a variety of opportunities to consider, explore, and engage ideas from multiple viewpoints.

Different from single-perspective services, multiple-perspective services provide more food for thought and contemplation. They reinforce existing beliefs and knowledge. They challenge existing beliefs and knowledge. They provide opportunities for thinking at deeper levels, or higher levels, or more-complex levels. They prompt more sharing, discussion, and interchange. They respect different ways of knowing. They better facilitate visitors personally connecting to things and places, events and people, because

relevance to visitors is enhanced through the use of multiple points of view.

Relevance and Familiarity

Some of the perspectives presented in a specific interpretive service will be familiar to some visitors and unfamiliar to others. Familiar ideas tend to be more relevant to the recipient of the communication — visitors can relate the ideas to their own experiences. Such relevance creates an environment more conducive to establishing new personal connections, or enhancing existing ones. Familiar ideas provide a footing from which individuals can extend themselves outward to consider additional aspects of the material being presented.

Unfamiliar ideas also provoke contemplation, but are often approached more cautiously by the recipient since there is much less of a footing for them to use in considering the material being presented. If they haven't yet established a conceptual framework that allows them to understand these ideas, then the ideas don't seem relevant to them and have little meaning for them. Unfamiliar ideas travel different routes (than familiar ideas) through the various filters that people use internally to make sense out of the world. More testing occurs with unfamiliar ideas than with familiar ones, since familiar ideas tend to more neatly plug into predetermined receptacles in an individual's worldview.

Designing and presenting an interpretive service to include multiple, familiar ideas is likely to increase relevance of the service to visitors. This approach lays the groundwork for visitors' consideration of unfamiliar, less immediately relevant, ideas. (Learning occurs in this netherworld between familiar and unfamiliar as the individual creates connections to ideas that are new to them.) Designing multiple perspectives and universal concepts into an interpretive service increases the likelihood that, among a group of visitors, each will find some of the material familiar and relevant. It is, in some ways, a numbers game. More ideas increases the likelihood that each individual in an audience will recognize one or more of these ideas as familiar and relevant. Learning opportunities are primed. Ability to encounter and consider diverse ideas is enhanced.

Interpretive services built from a multiple-perspectives approach invite the active intellectual and emotional participation of visitors, resulting in interpretive services that are more accessible and meaningful to a greater percentage of the audience.

Multiple Perspectives vs. Polarized Positions

Presenting multiple perspectives does not mean presenting two polarized positions instead of a single position. Polarization causes people to react defensively. It causes visitors to mentally and emotionally shut down and reject ideas, rather than open up and welcome ideas. Polarization creates either/or, right/wrong, with/against us reactions that are frequently detrimental to the interpretive presentation of a variety of ideas worthy of consideration. Polarization may be good for television ratings, but is detrimental to the personal pursuit of meaningfully exploring ideas.

Polarization purposely eliminates a range of ideas in order to focus on a diametrically opposed subset. In reality, no subject or issue has only two points of view, or sides, or approaches. All topics can be appropriately considered from multiple points of view that overlap and intersect, yet retain their own shape and form, one view distinct from another. Some are slightly different from one another; others are markedly different. Contrast between ideas can vary widely, even without being polarized, since ideas fill the range between poles as well as establish the poles themselves. A responsible discussion and exploration of ideas will frequently include as many of these viewpoints as sound scholarship supports and circumstance allows. Since visitors will likely contribute both scholarly and non-scholarly information to the conversation, one of the interpreter's greatest challenges is to understand the difference and guide the discussion in such a way as to avoid embarrassing or offending the person(s) who voiced ideas that have less scholarly merit.

Perhaps one of the most important revelations of interpretive work is how people can experience the same resource and yet arrive at divergent opinions and conclusions about it. They assign different meanings to it based on their life experiences, personal beliefs, levels of education, cultures, learning styles, languages, socioeconomic status, and a host of other factors. One of the great strengths of a democratic society is that it creates a relatively safe environment for many divergent views to coexist. Interpretation consciously promotes such an environment.

The Perspective of Interpretation

Interpretation as a profession is not devoid of an overarching perspective itself. But not, perhaps, in the ways that might first spring to mind. Professional interpretation does not seek to reveal, or revere itself as purporting to know, *the truth*. It does not represent an *official* view of some event or phenomenon to the exclusion of other views. It does not communicate a *single* perspective to the exclusion of all other perspectives. It does not even represent *management's* view to the exclusion of other views.

Interpretation, like other professions, has its own culture. It is a subset of the society within which it functions. And cultures can be understood and characterized: Cultural traits include bodies of customary beliefs, social forms, and material aspects. Cultures have tenets, standards, ethics, boundaries, traditions, and often attract like-minded adherents to these traits.

By its very nature, the profession of interpretation echoes the values that society places on heritage resources as a whole. When a society places value on setting some resources aside for perpetual public enjoyment, or builds memorials that exemplify or commemorate some important aspect of culture, interpretation and interpreters exhibit a mindset that identifies with these values. For instance, interpretation supports heritage preservation, and public access to it, reflecting the values of a democratic society.

The profession of interpretation regards its role, in both society and the lives of individual citizens, from a viewpoint that fosters ideas like:

- Life, liberty, and the pursuit of happiness are rights worthy of the effort needed to assure them.
- Every person has guaranteed rights.
- Democratic social structure necessitates accessible, balanced, and accurate information.
- Multiple perspectives are better discussed and considered rather than ignored or denied.
- Discussion is better than avoidance; yet valuing silence at the right time is golden.
- Curiosity is better than lack of interest.
- Learning is a lifelong process; there is more to learn than can be learned.
- Knowledge is better than ignorance.
- Heritage is worth preserving.

All of these ideas manifest themselves in professional interpretive work. If interpretation works toward persuading visitors of anything, it is these broad tenets of the democratic worldview.

But persuasion does not mean argument. Trying to argue someone into a point of view is ineffective. If people have an opportunity to explore resource-relevant ideas from multiple perspectives, the democratic worldview trusts that the majority eventually adopt perspectives that perpetuate values held in common by the group of people in question (family, community, state, nation, humans). Better-informed citizens make better decisions — a mandatory condition for the perpetuation of a democratic society and the liberties it safeguards.

Visitor Contacts

Interpretive Venue and Audience Size

Visitor contacts occur in a variety of venues. Some involve large audience groups, some small groups, and some only one visitor at a time. It's important for an interpreter to understand the dynamics of these different settings and situations.

Formal interpretive talks tend to be presented to larger groups of visitors. When an interpreter presents a talk to such a group, the group usually conveys a degree of authority and respect to the interpreter. This situation may feel to the visitors like a relatively safe way of gaining information about the park since no individual visitor stands out from the others.

Depending on the personality of the interpreter, he or she may also feel that this is a relatively safe venue because formal programs tend to have a predetermined format, are relatively well organized by the interpreter, and tend to offer much less of an opportunity for an unrestricted free-for-all than other types of interpretive situations. In this setting, if an audience member asks a question that might take the discussion in an unprofitable direction for the group, the interpreter must bring the conversation back to the organized content of the talk. The group venue necessitates this action.

By contrast, when an interpreter performs roving interpretation and encounters a single visitor who'd like to converse, the dynamics for this situation are substantially

more fluid than the example above. The visitor may or may not consider the interpreter an authority. The discourse will likely be more informal and candid. The encounter with a single visitor also lends itself to greater subject depth, since time constraints are usually less stringent. This differs from most other interpretive situations: The roving interpreter has an opportunity to participate in conversations that evolve organically with relatively few boundaries. This one-on-one exchange also provides an opportunity for the interpreter to customize the application of knowledge about resources and visitors to best fit the needs of this individual visitor.

Personality comes into play more directly here, too. For people who enjoy one-on-one conversations, this is a wonderful opportunity for a rich exchange of ideas. Conversely, the visitor may avoid such contact and telegraph this avoidance through a variety of behaviors. Unfortunately, this is also sometimes true of the interpreter — he or she may feel less safe in such a free-for-all conversation and may avoid making such a visitor contact, or once initiated, try to disengage as soon as possible.

The venue and size of the audience can vary greatly in interpretive work. They always play a part in determining what social dynamics apply to the situation, and how the interpreter can make the most of the interpretive contact for all involved.

Interpretive Moments

Visitor contacts occur in a wide variety of locations: They occur remotely on computer screens, through postal mail, in classrooms, in Rotary Club meetings and chambers of commerce breakfasts, and area hotels. They occur onsite at entrance stations, in visitor centers, at information or sales desks, in parking lots, on trails and overlooks, lakes and rivers, in frontcountry and backcountry. And the interpreter, in all of these settings, is performing a variety of duties and providing a variety of interpretive services ranging from roving contacts to formal talks, demonstrations to living history presentations. The professional interpreter in all of these situations is possessed of a certain mindset that guides his or her interaction with visitors.

Imagine this scene. "Hi," the interpreter greets the couple at the overlook. "Great weather we're having. Where y'all from?" This kind of informal exchange of pleasantries — small talk — is the most frequent way that visitor contacts begin. It's a fairly universal convention in human communication.

As the conversation continues, the interpreter is thinking about several things at once. Are the visitors willing to engage in dialogue, or should I move on so that they can continue their experience without interruption? Do they appear to be rushed? Is small talk the level of depth that they're comfortable with, or are they saying things or asking questions that prompt more detailed responses from me? What does their body language tell me about their interests in this personal exchange?

The professional interpreter is listening, watching, assessing, and determining what interpretive opportunities might be appropriate to offer to these visitors during this contact. To what extent can this contact be turned into something more meaningful for them? Is there an opportunity to go beyond small talk and delve deeper into potential

resource meanings, turning this into more of an *interpretive moment*? If they only want to know the location of the nearest gas station, or where to go for lunch after they're done here at the overlook, that's okay. Interpreters routinely provide basic orientation, way finding, and safety information to visitors. If this is the case, the professional interpreter will answer their questions, wish them an enjoyable day, and move on — a solid informational contact.

Or, perhaps these visitors *are* interested in more in-depth information. Perhaps they're curious about the landscape features visible from here, and why that valley looks so different from the one on the left. *Why* is a most wonderful word, as it often signifies an interest in and curiosity about underlying reasons, causes, processes, actions, procedures, effects, and other interrelationships. The willingness of visitors to interact with the interpreter makes for the beginnings of an interpretive moment — a real opportunity for the interpreter to enrich and enhance the visitors' consideration of, and engagement with, meanings of park resources. However, what visitors want from an interpreter is not always so clear.

Imagine this scene. An interpreter (Keesha) is leading an interpretive walk through a redwood forest. As Keesha and the group of visitors move along the trail, she identifies the flowers in bloom and talks about forest ecology. They round a bend in the trail and pass a bench. The bench is made of wood. A visitor asks, "What kind of wood is that bench made of?"

Keesha says, "I'm not sure what kind of wood they used for that," and she continues to lead them along the trail. Oops, an interpretive moment — perhaps the most significant opportunity of the entire walk — may have just been missed by the interpreter. What happened?

Keesha, it turns out, is very comfortable identifying flowers, animals, and trees. She's comfortable talking about how the components of the larger forest system all interrelate. She is well aware that the bench is made of redwood. She is not, however, comfortable discussing anything that might be controversial, like conflicting values that people place on these resources. Because of this, she chose not to pursue the golden opportunity that occurred when the visitor asked about the bench.

Now imagine the conversation that could have taken place:

"What kind of wood is that bench made of?" a visitor asks.

"This bench is made of redwood," Keesha responds. "We didn't cut down a healthy tree to make this bench, though. Redwoods are sometimes uprooted and fall down, mostly through the action of winter storms. Sometimes they fall in the middle of the forest, where they are left to decompose naturally and recycle nutrients into the forest environment. Sometimes, though, they fall onto roads or across trails like this one. When that happens, we remove a portion of them to continue to provide visitor access on established trails." As Keesha speaks, she makes sure to engage the visitor group, her eyes roaming from one face to another.

"In fact, I think the tree used for this bench fell last year across the trailhead where we assembled this morning. Anyway, we use removed portions of downed trees in the park for trail signs and benches like this. In this way, we're managing the park so that visitors like yourselves can get

around and see this magnificent stand of redwoods, and we're also able to show what a beautiful wood this is when crafted into a bench."

In this version, Keesha was exhibiting the mindset of an interpreter. She was ready to respond in a meaningful way when an interpretive opportunity presented itself, even though it might be controversial. While some people seem to have this mindset naturally, other interpreters must cultivate it. Interpreters ready to capitalize on interpretive moments like this visitor's question about the bench inevitably provide richer experiences for visitors, better performing their duties as interpreters.

It's important for an interpreter to hear the question underlying what the visitor literally asks, and to strategically determine how to respond. Was the visitor really asking: "How can you use a redwood tree for something as mundane as a bench? Doesn't that conflict with what the park is supposed to do, ya' know, conserve the forest? Or keep it from being harvested for commercial use?" Keesha was challenged to determine what questions were on the mind of the visitor asking "What kind of wood is the bench made of?" — and probably on the minds of others in the group, too. So, whenever practical and appropriate, her response should address both the literal question and the potential questions.

Sometimes it's better for the interpreter to pretend that he or she *didn't* hear the underlying question. If the interpreter thinks the underlying question will not serve any useful purpose — if the visitor is being deliberately argumentative or disrespectful — the interpreter can choose to interact with that visitor on a literal level only, answering the actual question asked instead of what the interpreter, and everyone else in the group, thinks is *really* being asked. It is important for the interpreter to understand both sides of this dynamic, recognize them as they occur, and make intelligent and productive choices when responding. The mission of interpretation should remain the foremost guide in making these choices: While respecting visitors' rights and other tenets of the profession of interpretation, how can my response to the visitor's question best facilitate opportunities for visitors to explore their own intellectual and emotional connections to the natural and cultural resources that comprise shared heritage?

When Visitors Ask "What's Your Opinion?"

When On Duty. What should an interpreter do when asked his or her opinion? Or asked any other kind of personal question? When in uniform, the interpreter represents the heritage preservation organization, even when asked a personal question. Regardless of how an interpreter might answer such a question, the answer will almost always be viewed by the asker as representing the interpreting organization. It is within this context that interpreters answer such questions, and if they are good at what they do, they turn the personal question and answer into another interpretive opportunity.

Imagine this scene. The landscape of a battlefield park has changed over time and no longer represents the landscape in which the battle was fought. Not only do beautiful, large, old trees ring the battlefield (as they did during the historic battle), but over the park's 70-year history, management has also allowed trees to spring up and grow upon the military earthworks that were constructed as part of the battle. The public has come to know the park's landscape in its present form, appreciating the tall trees and, especially, the wildlife they foster. Terry, an interpreter on staff, shares that appreciation.

Recently, park management has decided to return the landscape to the form it was in at the time of the battle so that visitors can better understand and appreciate the battle event. This will necessitate removing the trees from the earthworks — trees that the public has come to associate with this special place. The park staff are generally in agreement with this decision. Terry, however, is personally opposed to the trees being removed on the grounds that preserving wildlife is equally important to the park's mission. She is an avid bird watcher and worries that removing the trees will adversely impact some of the species in the park.

"Any thoughts?" inquires Terry as she pauses in her interpretive talk.

"Terry, I've heard some of the rangers here don't want these trees to be removed, even though that's what the Superintendent wants to do. How do you feel about that, personally? I mean, look at all the bird life that will have to go elsewhere!" Mark, a visitor, exclaims as he motions to the canopy overhead. He continues, "I thought park rangers were supposed to preserve wildlife. Besides, it can get really hot here. Don't visitors enjoy the trail better if they're shaded in the summer?" he says, making eye contact with the others in the group.

"Well, like most decisions, there are several sets of values to be considered," Terry responds, addressing the entire group. "The mission of the park is to preserve the battlefield. The legislation is clear on that. But we're also supposed to preserve the wildlife and natural systems that support it. That's a large part of what our organization does. Sometimes, those two ideas are at odds and one needs to become a priority over the other. Ideas and values have to be carefully weighed."

"You've also raised the idea of what this park has come to mean for local citizens, some of whom — like you, Mark — have personal connections to it. How do the rest of you feel about this?" she inquires.

"I've got connections to it, too," Byron volunteers. "My great grandfather fought in the battle here." He pauses. "Frankly, I'd like to see the land restored to the way it was during the battle."

Multiple points of view have been voiced and Terry continues the conversation in such a way as to provide a safe place for an open exchange of ideas. Together, they explore each idea, the values behind it, its potential benefits and trade offs — including why the park thinks the removal action is necessary and appropriate.

Considering her options, Terry chose not to answer the original question directly because she didn't believe that indicating her personal opinion would enhance interpretive opportunities. It was too likely that providing her own opinion would be seen as taking sides, potentially dividing the group into *us* and *them*. Terry's personal opinion happened to match some of the visitors' views of these resources, but she did not identify it as such for the group. After all, this interchange is not about Terry, or her opinions. As an interpreter on duty, she is a guide for others, a facilitator of considerations and connections.

Instead, Terry chose to use the visitor's question as an opportunity to provide additional insights into how various perspectives exist regarding the trees. These insights provided ample opportunities for various members of this visitor group to think about how they, themselves, seek to understand the world, and how they personally internalize what having these trees around means to them. Each found relevance in her answer and the subsequent exchange of views. They could personally identify with at least some of what was said, while considering some of the more unfamiliar ideas, weighing them against their own values.

When Off Duty. Being asked personal questions during off-duty times, when not in uniform, and when not being paid as a park employee, is also an interesting and sometimes-complex facet of working as an interpreter. This may be especially true when the park is located in a relatively small community, and park employees become known and recognized by other community members. A chance meeting at the post office, on an interpreter's day off, sometimes has little bearing on how they answer such questions.

Imagine this scene. "Hi Frank. How's the family?" asks Frank's neighbor, George.

"Ellen and the kids are fine. How's Peter doing in school?" answers Frank, an interpreter at the park.

"He's finally catching on to geography," George replies, grinning. "Say, what's up with the [any park issue]? I hear the superintendent decided [any decision]."

Frank is not in uniform. He is off duty. George knows that Frank is an interpreter at the park, *and* that he's off duty. Frank has his own, personal opinion about the superintendent's decision. And he knows how the superintendent or public information officer has been answering this same question all week long in the local press. How does Frank answer such a question in this setting? What does he consider? How well does he know George?

"The superintendent laid it out for us this way: [explanation here]. It was a difficult choice but an open and honest decision," Frank says. He also goes on to voice his personal opinion about the decision. (Note that it might not matter if his personal opinion agrees with or disagrees with the decision. Either way, there is always something valuable at stake in human interaction — professionally and personally.)

What if George were not only a neighbor, but also a member of the city council? Would Frank still voice his own opinion? Would he do it differently, providing more context? Would he choose to represent only the superintendent's decision and why it was made, essentially serving a public relations role on his day off?

What if George was also the president of the local historic preservation society? Or, what if George was a newspaper reporter? Is Frank going to find this discussion, and his personal opinion, cited in Monday's column as background? Or quoted as an official park position?

All of these are real-life considerations for an interpreter. A professional interpreter is, to some degree, always on duty. He or she needs to consider the ramifications of sharing personal opinions *before* doing so. The interpreter can never know for sure if the asker is pursuing a personal, unvoiced agenda. Or, maybe the asker is just a curious citizen. There is

no single best way for an interpreter to respond. It's always a subjective call on the part of the interpreter, and one not to be made in haste.

The Discomfort of Controversy

Controversy and disagreement can be uncomfortable. Disputes, contention, strife, and controversy can be unpleasant. And if the mission of interpretation were to avoid controversy, then interpreters would be justified in staying well clear of anything considered controversial. Every service they designed or performed would be safe, even reaffirming, for both the interpreter and the audience.

However, the avoidance of controversial ideas is not the mission of the profession. Interpretation is the profession that offers enhanced opportunities for visitors to explore their own intellectual and emotional connections to the natural and cultural resources that comprise shared heritage. The profession includes the presentation of multiple perspectives. It includes presenting some ideas that may be uncomfortable for some visitors (and interpreters). It includes presenting some ideas that affirm the perspectives of some visitors (and interpreters). It includes ideas that provoke thought and understanding and appreciation, and cause visitors (and interpreters) to contemplate their own perspectives. It always includes accurate and balanced information. And it all happens within the context of visitor rights.

To some degree, the idea of controversy is a matter of scope. Every subject is controversial for someone. In general, though, if meanings, values, and ideas are exchanged and explored, controversy will likely be a feature of the interpersonal dynamic. It simply goes with the job. The task is to embrace it and make it something useful.

Imagine this scene. Jan, a new seasonal interpreter, enters the office of the supervisory ranger, Corina.

"I saw your talk this morning and wanted to congratulate you. You handled that visitor pretty well. I couldn't believe it when he said 'I wouldn't mind owning a few slaves myself.' Good job with that. And your presentation style and delivery are improving, too."

"Thanks," said Jan. "It was interesting alright."

"Let's talk about your outline. I didn't hear any perspectives of slave owners or traders; you just talked about the lives of the slaves themselves. Why didn't you include some other perspectives?" Corina asks gently.

"Well, in doing my research, I *did* find the journals we talked about last week. But I just couldn't bring myself to use them. They were just so demeaning," she said. "Valuing humans as a commodity; how could one person do that to another? There just aren't any good reasons for a slave trade to have existed. I would be embarrassed reading anything from those journals," Jan concluded.

"Moral or not, good reasons or not, the ideas of state's rights, tradition, maintenance of a lifestyle, oppression of the powerless by the powerful — all of these played important parts in the slave trade. These are facts whether or not we agree with the ideas behind them. It happened; they're part of the story, *our* history.

"Remember, our job isn't focused on talking about only those ideas with which we can all agree. Are there really any of those, anyway? Every heritage resource is controversial in

one way or another. Talking about uncomfortable issues, or encountering controversy fueled by a visitor — these things go with the job.

"As interpreters, we can't ignore uncomfortable issues or ideas connected to the resources. Our job is to employ them in a balanced and accurate manner that is useful for visitors — useful for them to make their own connections. Appropriate to the resources of this site, we place this activity — slavery — into the context of its time. That means we have to include all of the valid perspectives, including the multiple reasons behind the slave trade. Why did some people consider it moral to own another human being? What ideas were behind that? If we don't address questions like these, we're improperly shielding the public from what really happened. We're presenting half-truths. We're denying visitors the opportunity to arrive at their own conclusions. We have to trust that being presented with the actual events, in depth, from multiple viewpoints, all based on sound scholarship, helps visitors deepen their understanding and appreciation of this site's history — and what it all means to them, individually. Does that make sense?" Corina concluded.

"Yeah, I think I'm getting your drift," Jan answered. "But if I do what you suggest, how can I trust visitors to eventually arrive at reasonable conclusions? After all, there are others out there like this guy, this wanna-be slave owner. How can you trust people so much?" Jan asked with a bit of exasperation.

"You're right," Corina responded, "Trust is a scary thing. But I'd like you to think about the alternative. You know, you can't *make* other people adopt your view on this — or on anything. There's no way to make that happen. And if we could, *should* we? The best we can do as interpreters is to make sure we provide accurate and balanced information, and do it in a way that's relevant to visitors in order to provide them with opportunities to reasonably consider multiple aspects of whatever resources we're discussing. You've gotta trust that all of us is smarter than any one of us, and that reasonableness wins in the end.

"One last thing," the supervisor said. "I didn't see it this way, either, when I started out as an interpreter twelve years ago. I thought I could change the world through sheer force of will and persuasion. But the more I dealt with visitors firsthand, the more I came to realize that trust really is at the heart of what we do — what societies like ours do.

"Okay, okay. I see your point. But I reserve the right to return and debate you on this," Jan said, smiling broadly.

"Okay Jan. My door's open anytime — you know that." Corina said, smiling just as broadly. "Why don't you bring me one of the journals. We'll look through it together and extract some of the more useful passages. Then, you can modify your outline before Thursday's talk," the supervisor suggested. "Oh, and Jan, be assured that now and then, you're going to encounter people whose values don't jibe with what most people consider the injustices of the past. Don't let them get to you. You did good today."

When placed in proper context, uncomfortable ideas can be immensely useful in the interpretive endeavor. It's important for interpreters to get comfortable with discomfort. It's important to truly internalize the philosophy of multiple perspectives, and understand why professional interpreters necessarily rely on this powerful tool.

Multiple Perspectives and Attribution

at•tri•bu•tion \ **2** : the process of ascribing to someone or something **3** : the ascribing of a work to an author, date, or place; *esp* : the ascribing of a work of art to a particular artist

Often, the specific way that perspectives are presented can positively or negatively contribute to the visitor's park experience. For instance, a statement without attribution can sound dogmatic, judgmental, or absolutist — especially if it is misunderstood to reflect an organization's official position rather than representing sound scholarship. An attribution that adds appropriate and useful context to an interpretive statement can go a long way toward removing potential roadblocks to learning and appreciation.

Imagine this scene. One of a park's wayside exhibit panels includes the following statement.

- The reddish rock layer is 3.5 million years old.

This statement of age, which could appear as an organization-authorized declaration of incontrovertible fact, is likely to be seen by visitors who possess a faith-based understanding of time as deliberately disrespectful of their point of view. This writing style may reinforce negative feelings or thoughts in such visitors, reducing opportunities for learning rather than enhancing them.

The same sentence could include an attribution of this information for the specific purpose of providing additional context while maintaining the communication intent of the original statement:

- Geologists have calculated a radiometric date for the reddish rock layer at 3.5 million years old.

Although most visitors probably, subconsciously attribute the original statement to geologists, actually seeing it in print can reaffirm this assumption and help them know for sure *who* is making the statement (geological scientists), *on what basis* this statement was reasoned (scientific dating methods), and the *validity* of the analyses and conclusions (representing geologic scholarship).

It's important to note that a single, skillful attribution can serve to clarify a single caption, a whole exhibit, an entire exhibit suite — or whatever follows in sequence. For instance, early in an evening program, an interpreter might say, "There have been several new research studies completed here by hydrologists from the universities of California and Colorado. I'd like to share some of their findings with you this evening. They shed some new light on our understanding of the ancient environment here...."

These simple examples demonstrate how attribution can add useful and appropriate context and specificity to an interpretive service. It enables a more inclusive and open exchange of ideas, and can make interpretive services much more relevant and respectful to the widest possible diversity of visitors. Attribution is neither a disclaimer nor an apology — it just clarifies the sources of scholarship being referenced, thereby improving the effectiveness and relevance of the service.

Interim Updates to Exhibits

Because exhibits are very expensive to produce, opportunities to substantially update them do not occur very often. Outdated exhibits are often inaccurate, use insensitive language, lack multiple perspectives, and/or do not include new discoveries that have a bearing on the exhibit's content. In essence, older exhibits may no longer reflect current scholarship or interpretive philosophy.

In instances where funds for exhibit replacement are unavailable, parks can inexpensively update them in a way that explains how current scholarship has progressed beyond the original content. Such interim messages are usually produced in-house by the park's interpretive staff and displayed on or near outdated exhibits.

In effect, such an update interprets previous perspectives about park resources. The update can have a significant impact all its own in exploring larger ideas such as the evolution of scholarship, why people pursue knowledge, how knowledge progresses, how knowledge is communicated, and the ripple effects of new knowledge. These ideas, expressed through such interim measures for outdated exhibits, can offer new and powerful opportunities for learning and appreciation.

Multiple Perspectives and Jargon

jar•gon \ **3 a** : the technical terminology or characteristic idiom of specialists or workers in a particular activity or area of knowledge; *often* : a pretentious or unnecessarily obscure and esoteric terminology **b** : a special vocabulary or idiom fashionable in a particular group or clique

Every profession, be it composed of scientists, historians, theologians, or other specialists (including interpreters), uses jargon. The jargon of a profession is a profession-specific customization of common language. Professional jargons evolve over time to meet the specific communication needs of the members of a profession. The use of jargon within the profession allows for more meaningful dialogue in a shorter span of time, and in less effort being expended to have a useful exchange of ideas. Jargon is shorthand that includes abbreviated words, terms, and phrases that represent larger, more complex processes and meanings.

When interpreters conduct research in preparation for designing an interpretive service, they will likely encounter jargon in the specialists' papers or other communication materials that they are reviewing. In the translation of this material into a useful format for the public, interpreters should take care to understand the material in both its professional context, and from the perspective of visitors and the use of common language. Jargon either needs to be carefully explained to visitors (so they can comprehend it within an appropriate context) or eliminated from the interpretive service altogether on the basis that using confusing terminology is antithetical to interpretation. ••

Multiple Perspectives and Scholarship

Scholarship in Interpretation

fact \ **3 a** : something that has actual existence : EVENT **b** : an occurrence, quality, or relation the reality of which is manifest in experience or may be inferred with certainty; *specif* : an actual happening in time or space **c** : a verified statement or proposition; *also* : something that makes a statement or proposition true or false **4 a** : the quality or character of being actual or of being made up of facts : ACTUALITY **b** : physical actuality or practical experience as distinguished from imagination, speculation, or theory **5** : an assertion, statement, or information containing or purporting to contain something having objective reality; *broadly* : something presented rightly or wrongly as having objective reality

know•ledge \ **syn** KNOWLEDGE, SCIENCE, LEARNING, ERUDITION, SCHOLARSHIP, INFORMATION and LORE agree in signifying what is or can be known. **KNOWLEDGE** applies to any body of known facts or to any body of ideas inferred from such facts or accepted as truths on good grounds. **SCIENCE** still sometimes interchanges with KNOWLEDGE but commonly applies to a body of systematized knowledge comprising facts carefully gathered and general truths carefully inferred from them, often underlying a practice, usu. connoting exactness, and often denoting knowledge of unquestionable certainty. **LEARNING** applies to knowledge gained by study, often long and careful and sometimes connoting comprehensiveness and profundity. **ERUDITION** usu. stresses wide, profound, or recondite learning, sometimes suggesting pedantry. **SCHOLARSHIP** implies the learning, careful mastery of detail, esp. of a given field, and the critical acumen characteristic of a good scholar. **INFORMATION** generally applies to knowledge, commonly accepted as true, of a factual kind usu. gathered from others or from books. **LORE** suggests special, often arcane, knowledge, usu. of a traditional anecdotal character and of a particular subject.

schol•ar \ **2 a** : one who by long systematic study (as in a university) has gained a high degree of mastery in one or more of the academic disciplines; *esp* : one who has engaged in advanced study and acquired the minutiae of knowledge in some special field along with accuracy and skill in investigation and powers of critical analysis in interpretation of such knowledge

schol•ar•ship \ **3** : the body of learning and esp. of research available in a particular field **syn** see KNOWLEDGE

Professional interpretation is always based on scholarship — on knowledge that is commonly held by scholars to be relatively well established and, especially in the "hard sciences," statistically well established. The world of scholarship defines the appropriate knowledge base from which interpretive services about heritage resources are

researched, designed, and presented. This idea is fundamental to interpretation organizations everywhere, including the National Park Service, whose policy states that "Interpretive and educational programs will be based on current scholarship and research about the history, science, and condition of park resources, and on research about the needs, expectations, and behavior of visitors. To accomplish this, a dialogue must be established and maintained among interpreters, education specialists, resource managers, scientists, archeologists, sociologists, ethnographers, historians, and other experts, for the purpose of offering the most current and accurate programs to the public."[6]

What is Scholarship?

Scholarship is the process that adds to and modifies a body of knowledge. It moves knowledge forward. Scholarship provides the context within which meaningful research occurs. At the same time, research is also an aspect of scholarly activity.[7]

For any activity to be designated as scholarship, it should manifest at least three key characteristics: It should be public, susceptible to critical review and evaluation, and accessible for exchange and use by other members of one's scholarly community. We thus observe, with respect to all forms of scholarship, that they are acts of the mind or spirit that have been made public in some manner, have been subjected to peer review by members of one's intellectual or professional community, and can be cited, refuted, built upon, and shared among members of that community. Scholarship properly communicated and critiqued serves as the building block for knowledge growth in a field.[8]

In other words, scholarly work has the following characteristics: it has a purpose, follows prescribed methodology, contributes to a body of knowledge, undergoes

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[6] **Management Policies 2001** — *7.5.4: Requirements for All Interpretive and Educational Services: Research;* (Washington, D.C.: U.S. Department of the Interior, National Park Service, December 2000), p. 76.

[7] Adapted from **Research and Scholarship: Perceptions of Senior Academic Administrators;** Ruth Neumann; School of Education, Macquarie University, Sydney, Australia; http://www.aare.edu.au/90pap/neuma90.439 (1990).

[8] **Handout for Mansfield University Campus Conversation, February 17, 1999;** Lee Shulman; http://www.mnsfld.edu/~effteach/definitions1.html (1999).

peer review and scrutiny, and is disseminated. Scholarly activity occurs in four areas:

- *Scholarship of Discovery*. This area concentrates on original theses, inventions, and innovations as part of a traditional research program.
- *Scholarship of Teaching*. This area investigates approaches and practices used to educate people and disseminate the body of knowledge.
- *Scholarship of Integration*. This area synthesizes concepts and methodologies from different research domains using interdisciplinary approaches.
- *Scholarship of Application*. This area applies methods and practices established in the body of knowledge to problems of interest.[9]

When an interpreter conducts research for use in designing and presenting an interpretive service, he or she is likely to encounter all four of these areas of scholarly activity. Knowing the difference can be useful to the interpreter by helping determine what direction to pursue in the investigation of heritage resources.

Among the scholarship conducted in different fields of knowledge, no single method or approach best suits all of them. However, commonalities are evident: Scholars in different disciplines all formulate questions and investigative strategies. They all evaluate and revise strategies, and describe what was learned.

Scholarship or Public Opinion?

Scholarship is distinctly different from public opinion. And it's this difference that causes professional interpreters to rely on scholarship, rather than public or majority opinion, as trustworthy sources of information.

A single interpretive service — constrained by time, money, staffing, resources, infrastructure, and visitor desires — could never address all of the information about a resource. So, on what basis does an interpreter decide what information to present?

Every population includes groups that support different ideas and beliefs, but where should the line be drawn between what to include and what *not* to include in an interpretive exhibit about a specific aspect of heritage? If twenty percent of the population support a certain idea, is that enough to include it in the exhibits, or is it below the line? Where's the line? On what basis is it drawn? Who draws the line, with what belief system themselves? Every person has some bias.

There usually exists a general stream of information that can be followed, with more divergent views extending to its edges and past its banks. The spectrum of park visitors represents this whole rather than just the main channel of the stream. This *mainstream* concept can often be a useful thing to society, but is never perfect. For instance, it wasn't long ago that law decreed that some of us were less human than others: Slavery was legal, and in the vicinity of the main channel for a long time. The mainstream clearly isn't always correct, or just. Majority opinion can be unreliable.

Interpreters depend on sound scholarship as the basis for understanding and appreciating heritage resources — partially because resource experts devote themselves to intensive study and analysis, partially because this is likely to be the most reasonable set of ideas within a pluralistic society, and partially because there really isn't any other equally valid and acceptable set from which to make a selection. It is of utmost importance, therefore, that interpreters understand what scholarship is and is not, and how best to tap its riches in designing and presenting interpretive services that include relevant, appropriate multiple perspectives.

Recognizing Scholarship

How does an interpreter recognize reliable scholarship? When researching a topic, on what basis does the interpreter validate a text as having scholarly merit, and therefore, being of more utility to interpretive work? An interpreter might initially approach these questions by first considering whether the information is easy to verify or difficult to verify. This rudimentary type of screen-out can be a valuable precursor to performing in-depth analyses.

Easily Verified Information in Scholarship

Interpreters are always well served by checking the basics, verifying the facts. This is the most efficient first step in the use of research time and resources. If the interpreter determines the text to be of little scholarly merit, no further time should be invested in it; go on to the next source.

Imagine this scene. Most historians say that a particular historic event occurred on a Wednesday, but the book being reviewed states that the event occurred on a Friday. This would seem to be an error in fact. If both sources state the date of the event as the 14th of the month, but state different days of the week, this controversy is relatively easy to investigate. Check a calendar and the issue will be resolved, one way or the other (unless several calendar systems apply).

If the book in question also calls the location "Bear Valley," but is cited by scholars as "Bear Canyon" (verified by checking appropriate historic maps, texts, and oral histories), this second factual mistake in the book begins to cause the interpreter to infer that the conclusions of the author may also be in error. And if other factually-verifiable information in the book is also inaccurate, the interpreter might likely conclude that the level of scholarship represented by the author is sloppy at best, and perhaps not useful to interpreters at all. Under conditions like these, the interpreter correctly decides to lend more credence to other research sources.

The interpreter should also research what other trusted scholars have said about this specific book. The opinions of peer scholars are always useful, though not necessarily always definitive, in aiding the interpreter in appropriately weighing content. The greater the number of respected scholars expressing a given opinion, the more confident the interpreter can be regarding judgment of the work in hand. Nevertheless, the history of scholarship is filled with instances in which the majority of scholarly opinion has later been shown to have been incorrect.

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[9] Adapted from *Scholarship Reconsidered: Priorities of the Professoriate*; E. Boyer; (San Francisco: Jossey-Bass, 1990).

Difficult-to-Verify Information in Scholarship

If the above screen-out procedure leaves the interpreter with several seemingly good sources, that is, they each *seem* to have scholarly merit, then what's next? Consider these standards for a more in-depth evaluation of scholarly work:

Clear Goals

- Does the scholar state the basic purposes of his or her work clearly?
- Does the scholar define objectives that are realistic and achievable?
- Does the scholar identify important questions in the field?

Adequate Preparation

- Does the scholar show an understanding of existing scholarship in the field?
- Does the scholar bring the necessary skills to his or her work?
- Does the scholar bring together the resources necessary to move the project forward?

Appropriate Methods

- Does the scholar use methods appropriate to the goals?
- Does the scholar apply effectively the methods selected?
- Does the scholar modify procedures in response to changing circumstances?

Significant Results

- Does the scholar achieve the goals?
- Does the scholar's work add consequentially to the field?
- Does the scholar's work open additional areas for further exploration?

Effective Presentation

- Does the scholar use a suitable style and effective organization to present his or her work?
- Does the scholar use appropriate forms for communicating work to its intended audiences?
- Does the scholar present his or her message with clarity and integrity?

Reflective Critique

- Does the scholar critically evaluate his or her own work?
- Does the scholar bring an appropriate breadth of evidence to his or her critique?
- Does the scholar use evaluation to improve the quality of future work?[10]

[10] ***Handout for Mansfield University Campus Conversation, February 17, 1999***; Lee Shulman; http://www.mnsfld.edu/~effteach/definitions1.html (1999). *Note: This section of the Web page cites* Scholarship Assessed,

Multiple Perspectives within Scholarship

Another aspect of scholarship is that it is never monolithic. Even within perspectives that are commonly held to be well established or accurate, there are variations of analyses and opinions.

Imagine this scene. An interpreter's research efforts identify multiple sources of excellent scholarship that cite multiple names for a location (Bear Valley, Bear Canyon, Bear Cañon, Briarvale, etc.). No source seems to be more authoritative, or accurate, or significant, than the others.

Sometimes, timing is the answer. If one of these place names was the term most often used during the time of the event in question, then perhaps that's the name to use because (the interpreter determines) it is most likely to aid visitors' understanding of the context of the event.

Or, if one of these names was widely used by the specific culture in question, perhaps that's the place name to use (the interpreter determines) because it is most likely to aid visitors' understanding of that culture.

Or, the interpreter may want to use multiple versions, explaining along the way the context of each to support a variety of ideas. But the interpreter should only do this if doing so enhances interpretive opportunities.

It is these fascinating, different analyses of heritage resources, all occurring within the framework of current and accurate scholarship, that interpretation thoughtfully reveals to visitors.

Consideration, Inclusion, and Appropriate Treatment

The existence of a variety of perspectives about any given topic does not commit interpretation to presenting every one of these perspectives, nor to treat every one of them to the same depth. Blind equality is a trap best avoided. In some circumstances, such equitability of treatment would elevate lesser-quality work to the same level as better-supported scholarship. In other circumstances, such equality of treatment would provide a false picture to the public. Although there may be several valid ideas, scholars often cleave to one idea much more than to others. The presence of a mainstream opinion within a body of scholars is a real and important component that enables scholarship to progress.

Imagine this scene. If a predominant explanation exists, followed by three lesser-adhered-to explanations that still fall within the bounds of accurate, valid, and current scholarship, then the predominant explanation should receive a fuller exposition than the other three. However, the interpreter should also weave the other three into the interpretive service so that balanced, accurate, multiple perspectives are included in the service. People need relevant information — they need to have something to respond to that relates to them — for consideration of the fuller range of ideas to occur.

The range of ideas and potential explanations related to resources is virtually unlimited. If a predominant explanation is held by scholars, but a second idea receives no scholarly support, or is viewed by most scholars as inaccurate, the interpreter should not feel obliged to refer to the second idea. These constraints of scholarship separate the universe of ideas into those supported by current and accurate scholarship, and those not supported by scholarship. This intellectual filter

Glassick, Huber, and Maeroff, (1997).

generally determines which perspectives are included in the design and presentation of interpretive services.

Addressing a similar topic, National Park Service policy states that interpreters "will present factual and balanced presentations of the many American cultures, heritages, and histories. Consultation with diverse constituencies is essential to the development of effective and meaningful interpretive and educational programs, because it (1) ensures appropriate content and accuracy, and (2) identifies multiple points of view and potentially sensitive issues.... Acknowledging multiple points of view does not require interpretive and educational programs to provide equal time, or to disregard the weight of scientific or historical evidence."[11]

The fact that different views exist is not, in itself, enough reason to include *all* of those views in the design of an interpretive service. The views that are interpreted must reflect the current, best scholarly understanding of the resources. Some of the most useful scholarship for interpretive purposes may be authored by ethnic scholars, or may be scholarship that looks at the events of history from the perspective of persons with lesser amounts of political, social, and/or economic power. Consulting a variety of sources is both appropriate and stimulating.

Imagine this scene. "But didn't the people who lived at Mesa Verde disappear abruptly? I've seen television shows that say aliens abducted them," the visitor inquires.

"Actually, today's analysis of the evidence points to more of a migration than a sudden disappearance. Although the idea of 'sudden abandonment' was in vogue about a century ago when archeology of these sites was still in its infancy, today we're pretty confident that people moved out of this site over some time. Some archeologists think the time span for emigration was about 40 years; others think it could have been as much as three times that, about 120 years. Either way, most contemporary archeologists agree that it wasn't a sudden event."

Although some people genuinely believe in alien abduction of ancestral Puebloans, such an explanation is not well-supported by current scholarship and is not, therefore, designed into the interpretive presentation as a valid explanation of events. If a visitor asks about it, the interpreter answers from a standpoint of sound scholarship and multiple perspectives. The interpreter may acknowledge that some people subscribe to that idea, but that an overwhelming majority of scholars do not consider it to be a reasonable explanation of events. The choices made by the interpreter in how he or she responds to non-scholarly viewpoints can lead to a greater understanding and appreciation of heritage resources among *all* of the audience members. Or, if the interpreter does not handle it appropriately and professionally, just the opposite can occur, and learning opportunities can be diminished. ••

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[11] ***Management Policies 2001*** — *7.5.5: Requirements for All Interpretive and Educational Services: Consultation;* (Washington, D.C.: U.S. Department of the Interior, National Park Service, December 2000), p. 76.

History Scholarship in Interpretation

What is History?

his•to•ry \ **1** : a narrative of events connected with a real or imaginary object, person, or career : TALE, STORY; *esp* : such a narrative devoted to the exposition of the natural unfolding and interdependence of the events treated **2 a** : a systematic written account comprising a chronological record of events (as affecting a city, state, nation, institution, science, or art) and usu. including a philosophical explanation of the cause and origin of such events — usu. distinguished from *annals* and *chronicle* **b** : a treatise presenting systematically related natural phenomena (as of geography, animals, or plants) **3** : a branch of knowledge that records and explains past events as steps in the sequence of human activities : the study of the character and significance of events — usu. used with a qualifying adjective

History is the study and interpretation of the recorded past. We often think of history as a set of dates, names, and facts to be memorized. Facts do help us study history, but they are nothing more than trivia until we try to make some sense out of them. Thoughtful, informed interpretation and synthesis of these facts will help us understand the development and interrelationships of human societies. History helps us understand many events that at first seem inexplicable, and it also helps us understand that the causes and effects of these events are often very complex.[12]

History is about change and continuity over time and space. We study the past from many perspectives; such as political, military and diplomatic developments, economic, social, and cultural development, and the role of religious ideas and beliefs in shaping human experiences. The range of topics open to historians is virtually endless. Some historians deal with global issues like the rise of capitalism or the origins of WWI, others take a microhistorical approach and closely study a small sect or community within a carefully bounded period of time so as to recover deeply buried experiences and meanings. The power of ideas in shaping past societies is a popular field, as is the impact of social and economic structures on such societies. Historians study the origins of conflict as well as the impact that such conflicts have upon those caught up in them. Some historians work on the very recent past: the origins of ethnic cleansing for example, while others may study societies in the far distant past....

With so many possible points of departure, historians must frequently look to other disciplines in the social sciences and the humanities to gain the necessary tools. For example, a study of a community in a time of change can often benefit from detailed demographic analysis while someone studying a particular historical document could gain by employing techniques of literary analysis.[13]

History is not a blueprint for the future but it is a means of understanding the past and present. Through the study of history we can develop a feel for the way in which society will develop in the future. History helps one to understand the immense complexity of our world and therefore enables one to cope with the problems and possibilities of the present and future.

History provides us with a sense of identity. People need to develop a sense of their collective past. Events in the past have made us what we are today. In one sense history is the only thing that is real. The way in which people identify and interact with one another is by and large a consequence of history, which shapes and conditions individuals and societies whether they fully understand it or not.

History is a bridge to other disciplines. In order to understand the other humanities and the sciences one needs an historical overview. Writers, artists, scientists, politicians and everyday people all are conditioned by the historical milieu in which they lived. Historical knowledge is a prerequisite for fully understanding any other type of knowledge and for understanding why events happened as they did.

History is magister vitae, "teacher of life." History prepares us to live more humanely in the present and to meet the challenges of the future because it provides us with understanding of the human condition. History is a means of disseminating and comprehending the wisdom and folly of our forbears.

History is fun. History fulfills our desire to know and understand ourselves and our ancestors. History allows one to vicariously experience countless situations and conditions, which stimulates the imagination and creativity.[14]

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[12] *What is History?;* J. Michael Beasley; Artzia.com, http://artzia.com/History/About/ (2003).

[13] *What is History?;* Department of History, University of Calgary, Canada; http://hist.ucalgary.ca/explicit/whathistory.htm (2003).
[14] *What is History, and Why Study It?;* Siena College, New York;

Philosophies of History

How can one define the philosophy of history? Hegel once said that the philosophy of history included little more than thoughtful reflection on the past. Although theorizing about history has been described in more general and ambiguous ways, the philosophy of history has come to represent far more than thoughtful reflections concerning history. In order to understand what is meant by the philosophical study of history, first it is important to reach some consensus as to what is meant by the word "history." A distinction must be made between two senses of the term "history." In one sense, history represents the entirety of events in human experience, or *history-as-event*. In another sense, "history" refers to the human practice of collecting (usually through the act of writing) and interpreting these events, or *history-as-discipline*. Michael Stanford has referred to these two different conceptions (though not in the exact same terms) as "history one" and "history two" respectively.

History (in both senses) has been of interest to a number of notable philosophers and historians.... Because there are two ways of conceptualizing history, there are two ways of conceptualizing the philosophy of history. The *philosophy of history-as-event* has tended to center around questions of a metaphysical nature, such as: is there a "plot" to history?, are there any definable "patterns" or "shapes", any ultimate ends or "goals" toward which events as a whole are developing? Some have seen the totality of *history-as-event* as a linear sequence of progress; others have attributed to it patterns of recurrent cycles. Still others have denied that there is any overriding organization or logical order to be found in the morass of historical events and have emphasized the importance of contingency and chance in the playing out of events. Although metaphysical speculation about the shape or "meaning" of history has fallen into disrepute, one cannot dismiss the lasting effect some speculative theories have had on the actual practice of historians and philosophers alike. The distinction between two types of philosophy of history is by no means new. What Maurice Mandelbaum called the distinction between "material" and "formal" philosophies of history, W. H. Walsh called "speculative" and "critical" philosophies of history.

The greater portion of philosophical reflection about history today focuses on the *philosophy of history-as-discipline*. While *philosophy of history-as-event* focuses on history as the totality of human experience, *philosophy of history-as-discipline* deals with philosophical questions pertaining to the human activity of recording and interpreting history-as-event. It eschews what are seen as the metaphysical issues of the past and deals more with epistemological and methodological concerns about the activities of historical research and the writing of history. *Philosophy of history-as-discipline* has also addressed concerns about the justification and limitations of historical objectivity, the truth of historical claims, and the nature of historical explanations. Are there any "proper" (formal/logical) methods that can be prescribed to the practice of history? What would such "proper" historical

method look like? Can this question be answered in isolation of questions regarding the practical (i.e. political, ideological) purposes to which historical writing is applied? A good part of the twentieth century was devoted to a debate sparked by the philosopher of science Carl Hempel's claim that historical explanations — to be legitimate scientific ones — must conform to the "covering-law" model developed from the physical sciences. In contrast with Hempel's thesis, some, such as R. G. Collingwood and William Dray, have insisted that the historian is more concerned with understanding the motives of historical agents than with predicting (or retrodicting) events.

Many who have concerned themselves with questions about the nature of historical knowledge and interpretation of the past have spent a good deal of time studying the history of various historical concepts and ideas; and in doing so some have concluded that there are no absolute ideals of historical method or truth which can be isolated from their own peculiar historical and social contexts. This is the problem of *historicism*....[15]

Multiple Perspectives and History

Most people can agree on the framework of history, that is the names, dates, places, people and events that have determined the past. Few people, for instance, would challenge the veracity of the old school rhyme "Columbus sailed the ocean blue in fourteen hundred and ninety-two." The problem is not with "Columbus" or "1492" but with "sailed" (not with the fact that Columbus did sail but why he sailed). Historical disagreement usually revolves around causation or motivation. Some see Columbus as a courageous harbinger of a new world; others see him as an evil, genocidal imperialist.

How a person understands the past is partially determined by one's background, upbringing, biases, and prejudices. But this doesn't mean that history is unknowable. Historical understanding is analogous to the debates that sports enthusiasts often have over what team was the all-time best or who was the greatest player ever? The basic "facts," i.e. the points scored, batting averages, yards gained, wins and losses etc. are known, but individuals often disagree over what those "facts" mean. Still a basic consensus is often reached (Babe Ruth and Henry Aaron are the two greatest home run hitters ever) and the same is possible in history.[16]

Consensus occurs within historical scholarship just as it does in other fields of scholarship. Nevertheless, multiple perspectives also exist within historical scholarship, and even include such overarching aspects as the value, scope, and meaning of the historical endeavor itself. The following quotes illustrate the wide variety of opinion that has existed, and continues to exist, about history, historians, and the use of history as a way to better understand ourselves.

[15] ***A Brief Essay Concerning the Philosophy of History;*** Paul J. R. Murray, B.S., and Andrew Reynolds, PhD.; University College of Cape Breton, Canada; http://faculty.uccb.ns.ca/areynold/paul/introessay.htm (2003).

[16] ***What is History, and Why Study It?,*** loc. cit.

http://www.siena.edu/history/whathist.html (2/7/2002).

Insights into What History Is

History is that form [in] which his imagination seeks comprehension of the living existence of the world in relation to his own life, which he thereby invests with a deeper reality. (Oswald Spengler, *The Decline of the West*)

Hardly a pure science, history is closer to animal husbandry than it is to mathematics, in that it involves selective breeding. The principal difference between the husbandryman and the historian is that the former breeds sheep or cows or such, and the latter breeds (assumed) facts. The husbandryman uses his skills to enrich the future; the historian uses his to enrich the past. Both are usually up to their ankles in bulls[~]t. (Tom Robbins)

Here, then, awaiting our study, lies man's authentic "being" — stretching the whole length of his past. Man is what has happened to him, what he has done. Other things might have happened to him or have been done by him, but what did in fact happen to him and was done by him, this constitutes a relentless trajectory of experiences that he carries on his back as the vagabond his bundle of all he possesses. Man is a substantial emigrant on a pilgrimage of being, and it is accordingly meaningless to set limits to what he is capable of being. (José Ortega y Gasset, *History as a System*)

Genuine historical knowledge requires nobility of character, a profound understanding of human existence — not detachment and objectivity. (Friedrich Nietzsche)

Historical knowledge is not a variety of knowledge, but it is knowledge itself; it is the form which completely fills and exhausts the field of knowing. (Benedetto Croce)

For better or worse, I think one of the things I am supposed to do is challenge and even upset students. Not because unhappiness is good in and of itself. Far from it. But, increasingly, Americans are a people without history, with only memory, which means a people poorly prepared for what is inevitable about life — tragedy, sadness, moral ambiguity — and, therefore, a people reluctant to engage difficult ethical issues. Consumer culture is mostly about denial, about forgetting the past, except insofar as the past is pleasant and, thus, marketable. As historians, we occupy one tiny space where the richness of the past is kept alive, where its complexity is acknowledged and studied, where competing voices can still be heard. One of the most important things historians do is to bear witness to the past, including its horrors, in order to battle the amnesia that would sweep away all that is difficult or repugnant. The distinction between history and memory — that is, the distinction between knowledge of painful things, painfully arrived at, and notions of the past that flatter us with easy myths or cheap emotions — is at the heart of our enterprise. (Elliott J. Gorn)

Any good history begins in strangeness. The past should not be comfortable. The past should not be a familiar echo of the present, for if it is familiar why revisit it? The past should be so strange that you wonder how you and people you know and love could come from such a time. (Richard White)

What is past is prologue. (William Shakespeare)

History is concerned with time, space, and change. It is concerned with the unique person, with the unique event, and with their combination. (James C. Malin, *The Historian and the Individual*)

People are trapped in History, and History is trapped in them! (James Baldwin)

History may be divided into three movements: what moves rapidly, what moves slowly and what appears not to move at all. (Fernand Braudel)

There is properly no history; only biography. (Ralph Waldo Emerson)[17]

History is Philosophy teaching by examples. (Thucydides)

History is the intellectual form in which a civilization renders account to itself of its past. (Johann Huizinga)

History is indeed the witness of the times, the light of truth. (Cicero)

History is the "know thyself" of humanity — the self-consciousness of mankind. (Droysen)

History is an argument without end. (Peter Geyl)

History and myth are two aspects of a kind of grand pattern in human destiny: history is the mass of observable or recorded fact, but myth is the abstract or essence of it. (Robertson Davies)

All statements about the past can be considered as very crude ways of expressing possible, hypothetical judgments about future experiences. (Pardon Tillinghast)

Nothing capable of being memorized is history. (R.G. Collingwood)[18]

Historical Accounts and their Implications

Historical knowledge enables us to place our perceptions of the contemporary world into a meaningful context and to discern the cause-and-effect relationships between events that serve as the basis for future expectations. Without such knowledge we would be as bewildered as a quarterback entering the fourth quarter of a football game without knowing the score, the amount of elapsed time, or the successes and failures of plays and players. (Allan J. Lichtman and Valerie French)

17 Adapted from the compilation *What is History?;* Steven Kreis; http://www.historyguide.org/history.html (7/25/2002).

18 Adapted from the compilation *What is History?;* The University of North Florida, Florida; http://www.unf.edu/~clifford/craft/what.htm (7/16/2003).

A mature sense of historical-mindedness stimulates self-identity, enabling the individual to surmount, intellectually, his or her immediate environment and emancipating the individual, to some extent, from the pressures to conform to this year's vogues. He or she ceases to be a pawn of the social forces and their representatives. (Carl G. Gustavson)

History is the witness that testifies to the passing of time; it illuminates reality, vitalizes memory, provides guidance in daily life, and brings us tidings of antiquity. (Marcus T. Cicero)

The world's history is the world's judgement. (Schiller, 1800)

Time in its irresistible and ceaseless flow carries along on its flood all created things and drowns them in the depths of obscurity.... But the tale of history forms a very strong bulwark against the stream of time, and checks in some measure its irresistible flow, so that, of all things done in it, as many as history has taken over it secures and binds together, and does not allow them to slip away into the abyss of oblivion. (Anna Comnena)

The value of history is, indeed, not scientific but moral: by liberalizing the mind, by deepening the sympathies, by fortifying the will, it enables us to control, not society, but ourselves — a much more important thing; it prepares us to live more humanely in the present and to meet rather than to foretell the future. (Carl Becker)

In lifting the bonds of time and place, in freeing us from the tyranny of the present, history gives greater freedom and becomes the instrument enhancing liberty. Of all learned endeavors, the study of the past can be the most exciting, humanizing, broadening — and hence the most liberating. (Stephen Vaughn)

One must always maintain one's connection to the past and yet ceaselessly pull away from it. To remain in touch with the past requires a love of memory. To remain in touch with the past requires a constant imaginative effort. (Gaston Bachelard)[19]

The study of history is the best medicine for a sick mind; for in history you have a record of the infinite variety of human experience plainly set out for all to see; and in that record you can find yourself and your country both examples and warnings; fine things to take as models, base things rotten through and through, to avoid. (Livy)

History is *for* human self-knowledge. Knowing yourself means knowing, first, what it is to be a person; secondly, knowing what it is to be the kind of person you are; and thirdly, knowing what it is to be the person *you* are and nobody else is. Knowing yourself means knowing what you can do; and since nobody knows what they can do until they

try, the only clue to what man can do is what man has done. The value of history, then, is that it teaches us what man has done and thus what man is. (R. G. Collingwood)[20]

Not to know what has been transacted in former times is to continue always a child. (Cicero)

Those who cannot remember the past are condemned to repeat it. (Santayana)

A nation which does not know what it was yesterday, does not know what it is today, nor what it is trying to do. (Woodrow Wilson)

History is a people's memory, and without memory man is demoted to the lower animals. (Malcolm X)[21]

Limitations of History as a Way of Knowing

History is a myth we all agree to believe. (Napoleon)

To each eye, perhaps, the outlines of a great civilization present a different picture. In the wide ocean upon which we venture, the possible ways and directions are many; and the same studies which have served for my work might easily, in other hands, not only receive a wholly different treatment and application, but lead to essentially different conclusions. (Jacob Burckhardt)

History is a damn dim candle over a damn dark abyss. (W.S. Holt)

The very ink with which all history is written is merely fluid prejudice. (Mark Twain)

History: An account, mostly false, of events, mostly unimportant, which are brought about by rulers, mostly knaves, and soldiers, mostly fools. (Ambrose Bierce)

From their experience or from the recorded experience of others (history), men learn only what their passions and their metaphysical prejudices allow them to learn. (Aldous Huxley)

History, as an entirety, could exist only in the eyes of an observer outside it and outside the world. History only exists, in the final analysis, for God. Thus it is impossible to act according to plans embracing the totality of universal history. Any historical enterprise can therefore only be a more or less reasonable and justifiable adventure. It is primarily a risk. (Camus, *The Rebel*)

History with its flickering lamp stumbles along the trail of the past, trying to reconstruct its scenes, to revive its echoes, and kindle with the pale gleams the passion of the former days. What is the worth of all this? The only guide to a man is his conscience; the only shield to his memory is the

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19 Adapted from the compilation *History Quotations?;* Historian Underground: Making History Relevant to Life; http://www.lemmingland.com/quote.htm (2003).

20 *What is History?;* Steven Kreis, loc.cit.
21 *What is History?;* The University of North Florida, loc. cit.

rectitude and sincerity of his actions. It is very imprudent to walk through life without this shield, because we are so often mocked by the failure of our hopes and the upsetting of our calculations; but with this shield, however the fates may play, we march always in the ranks of honor. (Sir Winston Churchill)

History will be kind to me for I intend to write it. (Winston Churchill)

If you do not like the past, change it. (William L. Burton)[22]

You have reckoned that history ought to judge the past and to instruct the contemporary world as to the future. The present attempt does not yield to that high office. It will merely tell how it really was. (Leopold von Ranke)[23]

If a man could say nothing against a character but what he can prove, history could not be written. (Samuel Johnson)

We teach history only when it can be made into an entertaining anecdote, a procedure which is about as sound as leaving the teaching of sexual hygiene to a commercial traveller. (Aubrey Maran)

History, real solemn history, I cannot be interested in.... The quarrels of popes and kings, with wars and pestilences in every page; the men all so good for nothing, and hardly any women at all. (Jane Austen)

Comments about the Work of Historians

Anybody can make history. Only a great man can write it. (Oscar Wilde, 1893)

History repeats itself, says the proverb, but that is precisely what it never really does. It is the historians (of a sort) who repeat themselves. (Clemen F. Rogers, 1938)

Since history has no properly scientific value, its only purpose is educative. And if historians neglect to educate the public, if they fail to interest it intelligently in the past, then all their historical learning is valueless except in so far as it educates themselves. (M. Trevelyan)

The historian does simply not come in to replenish the gaps of memory. He constantly challenges even those memories that have survived intact. (Yosef Hayim Yerushalmi)

The function of the historian is neither to love the past nor to emancipate himself from the past, but to master and understand it as the key to the understanding of the present. (E. H. Carr)[24]

Faithfulness to the truth of history involves far more than a research, however patient and scrupulous, into special facts.

Such facts may be detailed with the most minute exactness, and yet the narrative, taken as a whole, may be unmeaning or untrue. The narrator must seek to imbue himself with the life and spirit of the time. He must study events in their bearings near and remote; in the character, habits, and manners of those who took part in them. He must himself be, as it were, a sharer or a spectator of the action he describes. (Francis Parkman)

An historian should yield himself to his subject, become immersed in the place and period of his choice, standing apart from it now and then for a fresh view. (Samuel Eliot Morison)

That historians should give their own country a break, I grant you; but not so as to state things contrary to fact. For there are plenty of mistakes made by writers out of ignorance, and which any man finds it difficult to avoid. But if we knowingly write what is false, whether for the sake of our country or our friends or just to be pleasant, what difference is there between us and hack writers? Readers should be very attentive to and critical of historians, and they in turn should be constantly on their guard. (Polybius)[25]

Who controls the past controls the future: who controls the present controls the past. (George Orwell)

The historian can learn much from the novelist. (Samuel Eliot Morison)

It has been said that although God cannot alter the past, historians can. It is perhaps because they can be useful to him in this respect that he tolerates their existence. (Samuel Butler)[26]

Historical Scholarship in Interpretation

When conducting research via history texts, oral history records, or humanities references, an interpreter should always keep several things in mind. Influences on our understanding of history include the perspective and biases of the individual relating the history, the characteristics of the culture in which they lived, their reasons for gathering and providing the information, and the tools available to them to facilitate their inquiry and understanding of the factors that played a role in that history. No historical account is free of these influences. Interpreters should understand that some groups or cultures feel that certain facts of their specific histories have been ignored, deleted, or otherwise been made invisible — for a wide variety of reasons. In addition to keeping all of these influences on history in mind when developing an interpretive service, an interpreter should also provide such contexts to visitors to enable them to use balanced and accurate information to personally explore the meanings of resources. ••

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[22] *History Quotations?;* Historian Underground, loc. cit.
[23] *What is History?;* Steven Kreis, loc. cit.
[24] *History Quotations?;* Historian Underground, loc. cit.
[25] *What is History?;* Steven Kreis, loc. cit.
[26] *What is History?;* The University of North Florida, loc. cit.

Science Scholarship in Interpretation

What is Science?

sci•ence \ **3 a** : accumulated and accepted knowledge that has been systematized and formulated with reference to the discovery of general truths or the operation of general laws : knowledge classified and made available in work, life, or the search for truth : comprehensive, profound, or philosophical knowledge; *esp* : knowledge obtained and tested through use of the scientific method **b** : such knowledge concerned with the physical world and its phenomena : NATURAL SCIENCE **4** : a branch of study that is concerned with observation and classification of facts and esp. with the establishment or strictly with the quantitative formulation of verifiable general laws chiefly by induction and hypotheses

The term "science" refers to both a *methodology of inquiry* and the *body of knowledge* obtained through that methodology. Science includes professional fields of inquiry such as archeology, biology, chemistry, geology, the social sciences, and many others. Sciences tend to be classified as "hard" or "soft" depending on the reliability of any specific science in drawing accurate and precise conclusions from its investigations. Those sciences that are more closely associated with mathematics are said to be the "harder sciences" and are listed toward that end of the spectrum since reliability is a mathematically-derived concept.

Science is a particular way of knowing about the world. In science, explanations are limited to those based on observations and experiments that can be substantiated by other scientists. Explanations that cannot be based on empirical evidence are not a part of science.

In the quest for understanding, science involves a great deal of careful observation that eventually produces an elaborate written description of the natural world. Scientists communicate their findings and conclusions to other scientists through publications, talks at conferences, hallway conversations, and many other means. Other scientists then test those ideas and build on preexisting work. In this way, the accuracy and sophistication of descriptions of the natural world tend to increase with time, as subsequent generations of scientists correct and extend the work done by their predecessors.

Progress in science consists of the development of better explanations for the causes of natural phenomena. Scientists never can be sure that a given explanation is complete and final. Some of the hypotheses advanced by scientists turn out to be incorrect when tested by further observations or experiments. Yet many scientific explanations have been so thoroughly tested and confirmed that they are held with great confidence.[27]

The tremendous success of science in explaining natural phenomena and fostering technological innovation arises from its focus on explanations that can be inferred from confirmable data. Scientists seek to relate one natural phenomenon to another and to recognize the causes and effects of phenomena. In this way, they have developed explanations for the changing of the seasons, the movements of the sun and stars, the structure of matter, the shaping of mountains and valleys, the changes in the positions of continents over time, the history of life on Earth, and many other natural occurrences. By the same means, scientists have also deciphered which substances in our environment are harmful to humans and which are not, developed cures for diseases, and generated the knowledge needed to produce innumerable labor-saving devices.[28]

Important Terms in Science

Terms that are used in public discourse are often thought of as having commonly-understood definitions. These same terms, however, can also have additional definitions, or be used in completely different ways, when used as jargon within any specific, professional discipline. So it is within the field of endeavor known as science; the following terms have specific definitions when used in the context of science.

Fact: In science, an observation that has been repeatedly confirmed and for all practical purposes is accepted as 'true.' Truth in science, however, is never final, and what is accepted as a fact today may be modified or even discarded tomorrow.

Hypothesis: A tentative statement about the natural world leading to deductions that can be tested. If the deductions are verified, the hypothesis is provisionally corroborated. If the deductions are incorrect, the original hypothesis is proved false and must be abandoned or modified. Hypotheses can be used to build more complex inferences and explanations.

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[27] *Science and Creationism: A View from the National Academy of Sciences, Second Edition;* National Academy of Sciences; (Washington, D.C.: National Academy Press, 1999), p. 1.
[28] Ibid., p. viii.

Law: A descriptive generalization about how some aspect of the natural world behaves under stated circumstances.

Theory: In science, a well-substantiated explanation of some aspect of the natural world that can incorporate facts, laws, inferences, and tested hypotheses.[29]

Empirical: Relying on or derived from observation or experiment... verifiable or provable by means of observation or experiment.[30] *Empirical evidence* is "derived from experiment and observation rather than theory."[31]

Understanding Science

An accurate understanding of science has direct and important implications for how an interpreter uses scientific scholarship in the design and presentation of interpretive services. The better an interpreter grasps scientific intent, language, and technique, the better able that interpreter is to help visitors understand what science is, how it describes its work, how science is conducted, and what roles it plays in society.

Many studies have shown that the public — including interpreters — has a very poor understanding of science. Commonly-held misunderstandings about science are often due to a lack of well-grounded teacher training in science, non-integration of science philosophy with its practice, the lack of authentic science experiences for teachers and students, and poorly written textbooks. The interpreter has an opportunity to portray the world of scientific endeavor in a more realistic light when interpreting a park's resources.

The Relationships of Scientific Law, Theory, and Hypothesis

Although all three of these elements of scientific inquiry are related, there is no implied evolution among them. A hypothesis doesn't turn into a theory; a theory doesn't turn into a law. They are different kinds of knowledge. For instance, Sir Isaac Newton described the relationship of mass and distance to the attraction between objects. This is known as the law of gravity. But why does gravity operate the way it does? Even today, more than a century later, there is still no well-accepted theory of gravity, no consensus among scientists. Some physicists hypothesize that "gravity waves" can explain the law of gravity, but a clear understanding of how gravity could operate as waves has not yet been attained.

Induction Produces Knowledge that Can be Tested and Refined

All problem-solvers, investigators, and scientists collect empirical evidence and interpret it through induction. Induction is the process by which investigators attempt to formulate a general explanation through knowledge gained from a limited number of specific observations. Using the technique of induction, collecting and examining pieces of

evidence leads to the discovery of scientific laws and/or the formulation of scientific hypotheses and theories. It also produces generalizations that permit predictions. Induction is the foundation of most scientific endeavors.

Although induction is extremely useful in scientific investigation, even a preponderance of evidence does not guarantee that absolutely valid knowledge will be produced. The limitation to induction is that it is impossible for a scientist to secure *all* relevant facts and make *all* necessary observations pertaining to a given situation through *all* time — past, present, and future. Scientists seek to formulate laws and theories that are described to hold *true* in all cases, yet the limits to observation make an absolute guarantee of infallible scientific prediction or explanation impossible. For this reason, induction leads to the production of knowledge that is likely valid, but which can never be viewed as completely valid. Scientists often use terms like "degree of confidence" to refer to the relative validity of a specific piece of scientific information.

Scientific Explanations are Limited and Always Subject to Falsification

Science is predicated on the understanding that scientific knowledge is tentative and remains open to new evidence and interpretation. Accumulated evidence provides support, validity, and substantiation for scientific laws and theories, but will never prove those laws and theories to be absolutely true in all cases. The only truly conclusive knowledge that science produces occurs when a notion is falsified.

For instance, the law of gravity states that more massive objects exert a stronger gravitational attraction than do objects with less mass when distance is held constant. This is a valid scientific law, in part, because it could be falsified: It would be proved false if newly-discovered objects operate differently with respect to gravitational attraction.

In contrast, there are many questions and ideas that cannot be verified or disproved using the methods of science. Moral, ethical, and metaphysical questions, for instance, are beyond the realm of scientific inquiry. Scientists could accurately predict the physical consequences of dropping an atom bomb on a major city — but could never scientifically determine whether it would be moral to do so.

Research Methods Vary but Creativity is Key

Scientists approach their work with creativity, perseverance, and application of prior knowledge. Like other problem-solvers or investigators, many scientists proceed by defining a problem, gathering background information, forming a hypothesis, making observations, testing the hypothesis, and drawing conclusions. Although these are common stages of inquiry, there is no single, uniform, universal "scientific method." Scientists imaginatively pursue solutions to their work without regard to how neatly their procedures may fit into a predetermined, step-by-step plan of action. Instead, they are likely to take advantage of unexpected outcomes, lucky breaks, and other unpredictable but exploitable circumstances.

Scientists, via induction, make use of individual facts that have been collected and analyzed. Scientists may then observe a pattern in these data and propose a scientific law or theory. There is no single logical or procedural method by

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[29] Ibid., p. 2.
[30] *The American Heritage Dictionary of the English Language, Fourth Edition*; Houghton Mifflin Company; Dictionary.com, http://dictionary.reference.com/search?q=empirical (2003).
[31] *WordNet 1.6*; 1997 Princeton University; Dictionary.com; http://dictionary.reference.com/search?q=empirical (2003).

which such a pattern is always suggested. Only the creativity of the individual scientist leads to scientific innovation.

Experimentation is but One of Science's Tools

Scientific experiments involve carefully orchestrated procedures — along with control and test groups — usually designed to test a proposed cause-and-effect relationship. Experimentation is a useful tool in science, but is not the sole route to knowledge. Scientific knowledge is also acquired using tools such as observation, analysis, speculation, and library investigation. Many noteworthy scientists have used non-experimental techniques to advance knowledge. Moreover, in a number of science disciplines, true experimentation is not possible because of the inability to control variables. For instance, the science of astronomy is almost totally based on extensive observations rather than experiment.

Scientists Endeavor to be as Objective as Possible

Scientists routinely endeavor to be objective in the conduct of their work. They design and use procedures specifically aimed at removing subjectivity from their observations and analyses. That said, scientists are people too, and sometimes their individual or collective subjectivity or biases can enter into their work. Complete objectivity, while desirable, is simply unattainable in science. There are several reasons for this:

Scientists believe the advancement of science is best undertaken through the proposal of scientific laws and theories as conjectures, and then to actively work to disprove or refute these ideas. Verification often results in what may seem like a rather backward process: it results from the absence of disproof. This is seen by scientists as support for the idea. Although scientists agree that this theoretical model is important, in actuality, it does not occur to the extent that it might. There are few indications that scientists undertake extensive programs to search for disconfirming evidence.

Scientists, like other observers, hold a myriad of preconceptions and biases about the way the world operates. Held in the subconscious, these notions affect everyone's ability to make objective observations: Such "theory-laden observation" makes it impossible to collect and interpret facts without any bias. The history of science is replete with cases in which scientists failed to include particular observations in their final analyses of phenomena. This occurred not because of any fraud or deceit on the part of the scientists involved, but simply because these scientists possessed prior knowledge that either caused them to miss certain facts, or to consider them unimportant in the reporting of their observations.

Scientists also work within a research tradition or research paradigm. Shared by those working in a given discipline, this paradigm provides clues to the questions worth investigating, suggests what evidence is admissible, and prescribes the tests and techniques that are reasonable. Although the paradigm provides direction to the research, it may also stifle or limit investigation. Anything that confines the research endeavor necessarily limits objectivity. While there may be no conscious desire on the part of scientists to limit discussion, it is likely that some new ideas in science are rejected because they conflict with the current paradigm. Despite these pitfalls, it should be noted that such adherence to paradigms has led to many more advances in science than delays.

Such potential hindrances are unavoidable exceptions to what scientists endeavor to do: investigate the world as objectively as is humanly possible.

Scientific Peer Review — More is Better

Upon completing a research project, scientists communicate their results so that others may learn from and evaluate their research. This check-and-balance system is one of the processes that enables the kind of conjecture and refutation that is at the heart of advancing scientific knowledge. In reality, though, this process does not happen as often as it should. Errors in research may not come to light until other scientists build on the previous work.

Most scientists are simply too busy, and research funds too limited, for extensive review. The enormous amount of original scientific research published, and the pressure to produce new information rather than reproduce others' work (to verify it), dramatically increases the chance that errors will go unnoticed. Space limitations in scientific journals also adversely contribute to the thoroughness of peer review: Because space is limited, scientists rarely report valid, but negative, results. While this is understandable, progress is best served when those working in a particular scientific discipline have access to all of the information regarding a phenomenon — both positive and negative.[32]

Scientific Scholarship in Interpretation

Explanations offered by scientific scholarship remain some of the most useful ways for people within a pluralistic society to consider, explore, and discuss aspects of the natural world, including heritage resources. The implications of science range from understanding the literal functioning of systems and their components to philosophical implications of such explanations. Science is better suited to explaining the former part of that range. That is, the confidence of scientists is higher when regarding the functioning of systems and their components than when describing how that functioning should impact or connect to human values. In general terms, science properly remains understood by the majority of people within diverse societies as a useful way of understanding the natural world and how things actually work.

As interpreters conduct research about resources and audiences, design interpretive services, and present those services, they should consider the following.

- Science aims at understanding and explaining the natural world.

- Scientific explanations of the natural world are framed in terms of confidence, probability, and likelihood.

- Science evolves in response to changing knowledge that, through scientific methodology, accrues a higher degree of confidence than that accorded previous knowledge.

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[32] Adapted from ***Ten myths of science: Reexamining what we think we know....;*** William McComas; School Science & Mathematics; Vol. 96 (1/1/1996), p. 10.

- Science depends upon methodology that attempts to remove as much human bias and subjectivity as possible, basing its methodology on observing, hypothesizing, theorizing, and testing evidence.

- Science can inform, but does not answer, questions requiring moral or ethical judgments.

- Science is useful but is not all encompassing; it has limits.

Multiple Perspectives within Scientific Scholarship

Multiple perspectives also exist within scientific scholarship. Multiple working hypotheses regarding any natural feature or event is a normal part of scientific inquiry. If scientists report different conclusions about some aspect of park resources, yet all of these conclusions are supported by sound, juried scholarship, the interpreter should be ready to present all of these conclusions to the public because they all meet the test of supportability by scholarship. And in so doing, the interpreter is providing a range of valid ideas for visitors to consider. Science, as an open-ended method of study, makes no claim to representing absolute truth at any point in time. ••

Spirituality, Religion, and Interpretation

Spirituality and Religion

spir•i•tu•al \ **1** : of, relating to, or consisting of spirit : of the nature of spirit rather than material : INCORPOREAL — contrasted with *earthy* **2 a** : of or relating to religious or sacred matters **b** : SACRED **c** : ecclesiastical rather than lay or temporal **3** : of or relating to the moral feelings or states of the soul as distinguished from the external actions : reaching and affecting the spirit **4 a** : influenced or controlled by the divine Spirit : having a nature in which a concern for the Spirit of God predominates **b** : proceeding from or under the influence of the Holy Spirit : concerned with religious values : seeking earnestly to live in a right relation to God **c** : HOLY, DIVINE **d** : RELIGIOUS **5** : related or joined in spirit : spiritually akin : having a relationship one to another based on matters of the spirit **7** : of, relating to, or coming from the intellectual and higher endowments of the mind : INTELLECTUAL, MENTAL — contrasted with *animal* **8** : highly refined in thought or feeling **9** : SPIRITED, CLEVER, WITTY **10** : having to do with spirits, ghosts, or similar supernatural beings or with the world which they are held to people

re•li•gion \ **1** : the personal commitment to and serving of God or a god with worshipful devotion, conduct in accord with divine commands esp. as found in accepted sacred writings or declared by authoritative teachers, a way of life recognized as incumbent on true believers, and typically the relating of oneself to an organized body of believers **3 a** : one of the systems of faith and worship : a religious faith **b** : the body of institutionalized expressions of sacred beliefs, observances, and social practices found within a given cultural context **6 a** : a personal awareness or conviction of the existence of a supreme being or of supernatural powers or influences controlling one's own, humanity's, or all nature's destiny

The terms *spirituality*, *religion*, *spiritual*, and *religious* have different but related definitions. Because these are deeply meaningful subjects, people overlay the common definitions with even more of their own values and meanings than they might for other topics. For some, religion might be described as a highly structured social convention. It could revolve around built structures and social activities. It might include tenets, ceremonies, traditions, and artifacts. For others, religion might be directly tied to specific landforms or geographic locations, and their stories. Religion could also refer to an individual's privately-held thoughts and feelings about his or her relationship to all else — rather than applying to a group of like-minded people. Religion might infuse all of

a person's actions, or might only be tenuously connected to an activity that occurs on a periodic basis.

There are many, long established, major world religions, each with over three million followers...:

- Baha'i Faith
- Buddhism
- Christianity
- Confucianism
- Hinduism
- Islam
- Jainism
- Judaism
- Shinto
- Sikhism
- Taoism
- Vodun (Voodoo)[33]

In addition to these twelve religions, other forms of well-defined spirituality include Gnosticism, Native American Spirituality, Neopagan faiths (Asatru, Druidism, Goddess Worship, Wicca, Witchcraft), New Age (Self-Spirituality, New Spirituality, etc.), Scientology, Unitarian-Universalism, Zoroastrianism, and many others. Belief systems such as Atheism, Agnosticism, and Humanism round out this brief, broad overview.

Religious Scholarship

When interpreting religious perspectives, reliance is placed on scholarship generated by historians, anthropologists, archeologists, biologists, ethnographers, geologists, physicists, and other scholars for accurate, balanced, and relevant information. For some resources or circumstances, religious scholarship is also an appropriate and valuable tool for an interpreter.

Religious scholarship — like scholarship in the subjects of history and science — has a purpose, follows prescribed methodology, contributes to a body of knowledge, undergoes peer review and scrutiny, and is disseminated. Scholarly

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[33] *About Specific Religions, Faith Groups, Ethical Systems, etc.* — *"World" Religions;* Ontario Consultants on Religious Tolerance; http://www.religioustolerance.org/var_rel.htm (3/5/2004).

activity occurs in the areas of discovery, teaching, integration, and application within a religious context.

Unlike the scholarship of history and science, religious scholarship is often predicated on specific religious precepts, commandments, laws, and ordinances — some of which are viewed as being more open to diverse interpretations than others. Some, in fact, may be viewed as inerrant. These ideas and values are directed, guided, and influenced by texts, traditions, sacraments, and rites. These premises of religious scholarship differ markedly from that of history and science, comparatively narrowing its appropriate interpretive use to specific types of situations.

Reasons for Interpreters to Explore Spirituality and Religious Perspectives

Religious scholarship is a fascinating subject that, for an interpreter, has several faces. The reasons for an interpreter to explore spirituality and religious perspectives as a part of the professional endeavor are twofold: to better understand and appreciate park visitors, and to better understand and appreciate heritage resources and the meanings commonly ascribed to them.

Better Understanding and Appreciating Visitors

An important reason to explore, study, investigate, discuss, and ponder spirituality and religion is to better understand visitor perspectives, thereby improving interpreter-visitor communication. Religious scholarship is appropriately researched and studied by interpreters for the purpose of enriching and deepening their understanding of audience characteristics. Learning about how people perceive the world helps interpreters better understand how the personally meaningful values of visitors guide their interaction with resources. Learning about the religious perspectives of those who visit an interpreter's specific heritage site helps the interpreter tailor his or her efforts more effectively. Such study helps interpreters become more adept at facilitating connections between visitors and heritage resources, and aids interpreters in selecting more effective audience-appropriate approaches, techniques, and content when developing and conducting interpretive services.

Imagine this scene. You're at a heritage site that preserves and interprets important fossil resources. The interpretation of time in the exhibit cases is based on scientific, geologic dating techniques. Rock and fossil samples abound, noted with their ages. Increasingly, a specific segment of this site's visitors (those who hold Young-Earth Creationist beliefs) consider the scientific data to be unreliable or untrue — and they express these thoughts to interpreters.

Having participated in a number of these visitor contacts now, yet not fully grasping these visitors' perspectives, one of the site's interpreters (Moshe) takes the time to learn more about Creationism from a variety of sources, including respected religious scholars. He intends to better understand the perspectives of these visitors so he can have conversations with them that are more meaningful to them. *More meaningful* does not imply pandering to their perspectives and exploring no others; rather, it means Moshe being able to better relate to "where they're coming from" in order for him

to provide multiple perspectives and interpretive opportunities that create a higher-value heritage experience for these visitors.

When Moshe next converses with visitors who hold these perspectives, he relates to them better and the conversation is enriched by his deeper knowledge of similar viewpoints. He discusses the idea that there are actually quite a few different Creationism perspectives, and that some religions find science and spiritual views compatible and complimentary. Both he and the visitors enjoy their interchange. The visitors *are* respected, *feel* respected, and actually learn more about belief systems similar to theirs. This is valued by them. They also learn that some geologists hold a variety of professional opinions about the specific uses of scientific dating techniques, although most of them agree with the overall explanations of geologic time as established generally via the known range of fossils and described by current scientific scholarship. The visitors can better connect to this idea because earlier in the conversation, Moshe introduced the idea that within Creationism, or within the greater body of religions, some of these same traits (variation within general agreement) are also exhibited.

The visitors continue their visit, pondering the idea that "systems of knowing" might, in some ways, be more similar than different. Moshe's endeavor to learn more about visitor perspectives, via research into religious beliefs, has helped generate a more successful interpretive contact. His latest visitor encounter exemplifies the interpretive utility of learning about specific religions to better understand multiple visitor perspectives.

Better Understanding and Appreciating Heritage Resources

Another reason for an interpreter to research religious scholarship is to achieve an in-depth understanding of the heritage site and its resources. The scope of this research is more narrowly focused than the visitor research described above: It's limited to religious scholarship that will shed light on various aspects of this specific heritage site, especially its culture and history as relate to the park's resources.

Aspects of better understanding and appreciating heritage resources at your site are essentially twofold. The first aspect is focused on accruing useful information regarding background and context for the site. This may include religious movements, events, or activities occurring on any scale (worldwide, regionwide, local) that in some significant way influenced, or were influenced by, your site's resources.

The second focus is placed on religious scholarship that provides specific, meaningful information directly relevant to your site. Why did these stories occur in *this* place, in that way, in that time period? How was this artifact used? What do we think that activity meant to those who performed it? What were those people thinking when they...?

Obviously it might be difficult to draw a bright and shiny line between background and site-specific (or resource-specific) information, but that's okay. You don't need to draw such a line. You *do* need to ensure, however, that you cover the range — from background to specific information — when exploring scholarship regarding the religious or spiritual significance of your site. This helps achieve the goal of accruing a truly in-depth understanding and appreciation of the site's many facets.

How Visitors Benefit from an Interpreter's Preparation

Both of the reasons cited above for an interpreter to explore spirituality and religious scholarship directly affect the interpreter's approach to developing and conducting interpretive services — in their overall content as well as particular details. The insights gained through this type of research and study — including an understanding of the overall religious climate of a time period, or the noting of specific religious rifts, alliances, or events — can provide a critical backdrop upon which science and history interpretation is superimposed. And sometimes, the spiritual or religious information and perspectives are the primary subject matter themselves.

Through the appropriate use of religious scholarship, interpreters can help visitors explore the contextual setting within which the site's resources are explained and explored. They can help visitors understand the cultural character of the site. Thus enabled, interpreters are better positioned to facilitate opportunities for meaningful connections to occur and grow between visitors and resources.

Including Spiritual and Religious Perspectives in Interpretive Services

You've done the research. You possess information well-sourced by science scholarship, history scholarship, and religious scholarship. When and how is religious scholarship best used in performing interpretive work? What conditions must be considered? What influences these decisions? To what extent is balance necessary between perspectives based on scholarship in science, history, and spirituality?

When considering the appropriate use of religious scholarship in developing and conducting interpretive services, the primary considerations are: Will my research into, and use of, religious scholarship provide enhanced opportunities for people to form intellectual and emotional connections to the site's resources? Are opportunities for connection more accessible? Is the heritage site more relevant to visitors? In general, if the answers are affirmative, then these more-specific questions should be asked next:

- How is the interpreting organization structured and funded?

- Will the inclusion of spiritual perspectives lend important context to interpretive services that are mostly based on history scholarship?

- Will the inclusion of spiritual perspectives lend important context to interpretive services that are mostly based on science scholarship?

- Is the heritage site inherently religious in nature?

Structure and Funding Considerations

When it comes to interpreting spirituality, religion, and religious perspectives, considerations and constraints vary among different kinds of interpreting organizations. For instance, agencies of the federal government of the United States are prohibited by the First Amendment of the Constitution from establishing (or appearing to establish or endorse) religion, or one religion over another. Thus,

organizations that receive some of their funding from the federal government may also find their programming similarly constrained. Privately-funded organizations may not be constrained by these Constitutional responsibilities. It's important for interpreters to understand the context within which their organization interprets since that context will guide their interpretive treatment of spirituality and religious perspectives.

Including Important Religious Context

The more an interpreter can accurately portray past events and figures, processes and activities, the more these things become alive in the minds of visitors. The inclusion of religious perspectives can add important balance, accuracy, context, and relevance to interpretive services. Religious context can be appropriately employed as part of history-based interpretation as well as a complement to science-based interpretation.

For instance, although historic persons could be treated interpretively without mentioning their individual religious viewpoints, such an approach could also give visitors an incomplete understanding of those figures. Interpretive services that include what we know of these persons' religious views and motivations are often more powerful. In fact, visitors might be surprised that these historic personages not only had some similar spiritual beliefs, but quite different ones, too. Visitors might discover insights into the politics of the time — and of today — as some political machinations are strongly influenced by religious beliefs and alliances.

Even though visitors may identify with, or eschew, some of these views themselves, interpretive opportunities are enhanced by including this material along with other content that is sourced through history scholarship. A more complete picture enhances enjoyment of the site by furthering opportunities for understanding and appreciation.

Another appropriate interpretive use of spiritual or religious views might be our attempt to better understand entire peoples and cultures. Through anthropology, archeology, ethnography, and other scientific pursuits, we attempt to understand what life was like in the past. What motivated people to do that? Why build here? How did they celebrate seasonal changes? What motivated the carvings over there? How has this culture changed over time? And if written records apply, we use history scholarship, too, to help us better understand and appreciate past lifestyles and cultures.

Our efforts to understand others, exemplified by questions like these, can't help but include considerations of the spiritual beliefs of these peoples. All people, in one respect or another, operate from a foundation of how they've made sense out of the world. Spirituality is often an important component of this foundation. Therefore, as the visitor strives to better understand and appreciate cultures, interpretation of spiritual and religious perspectives should be a part. Without this component, the picture is incomplete.

Consider the interpretation of an historic Catholic mission site. Responsible for helping visitors explore the site's resources and meanings, the interpreter relies on information from scholars in history and science and religion. What were the religious views of the indigenous peoples? What were their lifestyles like? Why was a mission built *here*, why at *that* time, by whom? For what political, religious, and other purposes was it established? How well did it achieve these

purposes? How did the cultures initially interact? How did life change for all involved?

How could visitors understand the site without an understanding of the material fabric that remains? Or the historical, social, political, economic, and religious contexts that existed during the mission's founding? Spain's desire to accrue political power in the New World while concurrently converting indigenous peoples to the Catholic religion were paramount reasons for the government of Spain to fund and support such ventures — critical information that promotes understanding and appreciation. Interpreting these stories using sound scholarship in science, history, *and* religion is the most thorough manner in which to provide opportunities for visitors to appreciate the meanings of the place and explore their own connections to them.

Heritage Sites that Possess Historic Ties to Specific Religions

In addition to religious scholarship playing important contextual roles in the interpretation of heritage, it can also play a central role for sites that are inherently religious in nature — those sites with historic ties to specific religions. The Catholic mission example fits into this category. So do Saint Paul's Church National Historic Site (New York) and spiritual sites of indigenous peoples such as Devils Tower National Monument (Wyoming). All three are rooted in specific spiritual values or religions, ideas, traditions, histories, and stories. They are spiritual places due to religious encounters, activities, traditions, or teachings. Many of their natural and cultural resources are products of these sites' spiritual contexts. For instance, in the mission example, even the buildings' architecture directly expresses the religious views and perspectives of those who founded the mission. These kinds of places are set aside, in part, for public enjoyment and contemplation *because* they possess characteristics historically tied to specific religions or spiritual beliefs.

For sites that are inherently religious, religious aspects of the site become the primary subject matter rather than only useful context or background information. Interpretive services informed by religious scholarship help visitors to the Catholic mission understand more about the beliefs of its founders, of the religion to which they belonged, of their religious order, regional variations in belief, and all this related to a specific time period. Such use of religious scholarship helps visitors understand the built environment, artifacts, and records. Such knowledge, placed in an understanding of the larger contexts of the time, is crucial to providing interpretive opportunities that enable visitors to make connections to the stories and meanings of the place. The pursuit of specific religious knowledge, and the interpretation of it as primary subject matter, are appropriate activities within the context of this kind of site's characteristics — because its resources and meanings are inherently religious in nature.

Inappropriate Use of Religious Scholarship

Imagine this scene. Referring to Moshe's fossil-based site above, another interpreter at the site (Erin) also had similar encounters with visitors who espouse a Creationist perspective. However, she decided to take a different course of action. With multiple perspectives in mind, Erin proposed adding an exhibit panel that portrays a Creationist point of view regarding the site's fossil resources and concept of time.

This is an inappropriate decision for Erin to have made. Here's why: This fossil-based site and its resources are *not* rooted in any specific religious tradition and are most appropriately interpreted using geologic scholarship. Unlike the mission example — where the significant resources of the site are historically tied to the Catholic religion — the significant resources of the fossil site are not. At the fossil site, religious perspectives can play various roles (especially where it lends useful context to scientific or historic interpretation) but adding a religion-based exhibit to *counterpoint* the scientific explanations of fossils and time would be inappropriate.

Looking at this issue from another direction, consider a fictitious "Sermon On the Mount World Heritage Site." At this site, it would be entirely appropriate to interpret Jesus' sermon and its ramifications (in its time and for us today) as primary subject matter. The interpretation of such a site would draw on history, science, and religious scholarship — probably leaning most heavily on religious scholarship to describe the larger context of Jesus' ministry, comparative interpretations of Bible verses, exploration of contemporary social issues to which the sermon has relevance, etc. Interpretive services would probably focus on these things. Conversely though, it would be inappropriate for an interpreter at the site to design an exhibit to *counterpoint* the sermon by explaining human interrelationships from a purely biological sciences perspective.

Appropriate Use of Religious Scholarship

Continuing with the fossil site example, a different conclusion about the use of religious scholarship might be drawn if the site's founding intent is recast as follows. If this site's founding for public enjoyment and scientific advancement includes an emphasis on both the fossil resources *and* the culture of an *indigenous* people, then the following criteria come into play.

If this site is claimed as important to the cultural history and spiritual life of an indigenous people, then interpreting their stories and perspectives about what has occurred here are valid and appropriate — *even if these stories contradict the scientific explanations of the site's resources*. Examples of this occurrence include places like Aztec Ruins National Monument and Canyon de Chelly National Monument (both in Arizona). Cultures associated with these two sites include ancestral Puebloans, Navajos, and others. If the people who had critical association with these places' resources were Christian Creationists or Buddhist monks, this caveat would still apply.

Setting the example site aside for public enjoyment because of its tremendous fossil *and* cultural resources (especially the historic cultural resources of a people long-connected to this place) creates an appropriate condition for interpreting religious aspects and explanations of the place *as primary subject matter*. Considerations of appropriateness and benefit to interpretive opportunities continue to be paramount in the exercise of interpretive judgement.

Attribution and the Representation of Complexity

As is the case for history and science, attribution goes a long way toward professionally interpreting spiritual or

religious aspects of heritage resources. For example, when interpreting the creation story of a people, it's always better to state "This is the creation story of *this* people" than to matter-of-factly state "This is what happened here." The first phrase correctly attributes the story to a specific group; the second phrase implies an absolute certainty equally applicable to all of us. Of course, this example suggests the idea that one uniform story is held *by a people*. In reality, there are significant distinctions within any large group of people regarding the nature and meaning of any specific belief, with smaller subsets emphasizing or differently defining some important aspects of the story or stories in question. The professional interpreter is always on guard to avoid oversimplification. Life is complex; the professional interpreter represents that complexity appropriately.

Religious Concepts and Science Concepts

In general, scientific explanations of specific, mechanical workings of nature engender relatively little controversy. We can all feel fairly confident that our kidneys work the way scientists think they do. However, when science explains more profound aspects of knowledge and experience and meaning (how animals *came to have* kidneys), greater differences in acceptance of scientific views arise. This happens because those aspects of life related to depth of time or origins or transitions or ultimate purposes — concepts central to how an individual defines self in relation to all else — are saturated in meaning for individuals and groups. These ideas engender a variety of responses from visitors.

Science assumes that nature can be understood through empirical evidence, induction, and theory — that which can be observed, measured, tested, and inferred. Science does not explain aspects of nature that do not depend on empirical evidence validated through scientific methodology. For instance, science does not address the existence of God or gods since it cannot use scientific methodology to reliably investigate this subject. Such an hypothesis cannot be falsified (proven false).

Therefore, scientists say that science is "silent" on religion, spirituality, and the supernatural. Science neither affirms nor denies things it is unable to reliably investigate. Science can only address the material universe. Some theologians say that science, by its very assumption that the world can be understood through the observation and testing of empirical evidence, removes the supernatural from the equation and, therefore, only seeks to (or is able to) explain a subset of the whole. Others believe there is no inherent contradiction in these two ways of knowing — they simply look at different aspects of existence from different philosophical and methodological viewpoints.

Interpreters should be aware of these different philosophical and methodological frameworks, and respond to their assertions appropriately and usefully in their interpretive work. When visitors ask questions that draw sharp distinctions between these types of ideas, such as between science and religion, an interpreter can use such opportunities to provide insights into multiple valid perspectives.

Imagine this scene. Following an interpreter's talk in the park's amphitheater, several visitors approach the interpreter to continue to explore the ideas expressed in the talk. These three visitors happen to hold different views related to science and religion, the same range of opinions as described above. In facilitating their park-based exploration of these ideas, the responsibility of the interpreter might be thought of (simplistically) in the following terms.

- The interpreter should help the science-invested visitor better understand the limits of science in addressing all aspects of humanity (including morals, ethics, and the supernatural) without attempting to convince the visitor that his/her perspective is wrong and another is right.

- The interpreter should help the religion-invested visitor better understand the difference between the worldview of naturalism and the philosophy of science (including methodologies and how terminology is used by scientists) without attempting to convince the visitor that his/her perspective is wrong and another is right.

- The interpreter should help the no-conflict-seen visitor better understand that the other two viewpoints, and others, exist, are valid within specific parameters, and sometimes strongly differ.

In working with all three visitors, the interpreter should probe and provoke with accurate, balanced, and relevant information to provide the visitors with tools for their continued personal growth, exploration, and introspection. The interpreter should aid them in considering other viewpoints as valid without invalidating the perspectives held by the visitors, or introducing his or her own biases into the equation.

Faith-based Ideas and Scientific Scholarship

When a park interprets its resources from a scientific viewpoint, some visitors raise questions about why other viewpoints, such as religious viewpoints, are not interpreted or used to explain the resources. This may or may not have anything to do with the level of professionalism found within the services provided by the park's interpretation & education program. These kinds of questions seem to be connected more to visitors' contention over what ideas are worthy of inclusion when explaining resources to the public, than to specific types of resources (although most interpreters encounter these kinds of questions when paleontological, geological, or biological resources substantially comprise the park's importance). Suggestions are often connected to perspectives that stem from the idea of a created world rather than one that evolved naturalistically.

Creationism, *Creation Science*, *Intelligent Design Theory*, and *Biblical Science* are among the names given Christian Creator-centered, faith-based viewpoints for understanding and explaining the world. Other religions also share some of these teachings. Interpreters in the United States are likely to encounter views like these expressed by park visitors.

Just as science can be said to have a core mindset in how it approaches its investigation of the world, as well as multiple explanations that are anchored to that viewpoint, the same is true for faith traditions. Although many faith traditions espouse a Creator-based paradigm, details can vary widely.

Faith-based and Naturalistic Explanations

Religions around the world teach many hundreds of creation stories. Almost all religions believe and teach their own unique legend. Naturalistic evolution is also a popular belief, particularly among scientists. In North America, beliefs regarding the origins of the universe and origins of species of life mostly fall into three general categories....

Creation Science. God created the universe during 6 consecutive 24 hour days less than 10,000 years ago, precisely as a literal interpretation of the Biblical book of Genesis would indicate. All of the various species of animals that currently exist (and that once existed) on earth are descendants of the animals that God created during the single week of creation....

Theistic Evolution. The universe is about 14 billion years old. The earth's crust developed about 4.5 billion years ago. God created the first cell, and then used evolution as a tool to guide the development of each new species. The process culminated in human beings.

Naturalistic Evolution. Beliefs are identical to that of theistic evolution, except that God is assumed to have played no part in the processes.[34]

Creation Science Belief Systems

The following description of Creation Science belief systems exemplifies some of the more mainstream views among Creationists. We provide this brief description to familiarize interpreters with these views and provide a basis for discussing how these religious views differ from science, and why that matters.

The vast majority of scientific creationists, and all significant creation science organizations in North America are Christian. They assume that that the creation story/stories in Genesis are accurate. They believe that God created all life forms, the world, and the rest of the universe. Most believe that this happened fewer than ten thousand years ago. This belief in a new and created universe is common among Fundamentalists and other Evangelical Christians, because it is the only theory that is compatible with conservative Christians' belief in:

- The inerrancy of the Bible. Each passage in the Bible is viewed as being without error, wherever it discusses theological, historical, spiritual, scientific or other matters.

- Reliance on the literal interpretation of the Bible in most cases. Passages are interpreted literally, except when a symbolic meaning is obviously intended by the author.

...Modern day creation scientists are divided into many sub-groups, primarily according to their interpretation of the Hebrew word "yom" (day) in Genesis 1-3, and their belief on whether the six "days" were contiguous. All reject the possibility of biological evolution of the species:...[35]

The Institute for Creation Research is a useful source for learning more about one Creationist worldview. Information is posted at http://www.icr.org/abouticr/tenets.htm. A useful naturalistic explanation is posted at Understanding Evolution, http://evolution.berkeley.edu/evosite/evohome.html.

"Creation Science" is Not "Science"

The characteristic description of Creationism cited above demonstrates how Creationism or Creation Science is clearly based on a set of different premises from science, and consequently, evince a different overall perspective related to explaining the natural world. For Creationists, a series of specific, religiously-derived premises create a framework which overrides scientific methodology. In science, the framework is based on empirical evidence and is not based on scripture, religious texts, or other authorities. The previous work of other scientists and what they have observed, investigated, and concluded is always subject to repetition, falsification, reinvestigation, and/or reinterpretation.

Legal Findings Regarding Creation Science. A variety of court cases have addressed similarities and difference between "science" and "Creation Science." A number of these cases have ruled that "Creation Science" is a set of religious beliefs distinctly different from "science" and should not be confused with, or misrepresented as, science. Those cases also established that science is not a religion.

Six Significant Court Decisions Regarding Evolution and Creationism Ideas. The following are excerpts from important court decisions regarding evolution and creationism issues. The reader is encouraged to read the full statements as need and time allows.

1. In 1968, in *Epperson v. Arkansas*, the United States Supreme Court invalidated an Arkansas statute that prohibited the teaching of evolution. The Court held the statute unconstitutional on grounds that the First Amendment to the U.S. Constitution does not permit a state to require that teaching and learning must be tailored to the principles or prohibitions of any particular religious sect or doctrine. (*Epperson v. Arkansas,* 393 U.S. 97. (1968))

2. In 1981, in *Segraves v. State of California,* the Court found that the California State Board of Education's *Science Framework*, as written and as qualified by its anti-dogmatism policy, gave sufficient accommodation to the views of Segraves, contrary to his contention that class discussion of evolution prohibited his and his children's free exercise of religion. The anti-dogmatism policy provided that class distinctions of origins should emphasize that scientific explanations focus on "how," not "ultimate cause," and that any speculative statements concerning

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[34] *3 Main Evolution & Creation Science Belief Systems;* B. A. Robinson; Ontario Consultants on Religious Tolerance; http://www.religioustolerance.org/ev_world.htm (11/17/2002).

[35] *Creation Science Belief Systems: Beliefs of Origins, Generally Based on the Bible;* B. A. Robinson; Ontario Consultants on Religious Tolerance; http://www.religioustolerance.org/ev_world1.htm (5/26/2003).

origins, both in texts and in classes, should be presented conditionally, not dogmatically. The court's ruling also directed the Board of Education to widely disseminate the policy, which in 1989 was expanded to cover all areas of science, not just those concerning issues of origins. (*Segraves v. California,* No. 278978 Sacramento Superior Court (1981))

3. In 1982, in *McLean v. Arkansas Board of Education*, a federal court held that a "balanced treatment" statute violated the Establishment Clause of the U.S. Constitution. The Arkansas statute required public schools to give balanced treatment to "creation-science" and "evolution-science." In a decision that gave a detailed definition of the term "science," the court declared that "creation science" is not in fact a science. The court also found that the statute did not have a secular purpose, noting that the statute used language peculiar to creationist literature in emphasizing origins of life as an aspect of the theory of evolution. While the subject of life's origins is within the province of biology, the scientific community does not consider the subject as part of evolutionary theory, which assumes the existence of life and is directed to an explanation of how life evolved after it originated. The theory of evolution does not presuppose either the absence or the presence of a creator. (*McLean v. Arkansas Board of Education,* 529 F. Supp. 1255, 50 (1982) U.S. Law Week 2412)

4. In 1987, in *Edwards v. Aguillard*, the U.S. Supreme Court held unconstitutional Louisiana's "Creationism Act." This statute prohibited the teaching of evolution in public schools, except when it was accompanied by instruction in "creation science." The Court found that, by advancing the religious belief that a supernatural being created humankind, which is embraced by the term *creation science*, the act impermissibly endorses religion. In addition, the Court found that the provision of a comprehensive science education is undermined when it is forbidden to teach evolution except when creation science is also taught. (*Edwards v. Aguillard*, 482, U.S. 578, 55 (1987) U.S. Law Week 4860, S. CT. 2573, 96 L. Ed. 2d510)

5. In 1990, in *Webster v. New Lennox School District*, the Seventh Circuit Court of Appeals found that a school district may prohibit a teacher from teaching creation science in fulfilling its responsibility to ensure that the First Amendment's establishment clause is not violated, and religious beliefs are not injected into the public school curriculum. The court upheld a district court finding that the school district had not violated Webster's free speech rights when it prohibited him from teaching "creation science," since it is a form of religious advocacy. (*Webster v. New Lennox School District #122,* 917 F.2d 1004 (7th. Cir., 1990))

6. In 1994, in *Peloza v. Capistrano Unified School District*, the Ninth Circuit Court of Appeals upheld a district court finding that a teacher's First Amendment right to free exercise of religion is not violated by a school district's requirement that evolution be taught in biology classes. Rejecting plaintiff Peloza's definition of a "religion" of "evolutionism," the Court found that the district had simply and appropriately required a science teacher to teach a scientific theory in biology class. (*Peloza v. Capistrano Unified School District*, 37 F.3d 517 (9th Cir., 1994))[36]

Creation Science in Interpretation

The importance of these legal cases to the interpreter, in part, regards the determination that "Creation Science" is not the same as "science" and should not be interpreted as such. The courts have also ruled that these two subjects are not to be treated as if both are religions. Because interpretation of natural and cultural resources almost always depends upon sound scholarship in science and history, Creationism would rarely be a predominant explanation of any of the resources in the park.

However, that does not mean that Creationism cannot be discussed with visitors. Rather, scientific scholarship always provides the predominant explanation, but subsequent conversation can include Creationism as an appropriate means of exploring multiple perspectives and meanings of the resources. Talking with visitors about Creationism or other faith-based explanations of how the world was formed, for example, can provide relevance to that discussion. And so can talking about other ways of explaining the world. Such explanations, though, must occur within the context provided for the discussion by scientific scholarship. Interpretive opportunities are always enhanced by the interpreter's intelligent use of resource- and visitor-relevant information.

Spiritual Traditions and Perspectives of Indigenous Peoples

As of this writing, there are 562 federally recognized tribal governments in the United States.[37] People identified as indigenous peoples, Native Americans, American Indians, Indian Tribes and Nations, Native Hawaiians, and Alaska Natives are included in this group. Many heritage sites are connected to cultures that preceded the contemporary dominant culture of the United States, which is why interpreters should become familiar with this topic.

Among these populations, many different religious viewpoints exist. There is no *one* "Indian religion" — to suggest such is misleading and disrespectful. It is incumbent on interpreters to help visitors understand the distinct natures of these various peoples when interpreting associated resources. That's not to say that there are no similarities — there are. For instance, many of the religious views of these cultures are tied to specific aspects and features of the land. Similarities and differences *do* exist, and interpreters should facilitate an understanding and appreciation of this fact related to the heritage resources of their site.

To the extent that we can generally characterize the multiple viewpoints of these groups, they do not correlate their religious views with science. They do not attempt to use science to corroborate them and find this a rather alien idea. In this way, they are quite different from most Creationists.

[36] *Teaching About Evolution and the Nature of Science;* National Academy of Sciences; (Washington, D.C.: National Academy Press, 1998), pp. 121-122. Note: It can be read online at: http://www.nap.edu/readingroom/books/evolution98.

[37] **Bureau of Indian Affairs**; http://www.doi.gov/bureau-indian-affairs.html (2004).

Avoiding discussion of the spiritual worldviews of these groups, as relates to heritage resources, is often impossible. The traditional placement of the door (facing East) in a Navajo hogan is connected to a Navajo spiritual worldview. The nature and placement of markings found on rocks is often related to a people's spiritual worldview. The selection of village sites might be related to a people's spiritual worldview. And so on. The professional interpreter weaves these ideas into the context of what we think we know about heritage resources. And we forthrightly tell the public, "This is what we *think* we know."

Oral tradition — history passed on from generation to generation via its careful recitation — is an important social feature among many of these peoples. Ethnographers and others provide scholarship in this area that enables contemporary specialists and interpreters to construct more complete understandings of past events.

Spiritual Traditions and Perspectives

Natives today follow many spiritual traditions:

- Many Native families today have been devout Christians for generations.

- Others, particularly in the Southwest have retained their aboriginal traditions more or less intact.

- Most follow a personal faith that combines traditional and Christian elements.

- *Pan Indianism* is a recent and growing movement which encourages a return to traditional beliefs, and seeks to create a common Native religion.

- The *Native American Church* is a continuation of the ancient *Peyote Religion* which had used a cactus with psychedelic properties called peyote for about 10,000 years. Incorporated in 1918, its original aim was to promote Christian beliefs and values, and to use the peyote sacrament. Although use of peyote is restricted to religious ritual which is protected by the US Constitution, and it is not harmful or habit forming, and has a multi-millennia tradition, there has been considerable opposition from Christian groups, from governments, and from within some tribes.

The Inuit. The traditional *Inuit* (Eskimo) culture is similar to those found in other circumpolar regions: Northern Russia and the Northern Scandinavian countries. Life has been precarious; there are the double challenges of the cold, and the continual threat of starvation. (The popular name for the Inuit, "Eskimo," is not used by the Inuit.).

Their religious belief is grounded in the belief that *anua* (souls) exist in all people and animals. Individuals, families and the tribe must follow a complex system of taboos to assure that animals will continue to make themselves available to the hunters. Many rituals and ceremonies are performed before and after hunting expeditions to assure hunting success.

An underwater Goddess *Sedna* or *Takanaluk* is in charge of the sea mammals. She is part human and part fish. She observes how closely the tribe obeys the taboos and releases her animals to the hunters accordingly. There is a

corresponding array of deities who release land mammals; these are *Keepers* or *Masters*, one for each species.

The *Angakut* or Shaman is the spiritual leader of each tribe. He is able to interpret the causes of sickness or lack of hunting success; he can determine the individual or family responsible and isolate the broken taboo. In a manner similar to Shamans in may other cultures, he enters a trance with the aid of drum beating and chanting. This allows his soul to leave his body and traverse great distances to determine the causes of sickness and other community problems.

Eastern Subarctic, Eastern Woodlands, Plains and Southwest Cultures. Native religions in these areas share some similarities, and differ significantly from Inuit culture described above. Tribes also differ greatly from each other. Spiritual elements found in some (but not all) non-Inuit native religions are:

Deity: A common concept is that of a dual divinity:

- a Creator who is responsible for the creation of the world and is recognized in religious ritual and prayers;

- a mythical individual, a hero or trickster, who teaches culture, proper behavior and provides sustenance to the tribe.

There are also spirits which control the weather, spirits which interact with humans, and others who inhabit the underworld. Simultaneously the Creator and the spirits may be perceived as a single spiritual force, as in the unity called *Wakan-Tanka* by the Lakota and Dakota.

Creation: Individual tribes have differing stories of Creation. One set of themes found in some tribes describes that in the beginning, the world was populated by many people. Most were subsequently transformed into animals. Natives thus feel a close bond with animals because of their shared human ancestry. Dogs are excluded from this relationship. This bond is shown in the frequent rituals in which animal behavior is simulated. Each species has its master; for example, the deer have a master deer who is larger than all the others. The master of humans is the Creator.

Emergence of the Tribe: This is a concept found extensively in the Southwest. The universe is believed to consist of many dark, underground layers through which the humans had to climb. They emerged into the present world through a small hole in the ground - the world's navel. Other tribes believe that their ancestors have been present in North America as far back as there were humans.

Sacred Texts: Many tribes have complex forms of writing. Other tribes have preserved their spiritual beliefs as an oral tradition.

Afterlife: In general, Native religions have no precise belief about life after death. Some believe in reincarnation, with a person being reborn either as a human or animal after death. Others believe that humans return as ghosts, or that people go to another world. Others believe that nothing definitely can be known about one's fate after this life. Combinations of belief are common.

Cosmology: Again, many tribes have unique concepts of the world and its place in the universe. One theme found in some tribes understands the universe as being composed of multiple layers. The natural world is a middle segment. These layers are thought to be linked by the World Tree, which has its roots in the underground, has a trunk passing through the natural world, and has its top in the sky world.

Shamans: Although the term "Shaman" has its origins in Siberia, it is often used by anthropologists throughout the world to refer to Aboriginal healers. Spirits may be encouraged to occupy the Shaman's body during public lodge ceremonies. Drum beating and chanting aid this process. The spirits are then asked to depart and perform the needed acts. Other times, Shamans enter into a trance and traverse the underworld or go great distances in this world to seek lost possessions or healing.

Vision Quest: Young boys before or at puberty are encouraged to enter into a period of fasting, meditation and physical challenge. He separates himself from the tribe and goes to a wilderness area. The goal is to receive a vision that will guide his development for the rest of his life. They also seek to acquire a guardian spirit who will be close and supportive for their lifetime. Girls are not usually eligible for such a quest.

Renewal Celebrations: The Sun Dance amongst the Plains Natives is perceived as a replay of the original creation. Its name is a mistranslation of the Lakota *sun gazing dance*. Other tribes use different names. It fulfilled many religious purposes: to give thanks to the Creator, to pray for the renewal of the people and earth, to promote health, etc. It also gave an opportunity for people to socialize and renew friendships with other groups. A sweat lodge purifies the participants and readies them for lengthy fasting and dancing. It was successfully suppressed in most tribes by the Governments of the U.S. and Canada. However, it survived elsewhere and is now being increasingly celebrated.

Sweat Lodge: This is a structure which generates hot moist air, similar to a Finnish sauna. It is used for rituals of purification, for spiritual renewal and of healing, for education of the youth, etc. A sweat lodge may be a small structure made of a frame of saplings, covered with skins, canvas or blanket. A depression is dug in the center into which hot rocks are positioned. Water is thrown on the rocks to create steam. A small flap opening is used to regulate the temperature. As many as a dozen people can be accommodated in some lodges.

Hunting ceremonies: these involve the ritual treatment of a bear or other animal after its killing during a successful hunt. The goal is to appease its spirit and convince other animals to be willing to be killed in the future.

Prophets: The Abramic Religions (Judaism, Christianity and Islam) trace their development through a series of patriarchs and prophets. Native religions do not have as many corresponding revered persons in their background. Some Native prophets include Handsome Lake in the Iroquois Confederacy, Sweet Medicine of the Cheyenne, and White Buffalo Woman of the Lakota & Dakota tribes.

Traditional housing: There were many variations across North America: conical wigwams or tipis, long houses, and cliff dwellings. The shape of the structure often represents a model of the cosmos.[38]

Multiple Perspectives, Religion, and Native American Origins

From where did Native Americans originate? There are at least four conflicting beliefs about the origin of Native Americans:

- There has been, until recently, a consensus among scientists that prior to perhaps 11,200 years ago, the Western Hemisphere was completely devoid of humans. They believed that:

    Much of the world's water was frozen in gigantic ice sheets.

    The floor of the Bering Strait between Siberia and Alaska was exposed.

    Big-game hunters were able to walk to Alaska They turned south, spreading out through the Great Plains and into what is now the American Southwest. Within a few thousand years, they had made it all the way to the tip of South America.

- Recent archeological discoveries have convinced some scientists that people may have arrived far earlier than about 9200 BCE "in many waves of migration and by a number of routes" — perhaps even from Australia, South Asia and/or Europe.

- Many native tribes contest these theories. Their oral traditions teach that their ancestors have always been in the Americas.

- Some Natives believe that their ancestors emerged from beneath the earth into the present world through a hole in the earth's surface.

Some Natives find the suggestion that their ancestors migrated to North America only a few tens of thousands of years ago to be quite offensive.[39]

The variations in ideas about origins provide interpreters with a variety of considerations. Among these are the veracity of information, according to what group or process, and how best to be inclusive and portray multiple points of view within the context of sound scholarship.

Spiritual Rights of Indigenous Peoples

The topic of spirituality and religious perspectives is addressed a little differently for indigenous peoples than for others. And there are a variety of reasons for this.

Location of Heritage Sites. Many of the heritage sites in the United States are places where indigenous peoples have traditionally conducted religious or spiritual activities. This fact carries with it a responsibility for the managers of these

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[38] *Native American Spirituality;* B. A. Robinson; Ontario Consultants on Religious Tolerance; http://www.religioustolerance.org/nataspir.htm (2/20/2002).

[39] *From where did Native Americans originate?* — *Native American Spirituality;* B. A. Robinson, Ontario Consultants on Religious Tolerance, http://www.religioustolerance.org/nataspir.htm (2/20/2002).

heritage sites to provide appropriate access and opportunities to indigenous peoples to continue these traditions. This fact also carries with it a responsibility for interpreters to help the public understand the cultural necessity for such accommodation, and to explore together the complexities of indigenous worldviews when interpreting at one of these sites. The location of some heritage sites plays a part in how spirituality and religious perspectives are interpreted.

Protection and Preservation of Traditional Religions of Native Americans.
In 1978, a Joint Resolution of Congress stated:

Whereas the freedom of religion for all people is an inherent right, fundamental to the democratic structure of the United States and is guaranteed by the First Amendment of the United States Constitution;

Whereas the United States has traditionally rejected the concept of a government denying individuals the right to practice their religion and, as a result, has benefited from a rich variety of religious heritages in this country;

Whereas the religious practices of the American Indian (as well as Native Alaskan and Hawaiian) are an integral part of their culture, tradition and heritage, such practices forming the basis of Indian identity and value systems;

Whereas the traditional American Indian religions, as an integral part of Indian life, are indispensable and irreplaceable;

Whereas the lack of a clear, comprehensive, and consistent Federal policy has often resulted in the abridgment of religious freedom for traditional American Indians;

Whereas such religious infringements result from the lack of knowledge or the insensitive and inflexible enforcement of Federal policies and regulations premised on a variety of laws;

Whereas such laws were designed for such worthwhile purposes as conservation and preservation of natural species and resources but were never intended to relate to Indian religious practices and, therefore, were passed without consideration of their effect on traditional American Indian religions;

Whereas such laws and policies often deny American Indians access to sacred sties required in their religions, including cemeteries;

Whereas such laws at times prohibit the use and possession of sacred objects necessary to the exercise of religious rites and ceremonies;

Whereas traditional American Indian ceremonies have been intruded upon, interfered with, and in a few instances banned: Now, therefore, be it

Resolved by the Senate and House of Representatives of the United States of American in Congress assembled, That henceforth it shall be the policy of the United States to protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise the traditional religions of the American Indian, Eskimo, Aleut, and Native Hawaiians, including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rights.

[Editor's Note: This Act was Amended in 1994 by the addition of 42 USC 1966a which provides certain protection for the "traditional Indian ceremonial use of peyote."][40]

Indian Sacred Sites.
If your heritage site is managed by an agency of the United States government, a more recent order is also something with which you should be familiar. In 1996, an Executive Order titled "Indian Sacred Sites" was signed "to improve the internal management of the executive branch" of the United States government. It addresses accommodation of sacred sites, procedures, and property interests.[41]

Special Government-to-Government Relationship.
In the United States, Native American governments do not consider non-endorsement of religion to be an issue or conflict for their peoples. Additionally, although many of these tribes and nations are physically located within the borders of the United States, they are accorded some of the rights of sovereign nations. The United States and its agencies consult with them on a government-to-government basis. These special considerations all play a role in how an interpreter of a heritage site with ties to one or more of these groups conducts their work. Governments, religions, and rights is a complex subject but one with which we, as interpreters and managers, must be familiar — and one with which the public should be familiarized through interpretive services at sites where this subject is applicable.

Misconceptions about Indigenous People
An aspect of interpreting ancestral peoples is the erroneous idea that many of these cultures mysteriously, suddenly, inexplicably vanished. Often a more accurate picture is that these cultures continue to exist. One culture may have merged with another, and now a new culture exists today in some modified form. Or the pueblo on the next mesa is populated by people whose ancestors lived in the structures we're walking through today. Separating current understanding from sometimes-popularized *mis*understanding is of paramount importance to interpretive work, to the extent that it can be accomplished. This is done through the appropriate use of sound scholarship.

Indigenous people have sometimes been idealized to have lived in perfect balance with nature. Some aspects of this idea may be truer than others, but it seems clear that this simplistic viewpoint has done harm to the construction of more accurate understandings of what life was like for people in ages past. The interpreter is responsible for conveying valid, culturally acceptable, current knowledge.

Indigenous Spirituality and Cultural Restrictions
Sometimes indigenous people cannot share knowledge about a specific topic. Sometimes their culture only allows a male to communicate a particular story to another male.

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[40] ***American Indian Religious Freedom Act of 1978;*** Hamline University, School of Law; http://web.hamline.edu./law/lawrelign/sacred/airfa78.ssw.htm (2004).

[41] ***White House, Office of the Press Secretary, Executive Order No. 13007 "Indian Sacred Sites," May 24, 1996;*** Office of Tribal Justice, United States Department of Justice; http://www.usdoj.gov/otj/sacred.htm (2004).

Sometimes they may choose *not* to tell you something about their own or another clan. Sometimes they'll tell you something but ask that you not tell others, or expect this of you without mentioning it directly. Maybe a specific story is only told during winter; never in summer. And so on. Cultural restrictions come in a variety of forms, and interpreters working with indigenous peoples or interpreting resources associated with them need to be aware of, and respect, such cultural taboos and share an understanding of such limitations with visitors.

Multiple Perspectives and Attribution

Sometimes interpreters conduct research into the history of an indigenous people via archeology, ethnography, or through other means that portray a different series of events than do the oral histories of the people themselves. How does an interpreter treat this information? Both sources have sound scholarship behind them to the extent they can: The archeologist did not live 450 years ago; members of the contemporary tribe did not live 450 years ago. The archeologist used science to help her understand the people; the descendents are the recipients of stories that have been passed on from one generation to another to preserve the memory of important past events.

The interpreter once again turns to the usefulness of attribution. He or she develops the talk outline to include what scientists think happened, and attributes these thoughts to the appropriate archeologists and ethnographers. The interpreter develops the talk to also include what the descendents say happened, and attributes these thoughts to the people who are connected to this place today. The public internalizes these multiple perspectives, visitor by visitor. Despite what some visitors may think, interpreters are not charged to have *the* answer, the *only* answer, or *only one* answer. Knowledge is inextricably connected to context and subjective perspective. One of the best things we can do is help visitors understand this idea. ••

Concluding Thoughts

The work of interpreters has become an increasingly challenging endeavor. Establishing clear communication and fostering active civic engagement is more complex than ever before. In this publication, we've attempted to explore interpretive theory and practice from a variety of perspectives to help interpreters and managers better accomplish the mission of their park's interpretation & education program.

The role of the heritage interpreter can be seen as akin to a sacred trust — guiding people to more deeply and thoughtfully explore the world, enhancing a sense of personal enrichment, and creating opportunities for more meaningful participation in society. Quality of life is inextricably tied to a sense of place in this world — and sense of place is intimately tied to personal and shared experience of heritage.

By fostering personal connections to heritage resources, the interpreter also facilitates the sense of stewardship necessary to guarantee that the integrity of those resources will be protected and maintained unimpaired to enrich the lives of generations to come. For those of us in the profession, there is great satisfaction in providing the public service that enhances understanding, appreciation, protection, and perpetuation of the resources we love. By helping others to search out their own place in the great tapestry of life, we can better find our own.

As learner, teacher, guide, caretaker, and public servant, the interpreter occupies a unique and valuable niche in modern society. Like the bard, sage, muse, and court jester of elder days, the interpreter uses storytelling to provoke thoughtful introspection and enhance enjoyment while carefully respecting individual perspective and independence.

That can often be a stern test of character. The degree to which most interpreters are emotionally and intellectually invested in the heritage resources they interpret can lead to impatience, overzealousness, and arrogance vis-à-vis the visiting public. It's all too easy for the interpreter to conclude that he or she knows best. We must constantly be aware of our own weaknesses and biases — and of the fact that people invariable decide for themselves what heritage resources mean. We must trust that an honest, professional, diverse, and sound presentation of ideas and perspectives will lead visitors to find value in heritage — and that once heritage is valued, it will be cherished and protected.

As daunting and humbling as it may be to take on the responsibility to help others discover meaning, the work of the interpreter is always thoughtful, challenging, and meaningful.

Do good work — and have fun with it. ●●

Essential Tools for Interpreters

Interp Guide

The Philosophy and Practice of Connecting People to Heritage

This guide compellingly defines the profession of interpretation within the context of contemporary culture. It explores how cutting-edge interpretive philosophy and practice can help interpreters and managers provide services that accomplish the mission of interpretation: *Providing enhanced opportunities for visitors to explore their own intellectual and emotional connections to the natural and cultural resources that comprise shared heritage.* If you are a front-line interpreter, interpretive supervisor, or manager of heritage resources, this guide was written with you in mind. *January 2005 edition.*

CIP Guide

A Guide to Comprehensive Interpretive Planning

This guide describes how planners of the Office of Interpretation and Education, Intermountain Region (IMR), National Park Service approach comprehensively planning a park's interpretation & education program. It provides many insights into the planning process and is useful for anyone intending to conduct, or participate in, planning for interpretation. It also contains the detailed scripts used by IMR interpretation planners to organize and conduct comprehensive interpretive planning workshops, and contains other elements that are important to the process. These include a scope of work template, a project initiation checklist, a stakeholder invitation letter, sign-in sheets, agendas, workshop handouts, and more than 30 sets of significance statements and primary interpretive themes from a variety of parks. *February 2005 edition.*

Associated Electronic Templates. *CIP Guide* references four stand-alone electronic templates that are designed in Microsoft Word® XP format. These templates are available upon request and include the following files:

- Archive of the Comprehensive Interpretive Planning Process
- Foundational Information for Use Between Workshops
- CIP Component 1: Long-Range Interpretive Plan
- CIP Component 3: Interpretive Database

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Interp Guide : The Philosophy and Practice of Connecting People to Heritage.

Richard Kohen and Kim Sikoryak.

Third Edition, January 2005; June 2001, February 2000.

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Kim Sikoryak is a 28-year veteran with the National Park Service and has worked as Chief of Interpretation and Interpretive Specialist at parks and regional offices in Oregon, California, Hawaii, Colorado, and New Mexico. Kim's varied background in secondary and college education, public radio and television, field biology, and theater provides him with an opportunity to view interpretive challenges and opportunities from diverse, and sometimes unusual, perspectives. Since 1997 he has worked with Richard Kohen to develop a set of essential tools for interpreters that are tightly focused on outcomes, yet intimately tied to operational realities.

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Interp Guide

Great Trinity Forest Management Plan

RECREATION

Interpretive Planning Framework for the Southwestern Region

Interpretive Planning Framework

Interpretive Arts Unlimited!
A USDA Forest Service Enterprise Team

...telling your stories by heart...

Interpretive Arts Unlimited!

Table of Contents

If you plan to install a **sign**, want to submit a **grant proposal**, decide to produce a **brochure**, prepare for a **talk**, develop an **exhibit**, or anything else where you want to **communicate something to the public**, KEEP READING!

Have you thought about who your audience is, what your themes and messages are, and how they tie in to management goals?

Though there are many opportunities for interpretive projects, we cannot interpret everything (see Appendix C for a definition of interpretation). Therefore, we need to focus by telling the right stories at the best locations with the most appropriate media. An interpretive plan can help you get that focus by ensuring that interpretive projects are conceived and implemented with the purpose of achieving a Forest's interpretive mission.

Introduction to the Framework

This planning framework discusses the types of interpretive plans and elements to consider for three different levels of plans. This document was requested by the interpreters, recreation and public affairs staffs, and other communicators in Region 3. It is meant to be a handy tool, not a series of endless hoops to jump through. It is a compilation of the collective wisdom of interpretive planners (public and private) and those agency folks who are "on the ground and doin' stuff."

Don't take this document too seriously. Use it as a tool to help structure and set up your interpretive planning process, but don't think of it as a planning bible. If you come up with better ways of getting interpretive ideas down on paper in an organized fashion, please improve the process.

The Golden Rule of Interpretive Planning:

Don't decide what your medium will be until you've identified your audience and messages!

How to Use This Framework

Despite this golden rule, you may already be locked in and committed to your communication medium, whether trail sign or brochure (see Appendix A for pros and cons associated with various media choices).

By taking a step back and looking at the critical interpretive elements such as your audience, themes, and goals, you will improve your product ten-fold! We promise!

Read the Introduction and then once you know what level of planning you need, flip to the applicable section:

Why Bother Writing Interpretive Plans?

Why Bother?

1. So we can secure funding.
Example: You discover a week before the deadline that Natural Resources Conservation Education has funding for interpretive projects. You use the project interpretive plan to quickly fill out the nomination form. The project receives funding for phase II of the plan.

2. So consistency is maintained throughout the life of the project.
Example: A biologist adds signs to an interpretive trail after the wildlife biologist who created the trail and original signing retires. The new signs use different materials and writing styles than the first signs. The interpretive message is disjointed and ineffective.

3. So interpretive projects integrate with Regional, Forest and District priorities.
Example: The Whoops District forgets to put interpretive goals, themes and objectives into its Forest Land Management Plan, NEPA documents, and recreation plans. Interpretation isn't completely ignored, though: Whoops' wildlife biologist has some loose change and puts up five routed signs about wood rats. Meanwhile, visitors pound the door down with questions

"Plan-shmlan! Can't we cut through the all the paperwork and red tape and just DO something? Half our budget and time will be taken just to plan the project. Why should I bother to write an interpretive plan?"

Why? Because interpretive planning will help you, as a manager, prioritize funding, plan facilities, search for partnerships and communicate the potential interpretive projects to the public, other managers, forests, regions, or agencies. Writers, artists, and exhibit designers can use the plan to guide their research and creativity, thus producing a final product close to the vision of project planners.

Forest Service personnel are already doing interpretation, but it happens mostly in a haphazard or opportunistic way. See the sidebar in the next few pages for great examples of why we SHOULD bother with a coordinated approach.

"Every competitive, long distance runner knows that s/he does not begin a race unless s/he knows where the starting line and finish line are and how to get from one to the other. The same is true of an interpretive plan. The mission statement identifies the starting line; the goals identify the finish line; and the objectives identify the course in between."

–Foundations: Interpretive Program for the George Washington National Forest, 1991

What is the Level of Planning Needed for Your Project?

Are you planning for an entire area, such as a Forest, Region, or District? Or something site-specific, like a trail? Or do you want to just create a brochure, or give a guided walk?

All levels of interpretive planning should address themes, goals, objectives, and targeted audience, and should answer most of the following questions, to varying levels of detail:

- Who is the visitor?

- What kinds of information do visitors want or need?

- What kind of information does the Forest Service want to communicate?

- What media is best suited to presenting each part of the message?

- Where is information best conveyed?

Interpretive plans for broad areas like a district or scenic byway differ in some respects from plans for individual projects, like a trail. This planning framework presents general planning processes for three levels of planning (area, site, and product), and suggests outlines and considerations.

In most cases, it is preferable to write an overview interpretive plan for an area like a district or a scenic byway before writing the project level plans (brochure, scenic overlook, etc.).This way, projects can be placed appropriately and coordinated with each other. Ideally, each forest would have interpretive goals incorporated into its forest land management plan (and/or an interpretive plan as an addendum), and then each district would write a district level plan to help guide individual project planning.

Before beginning a planning process, it is very advisable to find one or more existing plans which tackle an area or project of similar scope to the one you are working on (e.g. if your plan is for a scenic byway, find another scenic byway plan), particularly if you are an inexperienced planner. You might reference it as an example of content and formatting that could be applicable, or adapted, to your site. Or, even better, you might contact the person on the district or site who is tasked with implementing the plan to find out what has and has not worked well.

Questions to Consider

- Does your Region, Forest or District have an interpretive plan or strategy to reference?

- Are you planning a project such as a one-time interpretive sign installation, or an ongoing program, such as regularly scheduled hikes or campfire programs?

- Are you looking to promote consistency in message and design between districts or forests?

Why Bother? (continued...)

about everything except wood rats, and the district's hard work on many excellent projects is not shared, gets misunderstood, or goes completely unnoticed.

4. So we coordinate between districts, forests, agencies, towns and cities on interpretive projects.
Example: Within one town, six self-guided signed interpretive trails are planned, all targeting the same audience. Several topics overlap and similar ecosystems are interpreted. Had the agencies collaborated, a variety of messages and media could have been planned, providing each trail with individuality, eliminating duplication, and maximizing opportunities to communicate.

5. So the best media will be chosen for each site.
Example: Signs leading up to and directly in front of a wetland are continually shot accidentally by hunters and purposely by vandals. A brochure for this site would have cost less and would have offered undisturbed interpretation.

Why Bother? (continued...)

6. So we spend our money and creativity efficiently interpreting the best subjects at the best locations.
Example: A district spent $20,000 rebuilding and creating interpretive signs for a CCC picnic shelter in one area and then realized that a much better example of CCC architecture existed some 40 miles away with a group of site-specific CCC retirees ready to do some of the work for free and provide oral history to boot.

7. So we help determine the phasing of funding – what is done in what order.
Example: A campground spent thousands of dollars renovating its visitor center: modern bathrooms with showers, a snack shop, a wheelchair access ramp, and a paved parking lot were all implemented. However, the original, run-down kiosk stood – with a barely-legible area map and a few faded words describing the facilities – clashing with the upscale visitor center only a few steps away.

• Do you want your seasonal interpreters delivering well-thought out programs?

It's important to determine the scope of your plan at the outset, considering the time and dollars available. This will determine the level of detail that you will include.

For example, for a forest interpretive plan, you will want to begin by clarifying management goals and objectives, developing and/or refining interpretive themes, and applying these to sites on the districts. Determining text for specific exhibits or signs is not appropriate for this level of planning, which would be better tackled in an exhibit or sign plan.

Even if you had all the time and money in the world to develop a forest or area plan, there will come a moment when you'll say, "That's it! Enough already! Save the storyline research for the exhibit plan!" Which brings up a good point: "you mean an interpretive plan isn't the be-all, end-all?"

That's right, interpretive planning is the first step, but someone will still have to implement the projects on the ground. As Lisa Brochu, author of "Interpretive Planning: The 5-M Model for Successful Planning Projects", puts it: "Plans don't make things happen. People make things happen, and a good plan makes it easier for that to take place."

Okay! See Appendix F for other types of plans. Which level of planning do you need?

> "Plans don't make things happen. People make things happen, and a good plan makes it easier for that to take place."
>
> --Lisa Brochu, "Interpretive Planning: The 5-M Model for Successful Planning Projects"

Great Trinity Forest Management Plan

RECREATION

SCORP NRSE Chapter 2: Participation & Trends in Outdoor Recreation

In order to understand the dynamics of outdoor recreation in Colorado, a comprehensive effort was made to examine both national and state participation and trends. While residents are the primary recreation participants in the state, visitors and tourists exploring Colorado also influence the recreation demands within our state. Studying regional and national trends beyond state borders helps us understand the preferences and needs of out-of-state recreationists and assists with anticipating future trends within Colorado.

NATIONAL PARTICIPATION AND TRENDS IN OUTDOOR RECREATION

National Survey on Recreation and the Environment (NSRE)

The National Survey on Recreation and the Environment (NSRE) 2000 is the 8th of the United States' on-going National Recreation Surveys, the first of which was done for the Outdoor Recreation Resources Review Commission in 1960.

Published by the United States Forest Service (USFS), the NSRE is a collaborative effort among many agencies including: National Oceanic and Atmospheric Administration (NOAA), Environmental Protection Association (EPA), National Park Service (NPS) and Bureau of Land Management (BLM). Other participating stakeholders include: National Scenic Byways, numerous state agencies and many others.

Methodology

Between July 1999, and July 2002, over 57,000 non-institutionalized individuals 16 years of age or older across the U.S. were asked about their participation in 12 types of outdoor recreation. Households were surveyed via phone and asked questions related to outdoor recreation participation, demographics, environmental attitudes, natural resources values, constraints to participation and attitudes toward management principles.

NSRE Results

A summary of the national results are summarized in this section. For comprehensive results, please visit the NSRE website at http://www.srs.fs.usda.gov/trends/.

According to the NSRE, an estimated 97.6% of respondents participated in some type of outdoor recreation during the 12 months prior to their interview. This means that more than 207.9 million people age 16 or older are involved in some form of outdoor recreation.

When reviewing the increase in participants from 1994-95 to 2000-2002, one should remember the population of the United States has increased substantially. However, the percent of people participating in several activities has increased substantially beyond what an increase in the total population would account for.

Highlights of NSRE Results:

- Over 97% of Americans participate in outdoor recreation activities.
- Walking, birding, hiking, swimming are the fastest growing activities.
- Most participants are trying a greater number of activities.
- Participation has increased in almost all outdoor recreation activities since 1990.
- Almost all outdoor activities are forecast to grow in number of people participating.
- People are living longer and staying active longer.
- Increasingly, minorities, older and urban people are participating.
- College-educated, >$50K income, with smaller households are a major growing demographic.
- Outdoor recreation is expected to continue to expand in the future, placing more demands on water and land resources.

Table 3: Fastest Growing Activities from 1982 - 2002 Among All Categories

Activity	Growth (in millions)	Number of Participants in 2002 (in millions)
Walking	85.4	179.0
Bird Watching	50.0	71.2
Hiking	48.4	73.1
Swimming/river, lake or ocean	36.4	92.9
Sightseeing	32.7	114.0
Picnicking	31.8	116.6
Bicycling	27.4	83.9
Developed Camping	22.8	52.8
Motor Boating	17.8	51.4
Off-Road Driving	17.3	36.7

Source: NSRE, 2002

Table 4: National Participation Trends from 1994-95 and 2000-02

The most popular types of outdoor participation by resource base, as measured by number of people participating include:

Resource Base Activity	1994-1995 Participants (in millions)	2000-2002 Participants (in millions)	Percent Change 1995 - 2002
LAND RESOURCE BASED ACTIVITIES			
Bird watching	54.1	69.0	27.5
Hiking	47.8	70.9	48.3
Backpacking	15.2	22.8	50.0
Primitive area camping	28.0	34.1	21.8
Off-road driving	27.9	37.3	33.7
Walking	133.7	176.9	32.3
Sightseeing	113.4	110.4	-2.6
Developed area camping	41.5	56.3	35.7
Picnicking	98.3	116.1	18.1
Bicycling	57.4	84.2	46.7
Horseback riding	14.3	20.7	44.8
Hunting	18.6	24.1	29.6
WATER RESOURCE BASED ACTIVITIES			
Motorboating	47.0	51.9	10.4
Swimming (river, lake, ocean)	78.1	89.1	14.1
Water skiing	17.9	17.3	-3.4
Fishing	57.8	72.7	25.8
Sailing	9.6	10.9	13.4

Source: NSRE, 2003

Table 4: National Participation Trends from 1994-95 and 2000-02 shows the percentage change of people participating in some land-resource-based and water-resource-based activities. The substantial increase in population in the United States accounts for some of the growth in these activities.

Overall, nearly all activities experienced an increase in people participating from 1995 through 2002. The highest percentage change occurred for backpacking (50.0%), followed by hiking (48.3%). Walking is the single most popular activity, with nearly 177 million participants.

Only two activities showed a decrease in participation, sightseeing (-2.6%) and water skiing (-3.4%) between 1995 and 2002. However, these decreases were very minor. In examining just the land-resource-based activities, the percent of people participating in activities such as bird watching, hiking, backpacking, off-road driving, walking, developed camping, bicycling, horseback riding, and hunting have increased significantly from 1995-2002. Activities that are simple, inexpensive, and related to nature such as hiking, walking, and bicycling, have been the fastest growing activities over the years.

In regards to water-resource-based activities, fishing, swimming, sailing, and motor boating have increased from 1995 to 2001. Fishing (25.8%) had the greatest gains in participants while motor boating (10.4%) had the least. In relation to motor-boating, the percent of people participating in water skiing decreased (-3.4%) from 1995 to 2002.

The Most Popular Outdoor Activities

Tables 5-9 are from the ongoing NSRE 2000; because additional households are surveyed as the study continues, some participation numbers slightly vary from previous tables.

Activities in Table 5 and 6 may be popular because they are low cost, require minimal physical exertion, and can be enjoyed without specialized equipment or skills.

Looking at individual activities, traditional, low-cost activities are the most popular, according to the latest NSRE results. Viewing natural scenery and visiting a nature center, nature trail, or zoo are activities that overlap with tourism and outdoor recreation.

Since outdoor recreation was first tracked by the NSRE, swimming has increased the most significantly. Hunting has shown the smallest growth since 1960. All activities show increases in people participating.

Land-based participants per square mile are mapped in Map 6, showing recreation demand 'hotspots' with the highest concentration of outdoor recreationists reside. Colorado contains many 'hotspots' of outdoor enthusiasts.

Table 5: The Most Popular Types of Outdoor Participation

Activity	Percent of population participating	Millions of participants
Individual Trail/Street/Road Activities	88.3	188.2
Traditional Social Activities	80.6	171.8
Viewing & Photographing Activities	73.9	157.5
Viewing & Learning Activities	67.3	143.4
Driving for Pleasure Activities	61.5	131.1
Swimming Activities	61.3	130.6

Source: NSRE, 2003

Table 6: The Most Popular Overall Activities

Activity	Percent of U.S. Population Participating
Walking	82.3
Family Gathering	73.8
Viewing Natural Scenery	59.5
Visiting a Nature Center, Nature Trail or Zoo	56.6
Picnicking	54.6

Source: NSRE, 2003

Map 6: Demand for Land Activities Based on Participation Rates
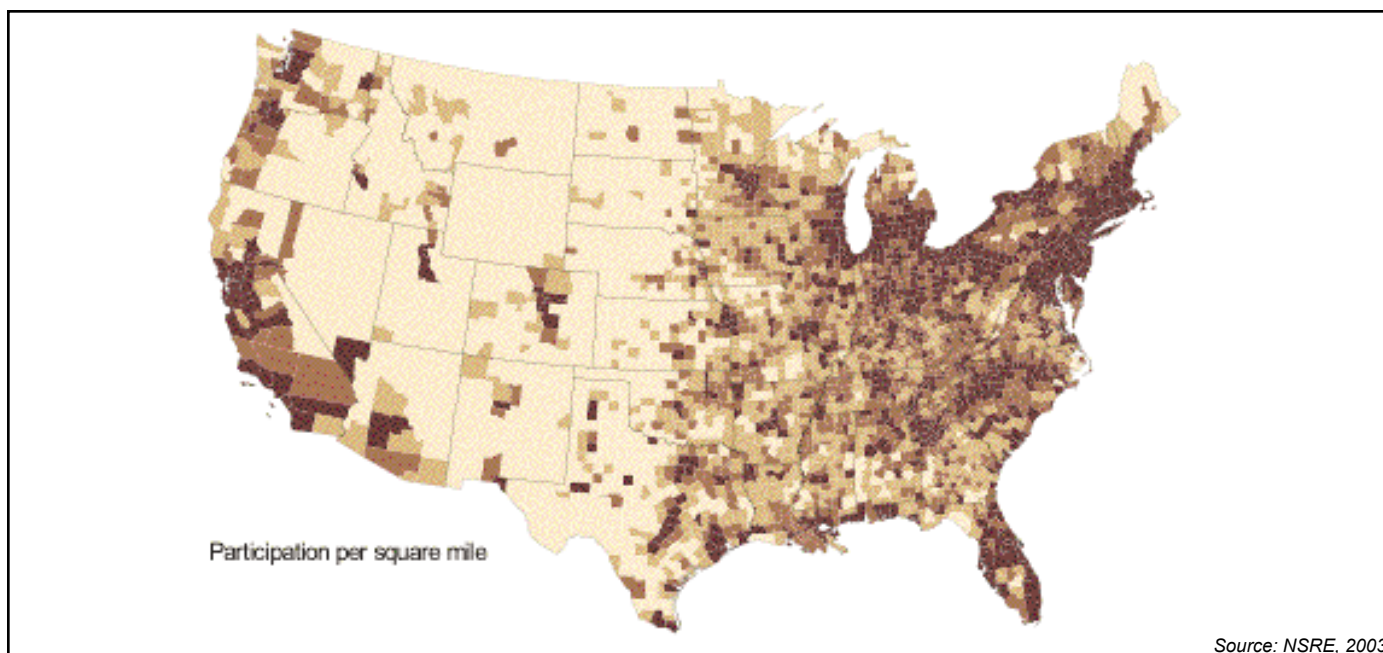
Participation per square mile

Source: NSRE, 2003

Outdoor Recreation Trends

Colorado Participation and Trends from the NSRE

To effectively evaluate outdoor recreation trends, the NSRE examined activities within each state. A summary of Colorado specific data is supplied in this section. Please visit www.parks.state.co.us for comprehensive data.

Methodology

State data was derived by sampling the country's population and locations providing a minimum number of interviews for each state. The 1995 number of participants is based on an estimate of 2.86 million Coloradans age16 and older and 2003 numbers are based on estimate of 3.32 million Coloradans over the age of 16. These estimates represent a 16% increase in population from 1995 to 2003, which should be considered in relation to the increases in participation.

Land, water and snow and ice-based activities are increasing faster than the population is growing, especially snow and ice-based activities.

Over 94% of Coloradans participate in outdoor recreation. People most often participate in trails and driving pursuits, viewing/learning activities and social pastimes. The largest percent increase from 1995 to 2003 is seen in individual sports, snow and ice activities, boating and trails/driving activities. Swimming and team sports are the only activities declining relative to population growth.

Kayaking, rafting and jet-skiing are the biggest factors in growth of water-based recreation. Snowboarding, snowmobiling and ice fishing are the major influences increasing winter recreation participation.

Family gatherings, walking for pleasure, outdoor sports events, visiting nature centers, sightseeing, picnicking and wildlife viewing engage the highest percentage of the population.

Table 7: Participation by Type of Outdoor Resource Base Among Colorado Residents

Resource Type	Percent participating, 1995	Millions of participants, 1995	Percent participating, 2003	Millions of participants, 2003	Percent change in # of participants 1995 - 2003
Land resource-based activities	79.75	2.28	94.24	3.13	37.28
Water resource-based activities	61.78	1.77	64.66	2.15	21.47
Snow and ice-based activities	28.55	0.82	37.41	1.24	51.22

*Source: NSRE, 2000-2003.
Versions 1-14, N=1,011,
Interview dates: 7/99 to 3/03*

Table 8: Participation by Type of Outdoor Activity Among Colorado Residents

Activity Type	Percent participating, 1995	Millions of participants, 1995	Percent participating, 2003	Millions of participants, 2003	Percent change in # of participants 1995 - 2003
Outdoor recreation participant	94.50	2.70	94.38	3.13	15.93
Trail/street/road activities	73.78	2.11	87.35	2.90	37.44
Individual sports	24.27	0.69	33.41	1.11	60.87
Team sports	26.72	0.76	24.52	0.81	6.58
Spectator activities	66.47	1.90	75.06	2.49	31.05
Viewing/learning activities	79.62	2.28	87.62	2.91	27.63
Snow/ice activities	28.55	0.82	37.41	1.24	51.22
Camping	42.81	1.22	45.21	1.50	22.95
Hunting	10.35	0.30	10.55	0.35	16.67
Fishing	31.82	0.91	35.21	1.17	28.57
Boating	25.21	0.72	32.67	1.08	50.00
Swimming (natural, pool, snorkeling)	49.47	1.41	41.01	1.36	-3.55
Outdoor adventure activities	54.46	1.56	61.79	2.05	31.41
Social activities	76.19	2.18	87.34	2.90	33.03

Source: NSRE, 2000-2003. Versions 1-14, N=1,001, Interview dates: 7/99 to 3/03.

Table 9: Percent Change in Participation in Outdoor Recreation Activities in Colorado

Activity Type	Percent participating, 1995	Millions of participants, 1995	Percent participating, 2003	Millions of participants, 2003	Percent change in # of participants 1995 - 2003
Kayaking	0.77	0.02	3.33	0.11	450.00
Surfing	0.52	0.01	1.41	0.05	400.00
Snowboarding	3.11	0.09	9.21	0.31	244.44
Soccer outdoors	4.15	0.12	10.40	0.35	191.67
Handball or racquetball outdoors	4.56	0.13	11.06	0.37	184.62
Jet skiing	3.81	0.11	8.68	0.29	163.64
View or photograph fish	11.87	0.34	24.79	0.82	141.18
Baseball	5.23	0.15	10.12	0.34	126.67
Snowmobiling	3.74	0.11	6.96	0.23	109.09
Sledding	11.62	0.33	17.65	0.59	78.79
Rafting	7.71	0.22	11.89	0.39	77.27
Football	7.88	0.23	11.32	0.38	65.22
Warmwater fishing	12.06	0.34	16.63	0.55	61.67

Table 9: Percent Change in Participation in Outdoor Recreation Activities in Colorado (Cont.)

Activity Type	Percent participating, 1995	Millions of participants, 1995	Percent participating, 2003	Millions of participants, 2003	Percent change in # of participants 1995 - 2003
Bicycling	33.66	0.96	45.37	1.51	57.29
View wildlife	41.79	1.20	56.27	1.87	55.83
Running or jogging	28.73	0.82	37.23	1.24	51.22
Snorkeling or scuba diving	6.01	0.17	7.39	0.25	47.06
Golfing	15.86	0.45	19.78	0.66	46.67
Tennis outdoors	10.35	0.30	13.13	0.44	46.67
Basketball outdoor	12.92	0.37	16.16	0.54	45.95
Backpacking	16.76	0.48	20.91	0.69	43.75
Canoeing	4.14	0.12	5.10	0.17	41.67
Developed camping	28.30	0.81	34.27	1.14	40.74
Family gathering	63.66	1.82	76.39	2.54	39.56
Swimming in lakes, streams, etc.	28.92	0.83	33.48	1.11	33.73
Walk for pleasure	71.54	2.05	82.63	2.74	33.66
Rowing	2.08	0.06	2.37	0.08	33.33
Small game hunting	6.16	0.18	7.08	0.24	33.33
Softball	14.60	0.42	16.90	0.56	33.33
Waterskiing	8.35	0.24	9.77	0.32	33.33
Yard games, e.g. croquet	38.19	1.09	43.69	1.45	33.03
Ice fishing	5.47	0.16	6.26	0.21	31.25
Attend outdoor sports events	55.97	1.60	62.85	2.09	30.63
Horseback riding	11.65	0.33	13.02	0.43	30.30
Coldwater fishing	26.91	0.77	30.07	1.00	29.87
Visit nature centers, etc.	61.30	1.75	68.10	2.26	29.14
Motorboating	18.18	0.52	20.11	0.67	28.85
Attend outdoor concerts, etc.	42.69	1.22	47.05	1.56	27.87
Anadromous fishing	3.68	0.11	4.12	0.14	27.27
Picnicking	59.11	1.69	64.44	2.14	26.63
Drive off-road	22.98	0.66	24.85	0.83	25.76
Big game hunting	8.46	0.24	9.09	0.30	25.00
Downhill skiing	18.43	0.53	20.01	0.66	24.53
Day hiking	44.85	1.28	47.77	1.59	24.22
Rock climbing	8.12	0.23	8.55	0.28	21.74
Migratory bird hunting	3.87	0.11	3.94	0.13	18.18

Table 9: Percent Change in Participation in Outdoor Recreation Activities in Colorado (CONT.)

Activity Type	Percent participating, 1995	Millions of participants, 1995	Percent participating, 2003	Millions of participants, 2003	Percent change in # of participants 1995 - 2003
Saltwater fishing	3.81	0.11	4.03	0.13	18.18
Ice skating outdoors	6.39	0.18	6.35	0.21	16.67
Visit historic sites	48.08	1.38	47.86	1.59	15.22
View birds	29.86	0.85	29.10	0.97	14.12
Caving	5.63	0.16	5.33	0.18	12.50
Volleyball outdoors	15.53	0.44	14.55	0.48	9.09
Visit beach or waterside	55.30	1.58	51.58	1.71	8.23
Sailing	4.54	0.13	4.35	0.14	7.69
Primitive camping	29.37	0.84	26.91	0.89	5.95
Pool swimming	39.32	1.12	35.16	1.17	4.46
Sightseeing	64.91	1.86	58.27	1.93	3.76
Cross country skiing	7.74	0.22	6.50	0.22	0.00
Visit archeological sites	32.53	0.93	26.86	0.89	-4.30
Mountain climbing	15.65	0.45	10.89	0.36	-20.00
Windsurfing	1.25	0.04	0.92	0.03	-25.00
Orienteering	3.72	0.11	2.11	0.07	-36.36

Source: NSRE, 2000-2003. Versions 1-14, N=1,001, Interview dates: 7/99 to 3/03.

Human-Powered Outdoor Recreation in Colorado

- The Outdoor Industry Association (OIA) estimates that 76.4% of Coloradans participate in human-powered outdoor recreation. Colorado ranks 8th highest in the percent of population age 16 and over participating in human-powered outdoor recreation.

- Outdoor recreation equipment, apparel and footwear contribute $200 million to Colorado's economy, based on the 2002 OIA State of the Industry Report.

- Ski and snowboard equipment and apparel expenditures total $1.1 billion each year, according to Colorado Ski Country USA.

Annual recreation-based retail expenditures total $1.3 billion in Colorado.

Source: OIA, 2203 and Colorado Ski Country USA, 2003

Outdoor Recreation & Participation Trends by Activity

Bicycling

- The total economic benefit from bicycling in Colorado is over $1 billion annually including expenditures, production, employment, income and tax revenues, according to a Colorado Department of Transportation (CDOT) study.

- Cycling downhill at Colorado ski areas is becoming a major recreation attraction and significant source of revenue, according to the CDOT. Over 699,000, or half of all summer visitors, biked at one of the ski areas in the state, bringing approximately $141 - $193 million of total revenue to Colorado.

- 70% of bicycling tourists at ski areas were from out-of-state.

- Nearly 10% of Coloradoans took a bicycle vacation in the last 12 months.

- 69% of Colorado households own at least one bicycle, with an average ownership of 2.7 bicycles.

- 15% of residents consider bicycling their primary recreation or exercise activity and 74% of residents report they sometimes bicycle, with a huge majority utilizing paved off-street bike paths.

- While off-road biking brings a significant amount of revenue to some regions and cities such as Durango, Winter Park, and Fruita, there is no research documenting these numbers. Studying the economic contributions of off-road biking should be considered to accurately estimate the full economic impact of bicycling in Colorado.

Trail Use

- Ascents of on 14'ers increased 300% in the past decade, from 65,000 to 200,000 per year. This is also exemplified in visitation numbers for three 14'ers graphed in Figure 12.

- Over 90% of Coloradans are trail users and the average Colorado family uses trails 78 times a year, according to a Colorado State Parks Trails Program survey.

- Since 1990, the number of climbers has increased by 10 percent per year.

Figure 12: More Climbers are Ascending 14'ers

VISITATION AT THREE 14,000 FOOT PEAKS (14'ERS)

Legend:
- ■ Mount Elbert
- ● Belford/Missouri Mountains
- ▲ Huron Peak
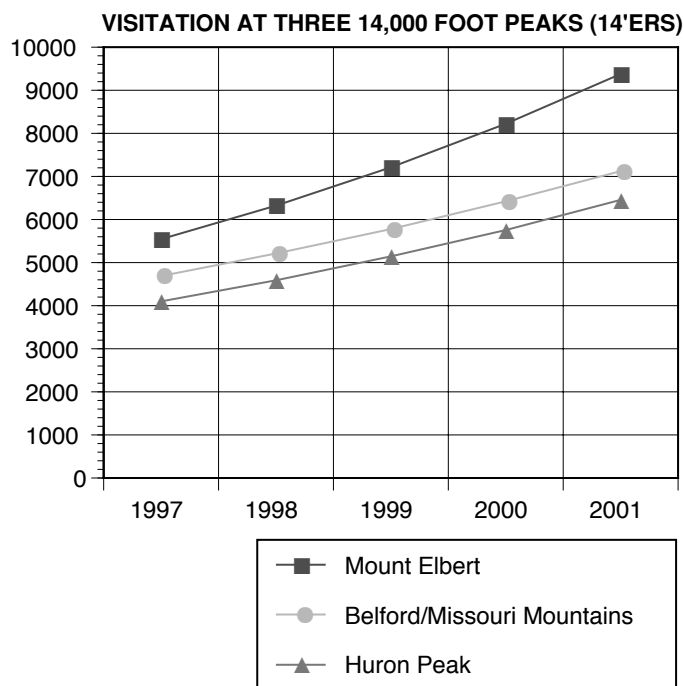
Source: SCORA, 2003

Map 7: Colorado's Fourteeners
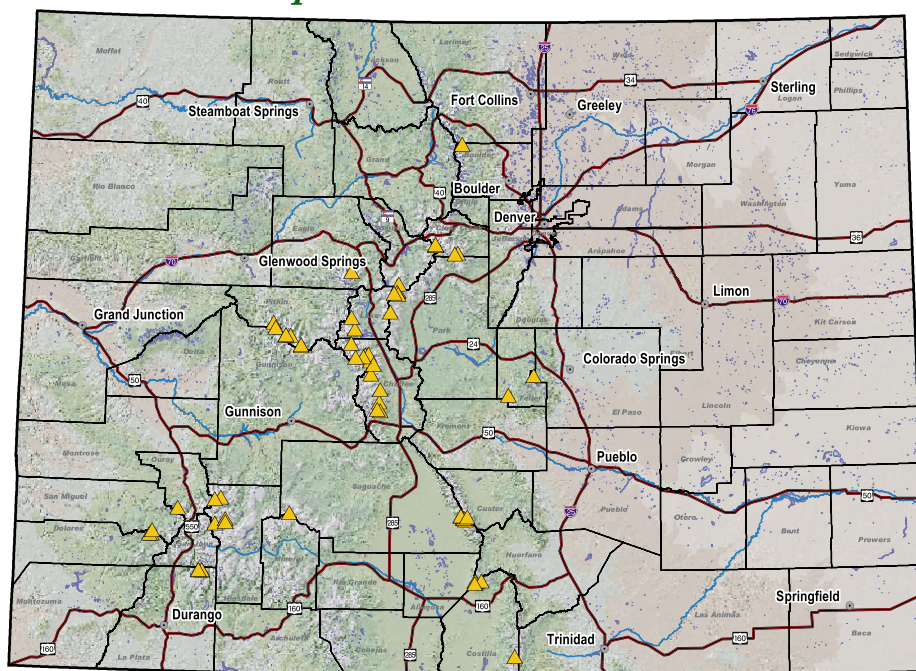
Map Scale = 1 : 2,700,000

Source: Colorado State Parks GIS, 2003

Wildlife Watching

Wildlife watching is an important factor in quality of life for Coloradans and a fast growing non-consumptive form of wildlife recreation. The following economic impacts were reported in DOW's *The 2001 Economic Benefits of Watchable Wildlife Recreation in Colorado*, based on *The 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (Survey)* conducted by the U.S. Fish and Wildlife Service (USFWS).

- The total economic effect from 2001 watchable wildlife recreation in Colorado was estimated at $1.286 billion ($551.1 million by residents and $735.1 million by non-residents), created by consumer purchases, or expenditures, of $624.4 million(Table 11).

- Watchable wildlife dollars are often spent in rural or lightly populated areas contributing to the rural economic base.

- During FY 2001-02, more than 13,500 people participated in "festivals" focusing specifically on viewing Colorado's wildlife.

- Only a small percentage of watchable wildlife recreationists in Colorado, both non-residential and residential, are not Caucasian. Participants are typically in their forties, are split almost evenly between male and female, and are likely to be married.

- Both non-residents and resident wildlife watchers have incomes averaging $20-30,000 higher than the 2001 state average.

Hunting and Fishing

- Of the eight states within the USFWS Mountain Region, Colorado attracted the most anglers and hunters.

- While recent license revenue is flat, non-resident revenue has increased due to a price increase in recent years, according to the DOW.

- Resident senior fishing licenses have almost doubled since 1992, according to DOW. Numbers have steadily increased every year reflecting the aging of Colorado's base angler population, which are typically white males.

- The DOW reports overall sales of one-day fishing licenses have increased from 171,000 in 1992 to 236,000 in 1999. Overall license sales have remained fairly stable (see Figure 13).

- Resident hunting licenses increased slightly from 1999-2001 while deer and elk non-resident licenses decreased sharply, due to an increase in license fees (see Figures 14 and 15).

Table 10: Expenditures and Participants in 2001 for Hunting and Fishing in Colorado

	Fishing	Hunting
Participants	915,000	281,000
Expenditures	$646,000,000	$383,000,000

Source: USFWS, 2001

Table 11: 2001 Economic Impacts of Watchable Wildlife Recreation in Colorado

	Residents	Non-Residents	All Participants
Retail sales	$275,010,918	$349,391,061	$624,401,979
Total economic effect	$551,057,708	$735,140,843	$1,286,198,552
Salaries & wages	$144,695,352	$197,170,314	$341,865,666
Full & part-time jobs	5,473	7,543	13,016
Tax revenues:			
State sales tax	$11,654,452	$15,545,724	$27,200,176
State income tax	$4,616,153	$6,362,007	$10,978,160
Federal income tax	$24,069,197	$33,172,298	$57,241,495

Source: DOW, 2003

Figure 13: Total Fishing License Sales Remain Steady

FISHING LICENSES SOLD 1997-2001
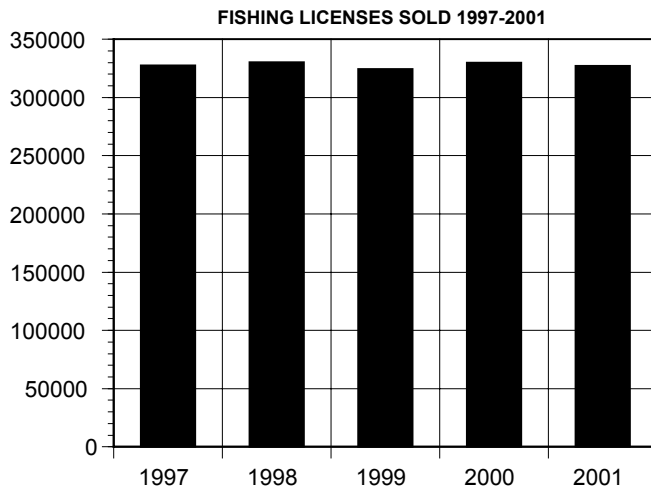
Source: DOW, 2002.

Figure 14: Resident Hunting License Sales

RESIDENT HUNTING LICENSES SOLD 1997-2001
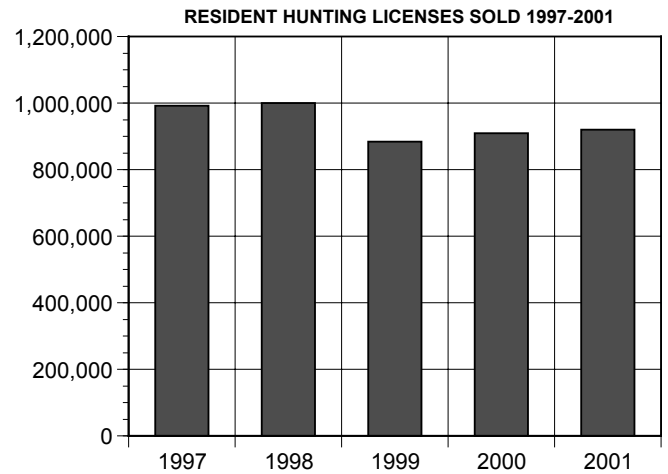
Source: DOW, 2002.

Figure 15: Non-resident Hunting License Sales are Declining

NON-RESIDENT HUNTING LICENSES SOLD 1997-2001
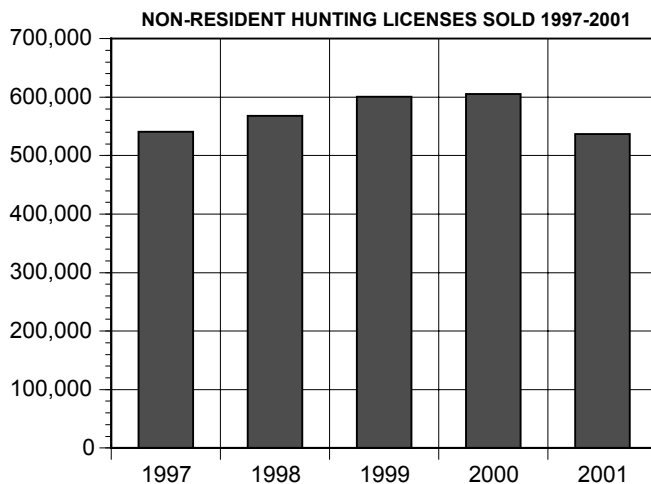
Source: DOW, 2002.

Figure 16: Resident & Non-Resident License Revenue
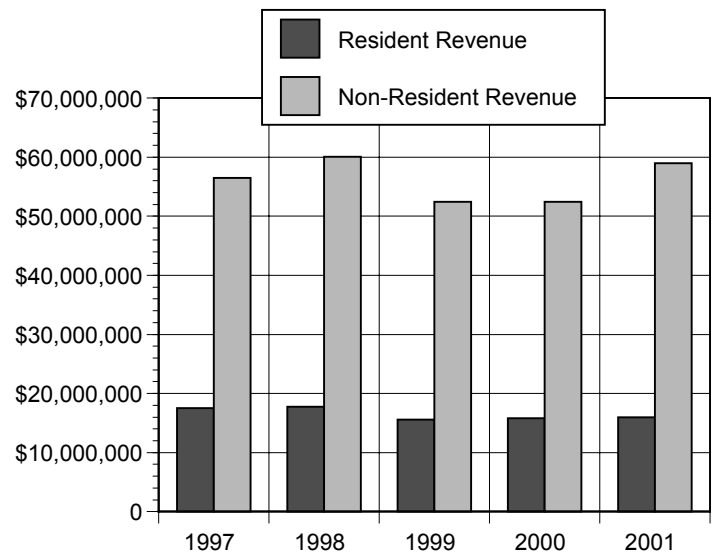
Source: DOW, 2002.

Whitewater Rafting

River rafting represents a large portion of Colorado's summer tourism business, both in terms of the number of rafters and economic impact.

- According to the Colorado River Outfitters Association (CROA) 523,587 user days were logged in 2001, which is more than double the 208,940 user days in 1988, when the industry began tracking numbers. (A user day is defined as one person on a half or full-day trip.) Due to drought conditions in 2002, user days dropped by 39% to 319,562. In 2003, outfitters reported a substantial rebound in user days due to restored river flows from near normal precipitation in many parts of the state.

- Economic impact of whitewater rafting jumped from $75 million in 1993 to $125 million in 2001, according to CROA. The 2002 drought conditions caused a drop to $78.5 million, but improved substantially in 2003 with the rebound in user days.

- The number of river outfitters licensed by the state increased from 125 in 1984 to 190 businesses in 2002. In addition to the increase in the number of businesses, many of the businesses have grown substantially and employ more guides.

- The increase in whitewater rafting is not only reflected by the near doubling of user days since 1988, but is also evidenced by the 5.7% increase in river outfitter licenses granted by Colorado State Parks since 1995. (See Table 12 for details.)

Downhill Skiing

- Colorado is the first choice ski destination among people polled by Longwoods International, although actual skier trips have been steadily declining since 1996. This trend could be a function of limited funding for marketing Colorado. To remedy this, Governor Owens worked with the state legislature to allocate $9 million for promoting Colorado tourism in 2003-04.

- Actual skier days are up despite declining state tourism visitation, indicating that locals are skiing in Colorado.

- In 2003, the ski industry in Colorado experienced a strong early season with its best first period results in more than five years due to above average snowfall throughout the state. Colorado Ski Country USA reported 11,605,588 million ski and snowboard visits through June, 2003, a 4.29 percent increase in skier visits, compared to 2001-02. The 2002-03 skier visits were 374,131 shy of the record visits in the 1997-98 season.

Table 12: River Outfitter Licenses

Fiscal Year	River Outfitter Licenses	Percentage Increase or Decrease
1995	140	-
1996	152	8.6%
1997	165	8.6%
1998	171	3.6%
1999	175	2.3%
2000	184	5.1%
2001	186	1.1%
2002	190	2.2%

Source: Colorado State Parks, 2002

Figure 17: Tracking Skier Visits at Colorado Ski Country USA Resorts

44
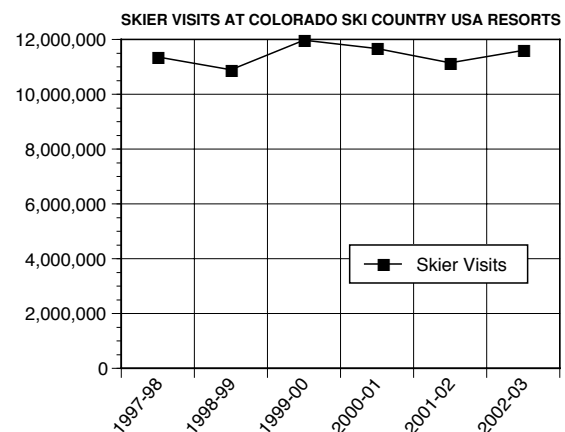
- Heavy amounts of early and late season snowfall are attributed to an increase in skier days for 2002-2003. Vail Mountain had 400 inches of cumulative snowfall, something not seen there since the 1996-1997 season.

- Winter Park attendance numbers were the second-highest in the resort's 64-year history, with over a million visitors in the 2002-2003 season.

- Arapahoe Basin experienced one of its best years of skier visits in 20 years during the 2002-03 season.

Motorized Sports

Registrations for OHV, boats and snowmobiles are on the rise (see Figure 18). All three registration programs are overseen by Colorado State Parks.

- In surveys conducted by Ciruli and Associates for GOCO in 1995 and 1998, respondents reported participation in 4WD and motorbike trail riding during the last two years at 19% in 1995 and 27% in 1998. In 2002, 31% of people reported participating in 4WD and motorbike use, demonstrating a continuing trend in motorized recreation popularity.

- Snowmobile recreation continues to grow, with an average annual increase in registration of 4.4% from 1998 to 2002. An additional increase of approximately 4% is expected by 2004.

Figure 18: Motorized Vehicle Registrations Continue to Grow

STATE MOTORIZED VEHICLE REGISTRATIONS 1998-2002

Legend: Boats, Off-Highway Vehicles, Snowmobiles
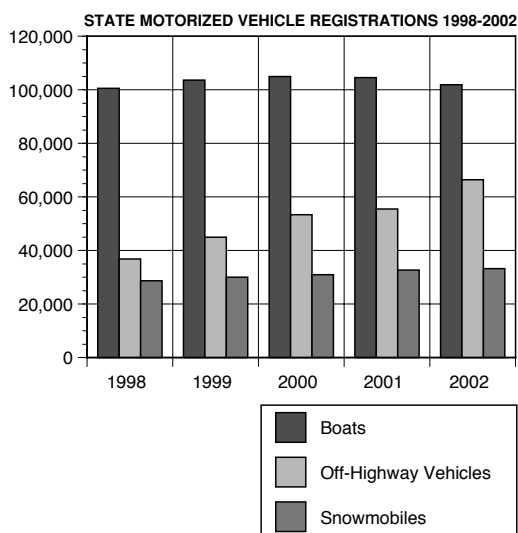
Source: Colorado State Parks, 2002

OHV Use

Colorado has witnessed an ever-increasing demand for motorized access to Colorado's landscapes. To help meet the demand for motorcycle, ATV and four wheel drive opportunities, trails have been developed by the state, in partnership with local and federal governments and off-highway vehicle enthusiasts to provide continuous access and linkages.

Off-Highway vehicles (OHV) include the following:

- All-terrain vehicles
- Dirt or dual purpose motorcycles (sport bikes)
- Snowmobiles
- 4-wheel drive vehicles

OHV registrations have increased 223% from 1995 to 2003, and an average of 18% annually (see Table 13). Growth is anticipated to slow over the next few years due to recent emphasis on encouraging hunters to register their vehicles.

- The economic contribution of OHV use in Colorado is estimated to be between $204 million and $231 million, according to the Colorado Off-Highway Vehicle Coalition (COHVCO). These sales created between 3,100 to 3,500 part-time and full-time jobs and between $68 million and $76 million in labor income to proprietors and employees.

Table 13: OHV Registrations Recorded by Colorado State Parks

Fiscal Year	Off-Highway Vehicle Registrations	Percentage Increase or Decrease
1995	23,233	-
1996	25,740	10.8%
1997	30,391	18.1%
1998	36,855	21.2%
1999	45,001	22.1%
2000	53,320	18.5%
2001	55,493	4.1%
2002	66,453	19.7%
2003 (Estimate)	75,000	12.8%

Source: Colorado State Parks, 2002

• Purchases of dual sport motorcycles increased by 10% per year during 1999 and 2000 based on sales of new motorcycles, as reported by the Motorcycle Industry Council.

• Between 136,662 and 144,707 resident and non-resident households use motorized vehicles for recreation in Colorado.

Motorized Boats

Colorado State Parks is responsible for registration of vessels, including sailboats, motorboats and personal watercraft. Boats registered with the state have risen an average of 2.8% since 1995. Projections of boat registrations in FY 2001-02 show a 20% increase from FY 1994-95.

• The fastest growing segment of boating recreation is personal watercraft (PWCs).

Table 14: Boat Registrations from 1995-2002

Fiscal Year	Boat Registrations	Percentage Increase or Decrease
1995	89,662	-
1996	94,331	5.2%
1997	96,839	2.7%
1998	97,643	0.8%
1999	103,673	6.2%
2000	104,946	1.2%
2001	104,500	0.5%
2002	107,600	3.0%

Source: Colorado State Parks.

Cross Country Skiing and Snowmobiling

Out-of-state skiers are seeking other forms of winter recreation to supplement their Colorado ski vacation, such as cross-country skiing, snowmobiling and snowshoeing, creating economic development to mountain communities outside of ski areas.

• There are over 4.2 million recreation days of cross-country skiing and 6.7 million days of snowmobiling across the Rocky Mountain States (Colorado, Wyoming, Nebraska, and South Dakota) based on USFS estimates. (See Table 15).

Future projection of dispersed winter recreation use based on existing participation rates for Colorado show increasing demands for these activities (see Table 16).

Camping

• Reservations at State Parks have increased 500% in the past 15 years.

• The private campground industry in Colorado appears to be static as a result of many factors. As Colorado's population increases, campgrounds that were originally on the outskirts of towns are now part of expanding metropolitan areas. Land values are increasing and campgrounds are being purchased for development. In addition, towns and municipalities do not readily approve zoning for new campgrounds due to the assumed associated noise and traffic.

• As private campgrounds compete for customers, owners are targeting marketing strategies toward a specific niche such as families, "snowbirds" or campers that live for an entire season in one area.

• Small camper cabins are increasingly common. Because campers can stay in cabins despite inclement weather conditions, owners are seeing an increase in the occupancy rate of these cabins. The Colorado Campground and Lodge Owners Association (CCLOA) predicts that the number of cabins on private campgrounds will continue to increase.

• Campground ownership is becoming more of a lifestyle than an income-based decision. With half of the 270 campgrounds in Colorado having 50 sites or less, campgrounds do not often produce substantial income for owners, according to CCLOA.

Table 15: Number and Percent of Rocky Mountain Region Residents Participating in Outdoor Recreation by Activity in all Areas

Activity	Cross-Country Skiing	Cross-Country Skiing on Groomed Trails	Cross-Country Skiing on Ungroomed Trails	Cross-Country Skiing in the Backcountry	Snowmobiling
Millions	.6	.5	.6	.4	.7
Percent of population	4.7	3.8	4.1	3.3	5.2
Average # of days	6.4	Not available	Not available	Not available	8.2
Millions of recreation days	4.2	Not available	Not available	Not available	6.7

Source: National Survey on Recreation and the Environment, 2003.

Table 16: Projected Winter Recreation Use on USFS Lands in the Rocky Mountain Region

Activity	Millions of participants 2020	Millions of participants 2040	Millions of recreation days 2020	Millions of recreation days 2040
Cross-Country Skiing	.76	.81	4.6	5.6
Snowmobiling	.72	.94	7.3	9.0

These projections are based on existing participation rates and the average rate of population growth in the Rocky Mountain region rounded to the nearest 100,000

Source: USFS, 2003.

Table 17: Estimated Winter Recreation Opportunities on USFS Lands in Colorado

National Forest	Miles of Cross-Country Ski Trails groomed	Miles of Snowmobile Trails-groomed	Estimated Snowplay Acres
Routt	17	415	50,000
Arapaho/Roosevelt	290	134	15
Pike/San Isabel	129	91	5,970
Rio Grande	49	287	0
San Juan	16	154	9,000
Grand Mesa, Uncompahgre, and Gunnison	55	456	1,740
White River	175	137	50,000
Total	**731**	**1,674**	**116,725**

Source: USFS, 2003.

Volunteerism: An Increasing Benefit to Land Managers

Volunteers are an enormous and growing asset for our public lands. *The Blueprint for Outdoor Stewardship*, conducted by Volunteers for Outdoor Colorado (VOC), identifies the following trends in volunteerism:

• 52% of state and federal land managers engage volunteer help at least once a month.

• A sample of 46 volunteer programs interviewed statewide estimated over 36,000 'volunteer days' were logged in 2000.

• VOC volunteers contributed 3,383 volunteer days in 2002, a 20.5% increase from the 193 volunteer days in 1984.

• The State Parks Local Government Survey revealed:

   ▪ Local governments average 296,300 total volunteer hours per year

   ▪ 16% of local governments use volunteers for visitor services

   ▪ 12% use volunteers for maintenance and construction

Youth Corps

• Since 1997, the number of youths employed through the Colorado Youth Corps Association and its network of independent community youth conservation corps has nearly tripled from five community programs serving 210 kids on the Front Range to ten operations statewide serving over 620 youth.

Visitation Trends

While statistics from the *National Survey on Recreation and the Environment (NSRE)* show steady increases in activity participation, visitation numbers at State Parks and National Parks in Colorado show a decline in visitors, particularly during the 2002 summer season. This may be due to a stressed economy, a decrease in Colorado marketing, a four-year drought, and wildfires across the state.

Further speculation could conclude that people are staying closer to home or not visiting state or national parks as often, perhaps because of congested transportation networks. Preliminary numbers reported for the summer of 2003 indicated that State Parks visitation increased from 2002

levels, likely due to drought recovery and a substantial reduction in wildfires. National Park visitation, however, continues at levels below the peak year of 1999. Additional research is necessary to determine the influences affecting these trends.

Figure 19: State Parks Visitation Has Increased Slightly Since 1998

STATE PARK VISITATION 1998-2002

5 year growth-13.8%   Source: State Parks, 2003.
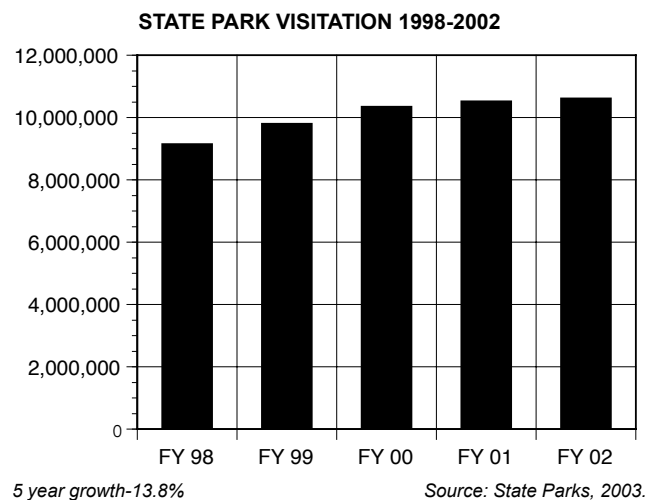
Figure 20: National Park Service Visitation Declines Slightly

NATIONAL PARK SERVICE VISITATION IN COLORADO 1998-2002

5 year growth-13.1%   Source: NPS, 2003.
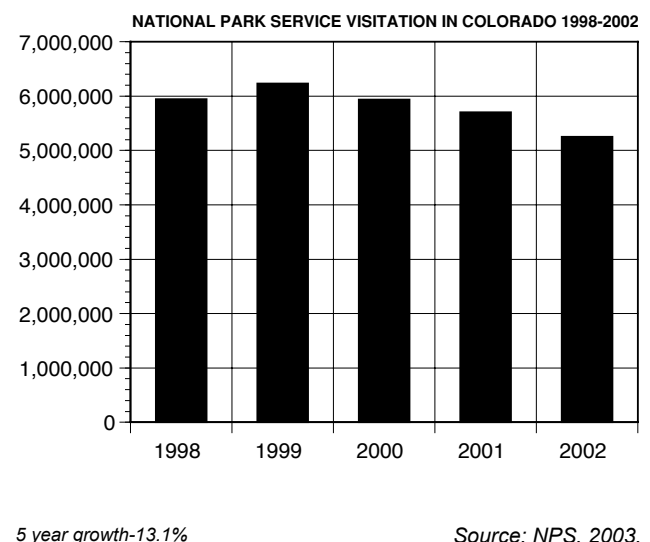
Figure 21: Tracking Skier Visits at Colorado Ski Country USA Resorts

Source: Colorado Ski Country USA, 2003.
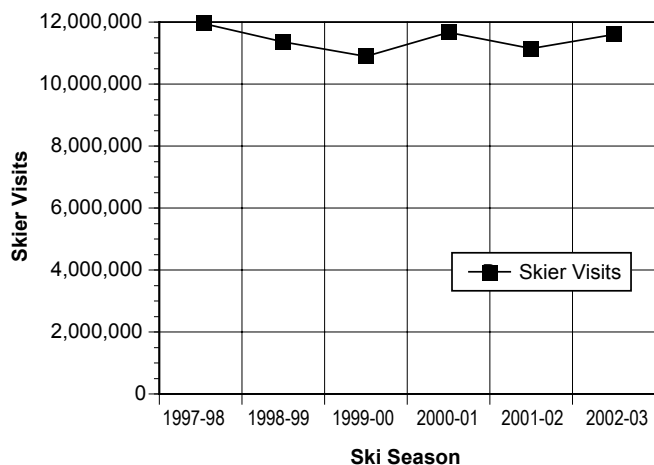
STATEWIDE COMPREHENSIVE OUTDOOR RECREATION ASSESSMENT (SCORA)

SCORA is a collection of outdoor recreation data for the preparation of the Colorado SCORP. This data compendium of demographic trends, visitation, licenses and registrations from 1997-2002 is the basis for many of the conclusions presented in the SCORP. A complete list of all of the tables, maps and charts in SCORA is in the SCORP appendix. To view the complete SCORA, please visit www.parks.state.co.us where it can be downloaded beginning in late 2003.

COLORADO STATE PARKS MARKET ASSESSMENT STUDY

In June 2002, PricewaterhouseCoopers (PwC) was commissioned by Colorado State Parks to conduct a comprehensive and systematic market assessment of Colorado's 40 state parks. An overview is provided here and information by region is listed in the appropriate regional description. To download the complete report, visit www.parks.state.co.us.

The primary objectives of the study were to assess Colorado State Parks' position in the marketplace and to help determine the preferred future direction for Colorado State Parks by identifying the facilities, services and programs valued by citizens of Colorado and visitors to Colorado State Parks.

Additional objectives of the study included the following:

- Profile key demographic, attitudinal and/or psychographic differences between users and non-users of Colorado State Parks;

- Ascertain public expectations of Colorado State Parks;

- Identify information about state park visitation that will be relevant for future policy and planning decisions; and

- Measure the economic expenditures associated with state park visitation.

Methodology

The research for this study was conducted in three phases:

- Phase One: six focus groups with users and non-users of Colorado State Parks.

- Phase Two: An Attitude and Perception Survey involving 1,613 Colorado residents (users and non-users). Overall sampling error of +/- 2.4%

- Phase Three: An on-site Visitor Assessment Survey was administered across 38 state parks in Colorado. Sample size of 4,074. Overall sampling error of +/- 1.5%

Each phase of the research captured distinct and highly significant demographic, psychographic, attitudinal and behavioral information about populations of interest.

Key findings/recommendations:

- Colorado State Parks continues to enjoy a very high favorability level with Coloradans, both park users and non-users. More than four out of five Coloradans have somewhat or very favorable impressions of State Parks.

- Both park users and non-users are most likely to describe State Parks as:

  ▪ Having outstanding scenery,

  ▪ Being a safe place to enjoy the outdoors, and

  ▪ Being a place to spend time with family and friends.

- Although the message delivered to Parks indicates the Parks experience meets public expectations in many ways, a tremendously large number of people simply do not know what State Parks has to offer.

- PwC provides an array of opportunities to increase State Parks visitation, specifically targeting:

  - Infrequent park visitors (less than five visits within past 24 months); and

  - Interested non-users.

- Information gathered by PwC strongly indicates a low daily vehicle entrance fee compliance rate throughout the system, as low as 25% in some cases.

- Future park investments with the broadest appeal among the public include:

  - Creating better quality facilities and equipment

  - More trail opportunities

  - More backcountry parks

- Additionally, creating a greater range of recreational opportunities may inspire an increase in visitation among younger Coloradans.

- The majority of Coloradans (both users and non-users) would prefer to see increased investment in improving existing parks rather than creating new parks.

- The majority of Coloradans feel that Colorado State Parks are "a good thing for Colorado". As such, more than half of Coloradans feel that there should be an increase in state funding of parks and very few feel that there should actually be a reduction in the amount of state funding.

Findings about State Parks Visitors

How many Coloradans visit state parks?

- Approximately 43% of Colorado residents over the age of 18 have visited at least one Colorado state park during the past two years.

- Current park visitors visit an average of five times per year.

- However, the majority of state park users only visit infrequently:

  - 50% of users have had fewer than five visits to Colorado State Parks during the past two years.

  - Only 25% have visited more than 10 times.

- 63% of visitors during the past two years have chosen to visit only one park in the system; during the same time period, only 18% of visitors went to more than three different state parks. Of the different park visitors throughout the system, more have visited Cherry Creek and Chatfield than any other parks.

Who visits state parks?

- Generally speaking, State Parks visitors are most likely to be:

  - In their 30s or early 40s (59% under the age of 45)

  - Well educated (54% have at least one college degree)

  - Caucasian (89%)

  - Married or living with a partner (71%)

  - Working full time (60%)

  - Having at least one child under 18 years living with them (46%)

  - Having a higher average household income ($46,000) than non-users

- Visitors and non-users indicated the added features most likely to increase their future park visitation were smaller crowds (82%) and better quality features (70%). Younger Coloradans, between 18 and 34 years, indicated more trail opportunities and a greater range of recreational opportunities as most likely to increase their future State Parks visitation.

- Features least likely to encourage increased visitation among current visitors were lodges/conference centers and golf courses.

- The majority of park visitors (54%) hike while at the park; other top activities include camping (37%) and fishing (35%). Participation in these activities varies greatly by age group and park type.

Figure 22: Percentage of Coloradans Visiting State Parks
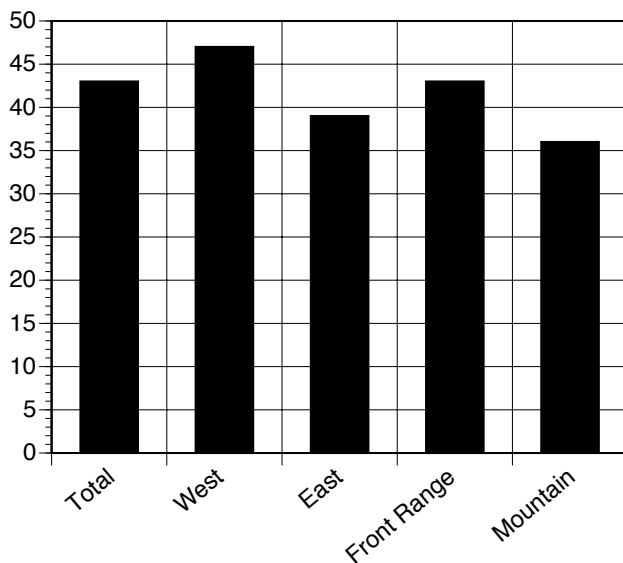
Source: Colorado State Parks Market Assessment Study, 2003

Figure 23: Participation in Activities at Parks

	Total %		Total %
Hiking	54	Bicycling	10
Camping	37	Non-motorized boating	6
Fishing	35	Naturalist led programs	5
Nature/wildlife observation	33	Rock climbing	3
Picnicking	30	Running	3
Swimming	22	Hunting	1
Photography	20	Horseback riding	1
Motorized Boating	17	Rollerblading	1
Dog walking	17	Dirt bike riding	1
Looking at visitor's centers	14		

Source: Colorado State Parks Market Assessment Study, 2003.

Pass Holders

State Parks visitors report using the following type of passes:

- Daily (63%)

- Annual (21%)

- Aspen Leaf Senior Pass(10%)

- No pass (5%)

- Disabled Veteran/Columbine (2%)

(Note: Totals equal 101% due to rounding).

- PwC analysis indicates the daily pass fee compliance is very low -- potentially as low as 25% compliance in some parks.

- Nearly one half (45%) of state park visitors who do <u>not</u> currently possess an annual state park pass indicate that they are very likely or somewhat likely to purchase one in the next 13 months.

Findings about Increasing State Parks Visits

According to the *US Forest Service's National Survey on Recreation and the Environment*, more then 94% of Colorado citizens participate in some sort of outdoor recreation. However, Colorado State Parks' *2003 market Assessment Survey* indicates that only about 43% of Coloradans visit state parks (see Figure 22: Percentage of Coloradans Visiting State Parks).

Figure 24: Segmenting State Park Visitors (% of Population)

Source: Colorado State Parks Market Assessment Study, 2003

CHAPTER 2: PARTICIPATION AND TRENDS IN OUTDOOR RECREATION
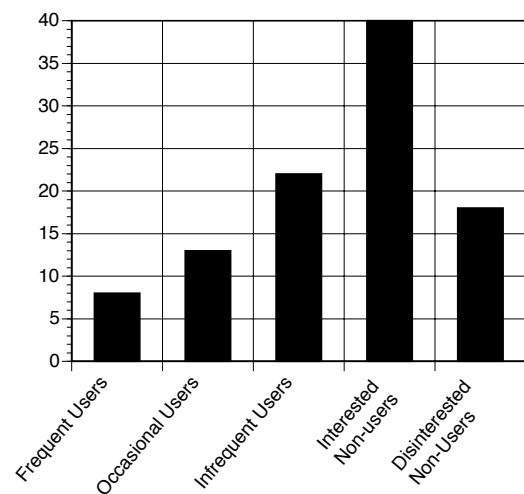
**Infrequent visitor demographic –
22% of state population**

The study identified infrequent users (1-4 visits per year) as the segment that should be the focus of initiatives designed to increase visitation among current users.

**Interested non-user demographic –
40% of state population**

Forty percent of non-users express a moderate to high likelihood of visiting a state park in the next year. This group has been deemed "interested non-users" and according to PWC, members of this segment should be the focus of campaigns designed to stimulate trial usage among non-users.

The PWC Study provides information to use as the basis for future marketing campaigns to these target groups, including:

- Demographics

- Recreation interests

- Motivations for choosing leisure activities

- Information sources used to plan leisure activities

Findings about State Parks and Funding Investments

Visitor Spending

- Most Coloradans (81%) feel they are getting an excellent or good value for money when visiting Colorado State Parks. This includes the price of entrance (annual passes and daily entry fees) and camping fees.

- Spending outside of the park - A vehicle visiting a park spends an average of $65.71 within a 50-mile radius of the park during each visit. Systemwide this totals almost $200 million per year.

- Spending inside of the park - Survey responses indicate visitors spend an average of $19.98 per vehicle inside the park (not including entrance fees). However, nearly half of all park visitors (48%) spend nothing above the price of entrance when visiting a state park.

Figure 25: Value of State Parks Visits

	Overall Value for Money of State Park %	Daily Vehicle Entrance Permit %	Annual Permit %	Campsite Fees %
Excellent	42	42	38	29
Good	39	37	35	44
Fair	16	16	20	23
Poor	3	5	8	5

(N=4,041)   Source: Colorado State Parks Market Assessment Study, 2003.

Future Investments

- Non-users are most likely to become State Parks visitors through:

  - Smaller crowds
  - Better quality facilities
  - More trail opportunities
  - More advertising

Current users, particularly those visiting on an occasional basis (between five and 10 times in the last two years), would likely visit state parks more often if there were more backcountry parks with minimal development (particularly younger visitors) and/or if a greater range of recreational opportunities including more trails were introduced.

Figure 26: Park Visitation Increases/ Decreases Due to Proposed Features

	Increase	Decrease
More trails	53	2
More natural/primitive experiences	50	2
More developed campsites	47	9
Easier/improved boating access	33	5
More primitive campsites	32	8
Swimming pools	31	30
Cabins and/or yurts with plumbing & electricity	28	12
More group picnic and group campsites	27	14
Lodge/Conference Center	13	21
Golf courses	13	44

(N=4,041)   Source: Colorado State Parks Market Assessment Study, 2003.

- Proposals such as swimming pools, cabins and/or yurts with plumbing and electricity and group picnic/group campsites are also likely to increase visitation (particularly among younger users).

- More aggressive development, however, such as golf courses, theme parks and/or lodges and conference centers, is more likely to decrease the number of park visits in the future.

General Parks Funding

- The majority of users and non-users (53% for both) are in support of increased state funding of parks while only 4% of Coloradans feel that there should be less or no state funding of state parks.

- The support for increased state funding of parks is particularly marked amongst younger Coloradans (62% of those under 35 years old support increased state funding).

- Most Coloradans (67%) feel that the majority of this money should go towards improving existing parks rather creating new ones. More specifically, the majority of Coloradans feel that a lot more money should be spent on:

  ▪ Ensuring the parks natural resources are preserved (63%).

▪ Keeping the parks clean (39%).

▪ General upkeep and maintenance of the parks (37%).

Willingness to Pay

- Most state park users are prepared to pay more to visit the parks:

  ▪ The majority of current annual state park pass holders (79%) are prepared to pay up to $5 dollar more for an annual pass (frequent visitors are less price sensitive when it comes to an increase in the price of annual passes).

  ▪ Most daily fee visitors (72%) are prepared to accept a $1 increase in the price of a daily entrance fee without reducing their number of visits.

  ▪ Most visitors (60%) are prepared to accept up to a $2 increase in campsite fees (older visitors are more price sensitive when it comes to campsite fees).

Figure 27: Preferred Investments to Improve State Parks (users and non-users)
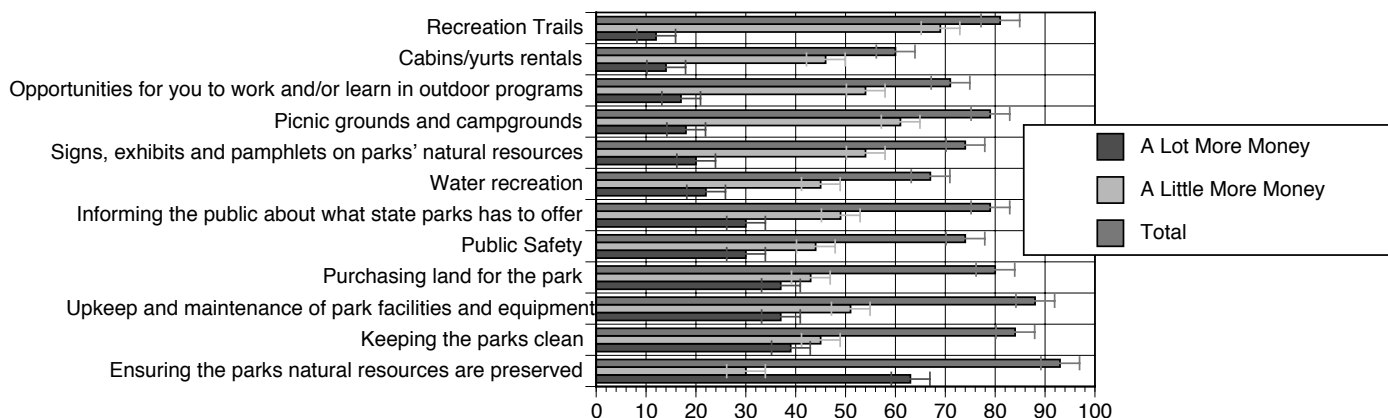
(N=1,585)   *Source: Colorado State Parks Market Assessment Study, 2003.*

It appears that people still rely on word-of-mouth recommendation when planning leisure pursuits. However, newspapers, television, and the internet are also powerful marketing and communication tools.

Table 18: Information Sources Used When Planning Leisure Activities (%)

	Statewide	Front Range	Northeast	Southeast	South Central	Southwest	Northwest
Recommendation from friends/family	87	87	83	85	87	83	85
Newspapers	62	64	45	67	59	57	60
Television	43	44	41	48	45	36	35
Radio ads	37	36	35	42	38	39	39
Internet	40	45	19	33	32	26	33
Entertainment magazines	20	20	20	23	19	15	20
Billboards	18	18	20	29	20	14	16

Source: Colorado State Parks Market Assessment Study, 2002.

Table 19: Participation in Outdoor Recreation Activities in Last Twelve Months (%)

	Statewide	Front Range	Northeast	Southeast	South Central	Southwest	Northwest
Picnicking	82	82	79	84	85	85	81
Trail recreation (hiking, biking, etc.)	74	75	50	63	76	73	77
Water recreation (swimming, sailing, etc.)	61	64	51	53	55	61	68
Tent camping	59	59	50	50	59	59	66
Fishing	53	47	61	64	62	62	70
Visiting historical sites	62	63	50	59	59	63	65
Motorized water recreation	29	28	33	32	28	33	37
RV/car camping	37	37	36	39	34	45	45
Bird/wildlife watching	52	51	39	45	56	61	58
Hunting	20	15	31	26	27	31	33
Winter sports (skiing, snowboarding, etc.)	36	39	16	18	32	30	42
Ball sports (golf, basketball, tennis)	44	47	40	35	39	35	40
Motorized trail recreation	31	24	32	31	45	47	47
Motorized winter sports	16	14	13	11	17	20	33

Source: Colorado State Parks Market Assessment Study, 2002.

When asked about the type of outdoor destination people most often seek, areas offering less development and more wilderness settings were preferred by 29% of respondents. This category ranked first among all regions except the Northeast. The preferred destinations represent that wide spectrum of opportunity provided by the variety of public land agencies in Colorado. Wilderness areas with little or no development are typically managed by the USFS and BLM while large parks with facilities best describe national and state parks. Forests and lakes with limited facilities are usually associated with national forests while community trails and parks are most often provided by local governments.

Table 20: First Choice Outdoor Destination (%)

Preferred Destination	Statewide	Front Range	Northeast	Southeast	South Central	Southwest	Northwest
Wilderness areas with little or no development	29	28	15	23	31	38	30
Large parks with a wide range of camping, trails, boating and fishing	27	28	34	27	25	21	27
Forests and lakes with limited trails, camping, boating and fishing	21	19	17	23	23	22	21
Rivers with boating and fishing	16	15	24	16	18	13	19
Community trails and community parks with ball fields and recreation centers	8	9	10	12	4	6	5

Source: Colorado State Parks Market Assessment Study, 2002.
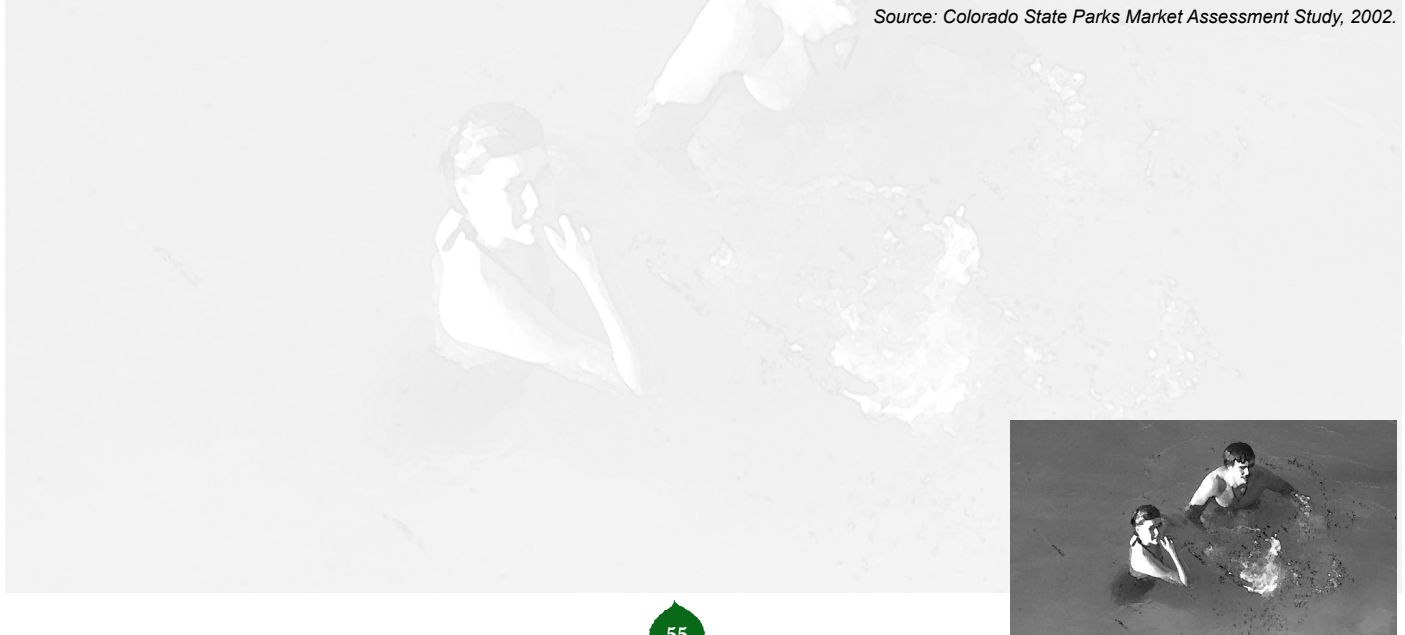
Investigating increased visitation with proposed features also helps us understand what people are seeking in outdoor recreation. More people would visit state parks if they had smaller crowds, more backcountry parks, and better quality facilities.

Table 21: Increased Visitation with Proposed Features
(percentage of respondents who would visit State Parks more often)

	Statewide	Front Range	Northeast	Southeast	South Central	Southwest	Northwest
Smaller crowds	83	84	74	69	87	75	74
More backcountry parks with minimal development	70	68	61	65	77	70	71
Better quality facilities	70	72	61	76	70	61	57
More trail opportunities	67	70	47	57	66	60	62
Greater range of recreational options	60	61	43	63	58	56	54
More education programs	57	56	55	57	60	53	55
More advertising	55	57	52	53	50	51	45
Theme parks	35	34	43	51	35	34	40
Lodges/conference centers	34	34	40	43	36	22	24
Golf courses	19	20	17	24	17	14	17

Source: Colorado State Parks Market Assessment Study, 2002.

People have many motivations for seeking leisure activities outside their home. Approximately 82% of people desire to unwind and escape whether it's to give their minds a rest, release tensions, or to be close to nature. (The categories capture similar groupings; the category is shown in bold and that percentage is the average of responses for all options in the category).

Table 22: Motivations for Choosing Out-of-Home Leisure Activities (%)

	Statewide	Front Range	Northeast	Southeast	South Central	Southwest	Northwest
Unwind/Escape (average)	82	81	82	83	83	83	83
Give my mind a rest	82	81	83	83	83	84	84
Release tensions and anxieties	83	83	88	84	83	78	80
Get away from demands of life	86	86	86	87	85	83	85
To relax	92	92	95	92	92	94	91
Experience peace and calm	89	89	88	90	91	91	90
Get away from crowds	83	83	81	82	86	84	85
Be alone	54	51	57	60	58	63	58
To be close to nature	85	84	81	82	89	89	90
Self-fulfillment (average)	70	68	67	71	73	77	73
Learn about new things	74	73	72	76	77	82	74
Develop my skills and abilities	56	54	59	62	60	68	62
To exercise and keep fit	72	71	55	64	74	75	77
Experience new and different things	77	75	83	81	80	83	80
Socialize (average)	68	67	77	73	70	69	70
To spend time with my family	88	87	95	91	89	86	88
Be with friends	79	79	93	80	76	80	81
To meet new people	38	35	44	49	45	40	40
Thrill-seeking (average)	51	48	49	55	58	55	54
To take risks	32	30	27	35	38	35	35
To experience thrills and excitement	48	44	48	54	55	51	53
To experience new challenges	58	57	51	60	64	60	61
Be my own boss	64	60	69	72	73	75	67

Source: Colorado State Parks Market Assessment Study, 2002.

When considering the number of times per month respondents participate in a leisure activity, surfing the internet and recreational activities for exercise top the list.

Table 23: Participation in Leisure Activities (Average Number of Times per Month)

	Statewide	Front Range	Northeast	Southeast	South Central	Southwest	Northwest
Surfing the Internet	11.3	12.2	8.6	9.3	10.3	7.5	10.2
Participating in recreational activities for exercise	8.7	9.0	4.7	6.8	8.4	8.1	9.6
Working in the garden	8.7	7.9	11.2	10.3	9.2	11.7	10.6
Go to the gym/indoor fitness activities	5.6	6.0	3.7	4.6	5.7	4.7	4.7
Outdoor leisure activities like camping, fishing, hunting	2.8	2.4	2.1	3.3	3.2	3.4	4.6
Go for dinner	5.3	5.5	5.3	6.0	4.9	4.6	5.0
Off-road driving	1.9	1.2	1.9	2.7	3.2	4.3	2.7
Go to shopping mall	2.6	2.9	1.4	2.6	2.1	1.9	2.3
Play team sports	1.5	1.4	1.0	1.5	1.7	1.2	1.3
Go to bar/night club	1.1	1.2	0.6	1.2	0.9	0.7	1.2
Go to movies	1.3	1.4	1.1	1.0	1.3	0.8	0.9
Casino, racetrack or other gaming venture	0.4	0.4	0.2	0.4	0.4	0.2	0.2
Go to museum/art gallery	0.9	1.0	0.4	0.8	0.8	0.8	0.8
Go to concert or live theater	0.7	0.8	0.2	0.4	0.7	0.4	0.8

Source: Colorado State Parks Market Assessment Study, 2002.
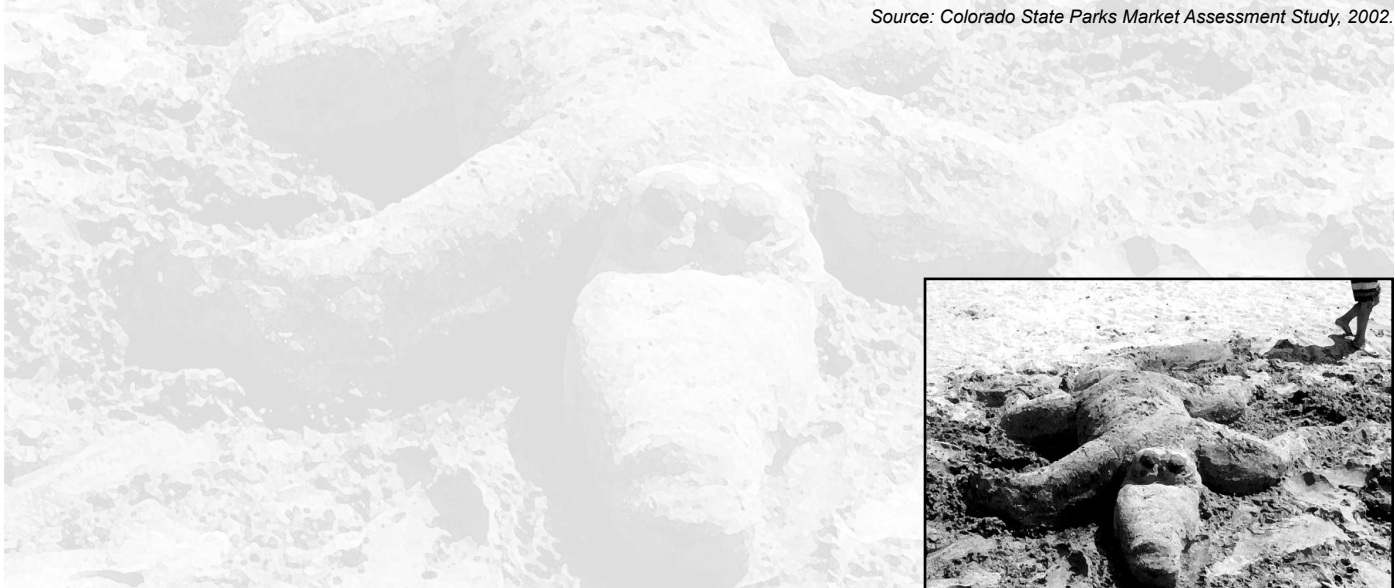
COLORADO STATE PARKS FIVE YEAR ACQUISITION AND DEVELOPMENT PLAN

Each year, Colorado State Parks updates its capital improvements plan, the *Five Year Acquisition and Development Plan*. Also known as the State Parks *Horizons Plan*, State Parks management bases the plan on a range of factors, including public and host community input, consistency with goals set by the Department of Natural Resources in consultation with the Governors Office of Planning and Budgeting, assessments of system quality as reflected in individual state park management and business plans, review by Legislative Committees, and adaptability to the various capital resources available to State Parks. For the 2003 update of the *Horizons Plan*, State Parks and Department managers were able to rely on the *2002 Market Assessment Study* to better understand public preferences.

Among the capital resources available to State Parks are the annual Land and Water Conservation Fund stateside allocations. State Parks is statutorily authorized to allocate up to 75% of stateside LWCF allocations towards funding of State Park priorities. In past years, the Board of Parks and Outdoor Recreation, based on recommendations of State Parks and DNR managers, have elected to split the LWCF allocations approximately 50/50 between State Parks and Local Government priorities.

The 2003 *State Parks Horizons Plan* outlines the following capital spending priorities. LWCF, Lottery funds that are allocated to State Parks directly and through the Great Outdoors Colorado Trust, other federal funds, vehicle registration funds and other state funding sources will be annually spread among the following investment priorities from Fiscal Year 2003-04 through FY 2008-09. The project eligibility guidelines of the funding sources will play a substantial role in determining which projects will be funded with each source:

Table 24: State Parks Capital Spending Priorities

Use of Funds	Total Projected Priorities FY 03/04 - FY 08/09 (millions)
Park Renovation Cost Shares with Bureau of Reclamation and Corps of Engineers	$31.300
State Parks Fire Plan	3.900
Reservoir Enhancements	1.128
General Renovations	19.900
Buffer Acquisitions	2.100
Water Acquisitions/Dam Repairs	3.600
Revenue Enhancement Initiatives	9.977
State Trails Program Grants Recreational Trails, Front Range Trail, OHV	24.375
Volunteer opportunities	0.285
Information Technology	1.625
Business Development Initiatives	0.800
New Parks John Martin, Cheyenne Mountain, Staunton, St. Vrain New opportunities	35.461

COLORADO STATE PARKS LOCAL GOVERNMENT SURVEY

Purpose

Conducted by Colorado State Parks, the *Local Government Survey* is a key part of the 2003 SCORP update. The results from the survey will be a basis for determining the use of Colorado's LWCF allocations, a significant portion of which are used to fund local government parks and recreation facilities through a grants program administered by Colorado State Parks.

Overview of Local Government Survey

The Local Government Survey is a crucial part of evaluating demand and supply for outdoor recreation resources by identifying needs and priorities of municipalities, counties, and special districts managing recreation.

There were 250 official responses to the survey out of a possible 398 – a completion rate of 63%. Jurisdictions with considerable populations and recreation services were targeted with follow-up phone calls to ensure their responses were included in the survey. The majority of local governments that did not complete surveys do not manage park or recreation services. This group consisted of several counties, particularly ones that are more sparsely populated, and many small towns. For a complete list of jurisdictions that completed the survey, see the Local Government Survey Report in Appendix B.

The survey contained a total of 124 questions that were split into three components addressing data/inventory, total dollar value of capital improvement planned for the five year period 2003-08, and priority issues in areas such as management, visitor services and funding. And lastly, the survey entailed local government's parks and recreation priority capital investment needs, such as facilities for specific recreation activities and acquisition of open space, parks or trail corridors.

Survey Results

The final results obtained from all submitted surveys were tabulated on a statewide basis and a regional basis. Regional results are included in the appropriate regional chapters and the top 15 issues and needs on a statewide basis (see Tables 26 and 27). Comprehensive results are located in the *Local Government Survey Report* in Appendix B. For more information about a particular jurisdiction's response, please contact the agency directly.

Agency Characteristics

- **Planning tools**
  - 63% of agencies have parks and recreation plans
  - 53% of agency plans formally adopted by governing body
  - 54% of plans with trails component
  - 43% of plans include resource management
- **Outdoor Education, Volunteerism, and Youth Corps**
  - 16% offer Outdoor Education/Interpretation programs
  - 522,100 total people attend programs
  - 16% with volunteers for visitor services
  - 12% with volunteers for maintenance/construction
  - 296,300 total volunteer hours per year
  - 12% use youth conservation corps
  - 32,900 crew weeks per year
- **Park, trail open space funding**
  - 36% of agencies have dedicated funding sources other than lottery
  - 5 year capital investment need (2003-08): $1.02 billion
  - Programmed capital sources to meet capital investment needs: $579.5 million

Inventory

- **Parks and Open Space**
  - 375,360 total acres are managed by local governments
    - 2,592 developed parks totaling 99,299 acres
    - 1,853 open space areas for passive recreation. Of those:
      - 183, 272 acres are fee title
      - 92,789 acres are through easements
- **Facilities**

  Table 25 details managed facilities reported statewide. Facilities are broken down by region in the appropriate region description.
- **Trails**
  - 3,007 total trail miles managed by local governments
    - 1,507 trail miles are paved multi-use
    - 1,231 trail miles are gravel/natural surface multi-use
    - 269 miles are designated pedestrian/hiking only

60

Table 25: Land and Facilities Managed by Local Governments

Facility/Park	Front Range	Northeast	Northwest	South central	Southeast	Southwest	Statewide Totals
Public parks	1,785	60	248	242	132	125	2,592
Acreage public parks	71,149	773	3,099	14,141	8,166	1,971	99,299
Open space areas	881	307	400	147	49	69	1,853
Acreage open space (fee title)	150,536	217	12,290	15,008	2,621	2,600	183,272
Acreage open space (easements)	69,031	15	20,928	2,080	263	472	92,789
Golf courses managed by your agency	50	5	10	4	3	3	75
Acreage golf courses	7,915	440	1,292	544	410	489	11,090
Baseball/softball fields	1,057	53	91	166	31	69	1,467
Basketball courts	364	24	69	115	50	34	656
Multi-use courts or gyms	136	4	25	7	11	10	193
Picnic shelters	713	75	111	219	37	77	1,232
Playgrounds	1,018	38	149	189	75	59	1,528
Soccer fields	842	6	71	91	28	43	1,081
Swimming pools	113	12	21	11	12	7	176
Tennis courts	574	25	100	90	40	53	882
Campsites	940	45	42	9	13	44	1,093
Miles of multiple use paved trails	1,137	8	192	113	32	25	1,507
Miles of multiple use gravel or soft surface trails	602	13	193	204	111	108	1,231
Miles of pedestrian only (hiking trails)	88	12	106	34	6	23	269

Source: Colorado State Parks Local Goverment Survey, 2003.

Local Government Issues

The top 15 issues and needs reported by local governments and broken down by tourism region (see Tables 26 and 27). For the complete responses of local government issues and needs, see the *Local Government Survey Report* in Appendix B. Clearly, budget stresses are presenting challenges to local governments as they attempt to continue providing recreation for a growing population. "Insufficient resources to fund agency's budget" and "Year to year stability of the agency's budget" are the top two issues for local governments. Visitor safety and liability protection also rank highly, followed by access for people with disabilities and resource protection(see Table 26).
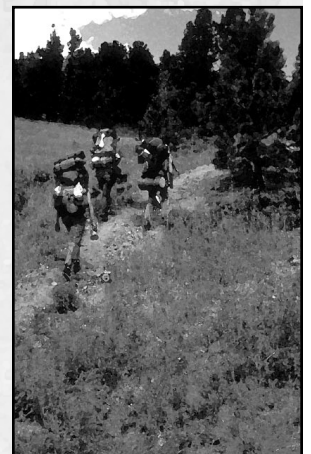
Table 26: Prioritized Local Government Issues

Issue	Statewide Rank	Front Range	Northeast	Northwest	South central	Southeast	Southwest
Insufficient resources to fund your agency's budget	1	3	3	9	2	6	1
Year to year stability of your agency's budget	2	2	1	7	3	4	5
Need for visitor safety and protection	3	1	17	3	9	13	3
Liability protection for your agency	4	6	4	11	1	5	7
Access for people with disabilities	5	4	7	8	5	3	10
Monitor natural resource conditions (e.g., vegetation, weeds, water quality)	6	5	2	5	10	11	8
Offer recreation programs for youth	7	10	6	10	4	2	9
Capacity to serve growing population	8	8	13	1	8	19	4
Vandalism	9	9	5	18	7	1	11
Provide public information about facilities and programs	10	12	9	16	6	9	12
Completing community trail systems	11	7	27	6	11	27	2
Need to create a dedicated funding source for acquisitions and facilities	12	11	8	17	13	10	13
Coordination/cooperation with other outdoor recreation agencies	13	16	14	2	15	16	15
Creating or updating your agency's parks and recreation plan	14	13	18	19	12	14	6
Recreation programs and opportunities for seniors	15	19	10	22	14	7	17

Source: Colorado State Parks Local Governent Survey, 2003.

Local Government Needs

Trails are proving to be one of the most prominent recreation needs among local governments. "Completing community trail systems" was the 11th biggest issue statewide and "Community trail systems" are the greatest need as shown in TABLE 27. Four of the top 15 needs relate to trails. High rankings for picnicking, playgrounds, and sportsfields reflect the important role local governments serve in providing these types of recreation. Open space and parkland acquisition are also high priorities.

Table 27: Prioritized Local Government Needs

Need	State	Front Range	Northeast	Northwest	South central	Southeast	Southwest
Community trail system	1	1	9	1	12	6	1
Picnicking	2	2	1	6	2	2	3
Playgrounds	3	3	2	7	3	3	6
Acquisitions of trail corridors and rights of way	4	6	18	3	1	17	2
Trails connecting to public lands	5	7	23	2	13	16	4
Trails connecting to adjacent communities	6	10	27	4	15	20	5
Acquisition of natural open space	7	4	12	5	7	19	12
Baseball and football fields	8	8	3	8	8	8	14
Acquisition of parklands	9	5	15	13	4	14	8
Soccer fields	10	9	8	9	10	11	11
Acquire water for recreation	11	11	13	12	5	1	7
Skateboard parks	12	14	6	17	9	4	10
Tennis/basketball/ volleyball courts	13	15	5	11	19	13	13
Nature study/wildlife watching sites	14	13	21	10	11	10	17
Dog off leash areas/ dog parks	15	12	20	26	22	23	19

Source: Colorado State Parks Local Govenent Survey, 2003.

Great Trinity Forest Management Plan

RECREATION

NRSE 2000

NSRE 2000

U.S.D.A. Forest Service &
N.O.A.A.

SUMMARY REPORT #1 FROM THE:

NATIONAL SURVEY ON RECREATION
AND THE ENVIRONMENT (NSRE 2000)
(Versions 1 to 5 with Sample Frequencies
and Weighted Population Estimates)

OUTDOOR RECREATION PARTICIPATION
IN THE UNITED STATES

INTRODUCTION

This summary is the first in a series that provides sample frequencies and weighted population estimates from the 1999-2000 National Survey on Recreation and the Environment (*NSRE 2000*). The *NSRE 2000*, in general, was conducted to discover and describe: (1) participation by Americans in outdoor recreation activities, (2) opinions concerning management of both public and private forests and grasslands, (3) the importance and value of our natural environment, (3) uses and values of wildlife and wilderness, (4) people's lifestyles, and (5) recreational trips people take away from home. The *NSRE 2000* data will be used by a variety of public and private organizations for both management and research purposes.

This summary, specifically, provides sample frequencies and weighted estimates from versions one to five of the *NSRE 2000* regarding participation by Americans in outdoor recreation activities. Version's one to five had a total target sample of 22,700 Americans above the age of 16. The average length of interviews for these survey's was 17 minutes. Data was collected from July 1999 through October 2000. A total of 22, 847 useable interviews were completed.

Data from versions one to five of the *NSRE 2000* were examined for differences in demographic profiles between those surveyed and the overall population of the country. Differences were found to warrant weighting the data. The weighting strategy used a combination of multi-variate and multiplicative weights accounting for age, race, sex, education, and urban/rural differences. This weighting adjustment assures better estimates of recreation participation and trends across the general population. Subsequently, the population estimates provided in this report are from weighted sample frequencies and percentages. Furthermore, the population estimates are based upon the noninstitutionalized civilian population. Estimates of the noninstitutionalized civilian population (207.3 million)differ from the civilian population estimates (212.4 million) in that they exclude persons residing in institutions, such as nursing homes, prisons, mental hospitals or correctional facilities. People residing in such institutions are not part of the **NSRE**'s telephone sample, hence they are not contacted for interviews or used in the generation of population estimates.

Another source of bias comes from language barriers and the exclusion of non-English speaking US residents. According to the 1990 Census, 10.3% of the U.S. population is Hispanic. For the non- English speaking segment of the Hispanic population, the *NSRE 2000* is being conducted in Spanish. The most difficult part of this process is getting the translation generic enough for overall comprehension by all the various Hispanic dialects. Please note that other non-English speaking U.S. residents are excluded from the *NSRE 2000* survey. The complexity of translation and interviewing process make it cost prohibitive to conduct multi-lingual interviews.

In viewing the frequencies and percentages presented in this summary, it is important to remember that individuals were asked about their personal participation in specific recreation activities. When all versions of the *NSRE 2000* have been completed, participants would have answered questions pertaining to approximately 80 outdoor recreation activities. However, for versions one to five questions were restricted to people's participation in approximately 50 outdoor recreation activities.

AMERICAN'S PARTICIPATION IN OUTDOOR RECREATION:
NSRE 2000 Summary (Versions 1 to 5)
(With Sample Frequencies and Weighted Population Estimates)

The emphasis of this summary is on the frequencies and percentages of participation by a sample of Americans in various outdoor recreation activities. Version's one to five of the *NSRE 2000* covered more than 50 activities, from casual walking outdoors to more challenging activities such as mountain biking and scuba diving. In this summary, weighted sample frequencies and percentages for each outdoor recreation activity incorporated in the *NSRE 2000* to date are provided. (**Please note population percentages and numbers in all tables were generated from weighted data, and rounded to the nearest decimal point**).

NSRE 2000 Survey

Outdoor Recreation Participation

I would like you to think about the outdoor recreation activities you took part in during the past 12 months. Include any outdoor activities you did around the home, on vacations, trips, or any other time. We are interested in a wide range of outdoor activities from walking, bicycling, and birdwatching to camping, boating, skiing, and so forth.

Q20 During the past 12 months, did you participate in any outdoor team sports, such as softball or soccer?

	Frequency	*Percent	*Number in Millions
1. Yes	4101	21.9	45.4
2. No	16022	78.0	161.7
3. Don't know	4	0.1	0.2

Q28 During the past 12 months, did you do any type of bicycling for fun or exercise?

	Frequency	Percent	Number in Millions
1. Yes	9217	39.0	80.8
2. No	13616	60.9	126.2
3. Don't know	9	0.1	0.2

Q36 Did any of your bicycling occur on back-country roads, trails, or cross country, riding a mountain bike or hybrid bike?

	Frequency	Percent	Number in Millions
1. Yes	4542	20.9	43.3
2. No	15576	79.0	163.8
3. Don't know	16	0.1	0.2

Q38 Did you go horseback riding or do other equestrian activities?

	Frequency	Percent	Number in Millions
1. Yes	2522	9.8	20.3
2. No	20312	90.2	187.0
3. Don't know	7	0.0	0.0

Q42 Was any of your horseback riding done on trails, back roads, or cross country?

	Frequency	Percent	Number in Millions
1. Yes	1809	8.0	16.6
2. No	18323	92.0	190.7
3. Don't know	3	0.0	0.0

Q45 Did you go picnicking?

	Frequency	Percent	Number in Millions
1. Yes	13768	55.2	114.4
2. No	9045	44.7	92.7
3. Don't know	30	0.1	0.2

Q51 Did you go to a gathering of family or friends in an outdoor area away from a home?

	Frequency	Percent	Number in Millions
1. Yes	17404	73.3	152.0
2. No	5400	26.4	54.7
3. Don't know	39	0.3	0.6

Q58   Did you visit an outdoor nature center, a nature trail, a visitor center, or a zoo?

	Frequency	Percent	Number in Millions
1. Yes	14189	57.1	118.4
2. No	8605	42.7	88.5
3. Don't know	48	0.2	0.4

Q68   Did you visit prehistoric structures, or archaeological sites?

	Frequency	Percent	Number in Millions
1. Yes	5242	20.6	42.7
2. No	17500	78.9	163.6
3. Don't know	99	0.5	1.0

Q74   Did you visit any historic sites, buildings, or monuments?

	Frequency	Percent	Number in Millions
1. Yes	12081	46.7	96.8
2. No	10630	52.7	109.3
3. Don't know	131	0.6	1.2

Q80   Did you go walking for exercise or pleasure?

	Frequency	Percent	Number in Millions
1. Yes	19855	83.8	173.7
2. No	2982	16.2	33.6
3. Don't know	3	0.0	0.0

Q83   Did you go day hiking?

	Frequency	Percent	Number in Millions
1. Yes	8036	33.4	69.2
2. No	14768	66.5	137.9
3. Don't know	36	0.1	0.2

Q93   Did you go backpacking on trails or cross country?

	Frequency	Percent	Number in Millions
1. Yes	2677	10.8	22.4
2. No	20150	89.2	184.9
3. Don't know	12	0.0	0.0

Q101 Did you camp at developed sites with facilities such as tables and toilets?

	Frequency	Percent	Number in Millions
1. Yes	6361	25.4	52.7
2. No	16468	74.6	154.6
3. Don't know	11	0.0	0.0

Q109 Did you camp at a primitive site without facilities?

	Frequency	Percent	Number in Millions
1. Yes	3976	15.4	31.9
2. No	18847	84.6	175.4
3. Don't know	16	0.0	0.0

Q131 Did you visit a wilderness or other primitive, roadless area?

	Frequency	Percent	Number in Millions
1. Yes	8460	33.2	68.8
2. No	14301	66.4	137.7
3. Don't know	80	0.4	0.8

Q134 During the past 12 months, did you gather mushrooms, berries, firewood, or other natural products?

	Frequency	Percent	Number in Millions
1. Yes	7126	27.4	56.8
2. No	15706	72.5	150.3
3. Don't know	10	0.1	0.2

Q136 During the past 12 months, did you view, identify, or photograph birds ?

	Frequency	Percent	Number in Millions
1. Yes	7919	33.3	69.0
2. No	14827	66.6	138.1
3. Don't know	25	0.1	0.2

Q142   During the past 12 months did you view, identify, or photograph wildlife besides birds for
example, deer, bears, snakes, butterflies, turtles?

	Frequency	Percent	Number in Millions
1. Yes	10696	41.9	86.9
2. No	12048	58.0	120.2
3. Don't know	24	0.1	0.2

Q148   Did you view, identify, or photograph salt or freshwater fish?

	Frequency	Percent	Number in Millions
1. Yes	5688	23.4	48.5
2. No	17057	76.5	158.6
3. Don't know	27	0.1	0.2

Q151   During the past 12 months did you view, identify, or photograph wildflowers, trees, or other
natural vegetation?

	Frequency	Percent	Number in Millions
1. Yes	10598	42.5	88.1
2. No	12125	57.3	118.8
3. Don't know	42	0.2	0.4

Q154   During the past 12 months did you view or photograph natural scenery?

	Frequency	Percent	Number in Millions
1. Yes	13852	55.1	114.2
2. No	8872	44.7	92.7
3. Don't know	42	0.2	0.4

Q152   Did you go hunting during the past 12 months?

	Frequency	Percent	Number in Millions
1. Yes	2915	11.0	22.8
2. No	19919	89.0	184.5
3. Don't know	3	0.0	0.0

Q153 Did you hunt big game?

	Frequency	Percent	Number in Millions
1. Yes	2023	8.2	17.0
2. No	18109	91.8	190.3
3. Don't know	3	0.0	0.0

Q159 Did you hunt small game?

	Frequency	Percent	Number in Millions
1. Yes	1702	7.0	14.5
2. No	18427	93.0	192.8
3. Don't know	6	0.0	0.0

Q165 Did you hunt waterfowl such as ducks or geese?

	Frequency	Percent	Number in Millions
1. Yes	624	2.3	4.8
2. No	22219	97.7	202.5
3. Don't know	4	0.0	0.0

Q171 Did you do any winter activities such as ice skating, snowboarding, skiing, snowshoeing, snowmobiling, or sledding in the past 12 months?

	Frequency	Percent	Number in Millions
1. Yes	6594	25.8	53.5
2. No	16232	74.1	153.6
3. Don't know	12	0.1	0.2

Q174 Did you go downhill skiing?

	Frequency	Percent	Number in Millions
1. Yes	1890	8.3	17.2
2. No	18245	91.7	190.1
3. Don't know	0.0	0.0	0.0

Q173 Did you go snowboarding?

	Frequency	Percent	Number in Millions
1. Yes	818	4.6	9.5
2. No	19317	95.4	197.8
3. Don't know	0.0	0.0	0.0

Q180 Did you go cross-country skiing or ski touring?

	Frequency	Percent	Number in Millions
1. Yes	1052	3.9	8.1
2. No	19081	96.1	199.2
3. Don't know	2	0.0	0.0

Q189 Did you go snowmobiling?

	Frequency	Percent	Number in Millions
1. Yes	1253	5.3	11.0
2. No	18881	94.7	196.3
3. Don't know	1	0.0	0.0

Q202 During the past 12 months, did you go sightseeing, driving for pleasure, or driving ATVs or motorcycles?

	Frequency	Percent	Number in Millions
1. Yes	15625	63.1	130.8
2. No	7204	36.9	76.5
3. Don't know	11	0.0	0.0

Q203 Did you go sightseeing?

	Frequency	Percent	Number in Millions
1. Yes	13767	53.8	111.5
2. No	9070	46.2	95.8
3. Don't know	9	0.0	0.0

Q207 Did you go driving for pleasure on country roads or in a park, forest, or other natural setting?

	Frequency	Percent	Number in Millions
1. Yes	13727	53.4	110.7
2. No	9110	46.5	96.4
3. Don't know	9	0.1	0.2

Q197 Did you drive off-road for recreation using a 4-wheel drive, ATV, or motorcycle?

	Frequency	Percent	Number in Millions
1. Yes	3924	17.5	36.3
2. No	16203	82.5	171.0
3. Don't know	7	0.0	0.0

Q221 During the past 12 months did you go fishing in either fresh or saltwater?

	Frequency	Percent	Number in Millions
1. Yes	8378	34.2	70.9
2. No	14447	65.7	136.2
3. Don't know	14	0.1	0.2

Q222 Did you go freshwater fishing?

	Frequency	Percent	Number in Millions
1. Yes	7391	29.6	61.4
2. No	15436	70.3	145.7
3. Don't know	20	0.1	0.2

Q234 Did you go fishing in cold water such as mountain rivers, lakes, or streams for trout?

	Frequency	Percent	Number in Millions
1. Yes	2934	13.1	27.2
2. No	17167	86.7	179.7
3. Don't know	33	0.2	0.4

Q228 Did you go fishing in warm water rivers, lakes, or streams for bass, bream, catfish, pike, walleye, crappie, or perch?

	Frequency	Percent	Number in Millions
1. Yes	5144	22.9	47.5
2. No	14936	76.7	159.0
3. Don't know	55	0.4	0.8

Q241 Did you go saltwater fishing?

	Frequency	Percent	Number in Millions
1. Yes	2282	10.0	20.7
2. No	20535	89.8	186.2
3. Don't know	30	0.2	0.4

Q247 Did you go fishing for ocean-to-freshwater migratory fish such salmon, shad, or steelhead trout?

	Frequency	Percent	Number in Millions
1. Yes	998	4.3	8.9
2. No	21746	95.2	197.4
3. Don't know	101	0.5	1.0

Q256 During the past 12 months did you go sailing, motor boating, water skiing, jet skiing, canoeing, kayaking, rafting, tubing, surfing, sailboarding, or any other form of boating?

	Frequency	Percent	Number in Millions
1. Yes	9586	36.7	76.1
2. No	13237	63.3	131.2
3. Don't know	15	0.0	0.0

Q257 Did you go sailing?

	Frequency	Percent	Number in Millions
1. Yes	1366	5.1	10.6
2. No	21476	94.9	196.7
3. Don't know	5	0.0	0.0

Q266 Did you go canoeing?

	Frequency	Percent	Number in Millions
1. Yes	2558	9.5	19.7
2. No	20284	90.5	187.6
3. Don't know	5	0.0	0.0

Q272 Did you go kayaking?

	Frequency	Percent	Number in Millions
1. Yes	824	3.2	6.6
2. No	22022	96.8	200.7
3. Don't know	1	0.0	0.0

Q278 Did you go rowing?

	Frequency	Percent	Number in Millions
1. Yes	1113	4.4	9.1
2. No	21724	95.6	198.2
3. Don't know	9	0.0	0.0

Q290 Did you go motorboating?

	Frequency	Percent	Number in Millions
1. Yes	6569	24.4	50.6
2. No	16270	75.6	156.7
3. Don't know	8	0.0	0.0

Q296 Did you go waterskiing?

	Frequency	Percent	Number in Millions
1. Yes	2040	8.2	17.0
2. No	20803	91.8	190.3
3. Don't know	3	0.0	0.0

Q302 Did you go boating using a personal watercraft such as jet skis, wave runners, etc.?

	Frequency	Percent	Number in Millions
1. Yes	2259	9.5	19.7
2. No	20579	90.5	187.6
3. Don't know	8	0.0	0.0

Q284 Did you go rafting, tubing, or any other type of floating on rivers or other flowing water?

	Frequency	Percent	Number in Millions
1. Yes	2452	9.7	20.1
2. No	20383	90.3	187.2
3. Don't know	10	0.0	0.0

Q308 Did you go sailboarding or windsurfing?

	Frequency	Percent	Number in Millions
1. Yes	182	0.8	1.7
2. No	22660	99.2	205.6
3. Don't know	4	0.0	0.0

Q314 Did you go surfing?

	Frequency	Percent	Number in Millions
1. Yes	307	1.5	3.1
2. No	22536	98.5	204.2
3. Don't know	3	0.0	0.0

Q319 During the past 12 months, did you go swimming, snorkeling, scuba diving, or visit a beach or other waterside area?

	Frequency	Percent	Number in Millions
1. Yes	14922	60.1	124.6
2. No	7898	39.8	82.5
3. Don't know	15	0.1	0.2

Q326 Did you go swimming in streams, lakes, ponds, or the ocean?

	Frequency	Percent	Number in Millions
1. Yes	11239	43.8	90.8
2. No	11597	56.2	116.5
3. Don't know	10	0.0	0.0

Q332 During the past 12 months did you go snorkeling?

	Frequency	Percent	Number in Millions
1. Yes	1714	6.6	13.7
2. No	21125	93.3	193.4
3. Don't know	8	0.1	0.2

Q337 During the past 12 months did you go scuba diving?

	Frequency	Percent	Number in Millions
1. Yes	447	1.9	3.9
2. No	22398	98.1	203.4
3. Don't know	1	0.0	0.0

Q209 During the past 12 months did you visit beaches for any outdoor recreation activities?

	Frequency	Percent	Number in Millions
1. Yes	9789	39.5	81.9
2. No	13035	60.4	125.2
3. Don't know	20	0.1	0.2

Q211 During the past 12 months, did you visit a waterside other than a beach for recreation activities?

	Frequency	Percent	Number in Millions
1. Yes	6973	27.1	56.2
2. No	15793	72.6	150.5
3. Don't know	72	0.3	0.6

Great Trinity Forest Management Plan

RECREATION

Recreation Statistics Update Report Number 1, August, 2004

Recreation Statistics Update[1]

Update Report No. 1
August, 2004

Participation Rates for Outdoor Activities in 2004[2]

The United States is a fast growing country in many ways. One of those ways is its populations' participation in outdoor recreation. The table provided at the end represents the latest update of recreation participation statistics from the Nationwide Survey on Recreation and the Environment (NSRE) of people 16 or older across the country from Florida to Hawaii. NSRE will start up again in the fall of 2004.

In the table provided here, percentages and millions participating in the past 12 months in 37 nature-based activities are reported. Prominent among the activities with highest numbers participating are viewing/photographing nature and history, driving, visiting the beach, swimming, and picnicking.   Water activities play prominent roles in Americans' outdoor pursuits. So do motorized activities such as driving and motor boating. Over 37 percent went fishing at least once, and over 29 percent participated in some sort of winter snow activity.

Activity	Percent participating	Participants (millions)
View/photograph natural scenery	70.6	151.2
Visit nature centers, etc.	63.5	135.9
Driving for pleasure	61.2	130.9
View/photograph other wildlife	58.2	124.6
View/photograph wildflowers, trees, etc.	57.0	122.0
Visit beach	56.9	121.8
Swimming in lakes, streams, etc.	54.2	116.1
Visit historic sites	53.1	113.6
Picnicking	52.4	112.1

Activity	Percent participating	Participants (millions)
Boating	44.2	94.6
View/photograph birds	39.8	85.2
Day hiking	38.0	81.3
Bicycling	37.6	80.5
Fishing	37.5	80.3
Visit a wilderness or primitive area	33.6	71.9
View/photograph fish	32.1	68.7
Developed camping	31.1	66.5
Freshwater fishing	30.9	66.1
Motorboating	30.3	64.9
Snow/ice activities	29.2	62.4
Drive off-road*	22.5	48.1
Visit prehistoric/archeological sites	21.6	46.2
Mountain biking	19.8	42.5
Primitive camping	15.5	33.1
Rafting	15.5	33.1
Jet skiing	13.4	28.7
Hunting	13.1	28.1
Coldwater fishing	13.0	27.7
Canoeing	12.6	26.9
Backpacking	12.1	25.8
Horseback riding (general)	8.9	19.1
Horseback riding on trails	7.1	15.2
Kayaking	7.0	15.0
Downhill skiing	6.8	14.5
Snowmobiling	6.3	13.5
Snowboarding	5.9	12.6
Cross country skiing	2.7	5.7

* Off-road is defined as off of paved or graveled roads.

This Recreation Statistics Update Report is based on recent data that updates the estimated participation statistics reported in **Outdoor Recreation for 21st Century America**, published by Venture Publishing, College Station, PA. Copies of **Outdoor Recreation for 21st Century America** may be obtained from Venture Publishing at their website (http://www.venturepublish.com) or telephone at 1-814-234-4561. To see more of our research, please visit our website (http://www.srs.fs.fed.us/trends).

Great Trinity Forest Management Plan

RECREATION

Recreation Statistics Update Report Number 2, September, 2004

Recreation Statistics Update[1]

Update Report No. 2
September, 2004

Trends in Activity Participation Since Fall 1999[2]

The first United States National Recreation Survey was conducted in 1960. At that time the population of this country was just at 180 million. Our population has grown by over 115 million since 1960, and it is projected to continue growing rapidly. In recent years, population has risen at a fast pace, from about 281 million in 2000 to 288 million in 2002, and reaching almost 295 million thus far in 2004.

The outdoor recreation participation numbers reported in the table below reflect this growth in our population. Shown are percentages of population 16 or older participating in each of a wide array of activities. Because of varying sample sizes across the periods during which surveying was done, some cells did not have sufficient data for calculating participation estimates and are left blank. The source of these participation statistics is the National Survey on Recreation and the Environment (NSRE). The most recent NSRE was the 8th of the United States on-going National Recreation Surveys. It ran from September 1999 through to February, 2004.

Activities in the table are listed from highest overall percentage of the population participating (walking at 82.5%) to the lowest (windsurfing at 0.8%). Topping the lists for all time periods are walking, outdoor family gatherings, gardening, viewing/photographing natural scenery, and visiting nature centers. Across the years of surveying, there seem to be two general trends. First, percentages of the population participating increased for many activities between Fall 1999 and Spring 2004. For example, visiting nature centers went from 57% in late 1999 to over 60% in early 2004. Outdoor swimming went from almost 44 in 1999 to almost 53% in 2004. The second trend generally is that for many activities, participation percentages dipped from Fall 2001 to Summer 2002, probably in reaction to the hijackings and tragedies that occurred on 9/11, 2001. Overall, however, outdoor recreation participation has increased over the 5 time periods covered.

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[1]This update is based on research information generated for the Forest Service's 2005 Forest and Rangeland Renewable Resources Assessment Update Report.

[2]Authors: K. Cordell, Project Leader, USDA Forest Service, G. Green, Research Scientist, University of Georgia, and C. Betz, Outdoor Recreation Planner, USDA Forest Service, all at Athens, GA; and M. Fly and B. Stephens, Associate Professor and Senior Research Associate, University of Tennessee, Knoxville, TN; Collaborators: Gregory Super and Floyd Thompson, USDA Forest Service, Washington, DC.

Outdoor recreation participants by activity and season in millions of participants and percentage of population.

Activity	Fall 1999 to Summer 2000 (n=21,762)	Fall 2000 to Summer 2001 (n=25,916)	Fall 2001 to Summer 2002 (n=10,767)	Fall 2002 to Summer 2003 (n=10,898)	Fall 2003 to Spring 2004 (n=3,503)	Fall 1999 to Spring 2004, Full Sample (n=72,846)
Walk for pleasure	179.7 84.0	175.8 82.1	169.0 79.0	182.0 85.1	,	176.6 82.5
Family gathering	157.3 73.5	158.7 74.2	157.8 73.7	164.3 76.8	,	158.9 74.2
Gardening or landscaping for pleasure	,	150.5 70.3	126.6 59.2	,	,	139.0 64.9
View/photograph natural scenery	115.2 53.8	127.0 59.4	122.4 57.2	136.3 63.7	152.4 71.2	125.1 58.5
Visit nature centers, etc.	122.3 57.1	121.2 56.6	116.8 54.6	118.1 55.2	130.5 61.0	120.9 56.5
Picnicking	118.1 55.2	117.0 54.7	113.7 53.1	111.1 51.9	112.5 52.6	115.8 54.1
Driving for pleasure	114.9 53.7	103.3 48.3	102.7 48.0	136.1 63.6	125.5 58.6	112.7 52.7
Sightseeing	115.6 54.0	105.0 49.1	101.7 47.5	128.2 59.9	,	111.5 52.1
Attend outdoor sports events	,	110.0 51.4	105.6 49.4	,	,	108.6 50.8
Visit historic sites	100.6 47.0	96.0 44.9	91.5 42.7	97.6 45.6	110.1 51.4	97.7 45.7
View/photograph wildflowers, trees, etc.	87.6 40.9	93.5 43.7	88.9 41.5	105.4 49.3	122.1 57.1	93.8 43.8
View/photograph other wildlife	87.0 40.6	94.1 44.0	86.8 40.6	102.8 48.0	121.4 56.7	93.1 43.5
View beach	84.4 39.4	89.0 41.6	90.6 42.3	118.0 55.1	118.3 55.3	91.7 42.9
Swimming in lakes, streams, etc.	93.7 43.8	85.5 39.9	84.4 39.5	97.8 45.7	112.7 52.7	90.3 42.2
Swimming in an outdoor pool	,	88.7 41.4	91.0 42.5	,	,	89.1 41.6
Attend outdoor concerts, plays, etc.	,	88.7 41.5	85.7 40.0	,	,	87.7 41.0
Bicycling	83.8 39.1	85.6 40.0	80.8 37.8	79.9 37.3	78.8 36.8	83.2 38.9
Yard games, e.g., horseshoes	,	85.8 40.1	76.0 35.5	,	,	83.2 38.9
Boating	78.3 36.6	77.6 36.3	75.3 35.2	81.7 38.2	91.1 42.6	78.5 36.7
Fishing	73.5 34.4	73.0 34.1	68.9 32.2	75.7 35.4	78.5 36.7	73.1 34.2
Running or jogging	,	71.4 33.4	67.9 31.7	,	,	70.5 32.9
Day hiking	71.8 33.5	68.3 31.9	70.6 33.0	64.7 30.2	82.6 38.6	69.9 32.6

Activity	Fall 1999 to Summer 2000 (n=21,762)	Fall 2000 to Summer 2001 (n=25,916)	Fall 2001 to Summer 2002 (n=10,767)	Fall 2002 to Summer 2003 (n=10,898)	Fall 2003 to Spring 2004 (n=3,503)	Fall 1999 to Spring 2004, Full Sample (n=72,846)
Visit a wilderness or primitive area	72.1 33.7	67.2 31.4	64.8 30.3	74.2 34.7	75.9 35.5	69.6 32.5
View/photograph birds	64.4 30.1	67.0 31.3	62.6 29.2	73.9 34.5	83.1 38.8	67.1 31.4
Freshwater fishing	63.8 29.8	62.3 29.1	58.3 27.3	65.7 30.7	64.2 30.0	62.4 29.2
Gather mushrooms, berries, etc.	58.8 27.5	63.6 29.7	57.1 26.7	59.9 28.0	,	60.5 28.3
Visit a farm or agricultural setting	60.2 28.1	59.9 28.0	55.4 25.9	60.5 28.3	,	58.9 27.5
Developed camping	54.0 25.2	58.6 27.4	55.4 25.9	57.9 27.1	67.1 31.4	57.0 26.6
Snow/ice activities	55.3 25.8	58.8 27.5	53.9 25.2	54.0 25.2	60.6 28.3	56.2 26.3
Visit other waterside (besides beach)	58.5 27.3	52.9 24.7	51.8 24.2			54.8 25.6
Motorboating	52.4 24.5	52.2 24.4	50.8 23.7	,	62.5 29.2	52.6 24.6
View/photograph fish	48.0 22.4	52.0 24.3	48.8 22.8	57.6 26.9	66.5 31.1	51.7 24.1
Outdoor team sports	47.0 22.0	49.9 23.3	48.9 22.9	47.2 22.0	,	48.5 22.6
Warmwater fishing	49.8 23.2	47.6 22.2	45.2 21.1	,	,	47.9 22.4
Mountain biking	45.0 21.0	46.5 21.7	42.3 19.8	44.1 20.6	40.8 19.1	44.9 21.0
Visit prehistoric/archeological sites	44.1 20.6	44.4 20.7	41.2 19.3	47.7 22.3	47.3 22.1	44.3 20.7
Boat tours or excursions	,	40.5 18.9	42.7 20.0	,	,	41.1 19.2
Drive off-road*	37.6 17.6	37.4 17.5	36.8 17.2	49.5 23.1	47.8 22.4	39.7 18.5
Inline skating or rollerblading	,	47.2 22.0	24.7 11.5	,	,	37.8 17.7
Golf	,	35.7 16.7	35.4 16.5	,	,	35.6 16.6
Primitive camping	33.1 15.5	35.2 16.5	33.3 15.6	39.9 18.6	35.7 16.7	34.5 16.1
Sledding	,	32.2 15.1	31.8 14.9	,	,	32.1 15.0
Basketball outdoors	,	31.4 14.7	26.1 12.2	,	,	30.0 14.0
Coldwater fishing	28.3 13.2	29.5 13.8	25.4 11.9	30.3 14.2	29.5 13.8	28.5 13.3
Hunting	24.1 11.3	24.5 11.5	21.3 10.0	24.6 11.5	25.9 12.1	24.0 11.2

Activity	Fall 1999 to Summer 2000 (n=21,762)	Fall 2000 to Summer 2001 (n=25,916)	Fall 2001 to Summer 2002 (n=10,767)	Fall 2002 to Summer 2003 (n=10,898)	Fall 2003 to Spring 2004 (n=3,503)	Fall 1999 to Spring 2004, Full Sample (n=72,846)
Backpacking	23.3 10.9	21.7 10.1	21.5 10.0	22.9 10.7	26.7 12.5	22.5 10.5
Tennis outdoors	,	22.8 10.6	21.5 10.0		,	22.4 10.5
Saltwater fishing	21.2 9.9	23.0 10.7	22.3 10.4	,	,	22.2 10.4
Volleyball outdoors	,	23.1 10.8	20.1 9.4	,	,	22.3 10.4
Rafting	20.7 9.7	20.5 9.6	21.4 10.0	,	31.6 14.8	21.3 10.0
Softball	,	22.3 10.4	19.0 8.9	,	,	21.4 10.0
Canoeing	20.4 9.5	21.5 10.0	18.4 8.6	,	24.5 11.4	20.7 9.7
Jet skiing	19.9 9.3	20.7 9.7	20.0 9.3	,	27.7 12.9	20.7 9.7
Horseback riding (general)	21.1 9.8	20.5 9.6	19.3 9.0	20.6 9.6	19.6 9.2	20.4 9.6
Big game hunting	18.0 8.4	18.6 8.7	16.5 7.7	,	,	18.0 8.4
Downhill skiing	17.8 8.3	18.8 8.8	17.4 8.1	17.6 8.2	16.6 7.7	18.0 8.4
Football	,	16.8 7.9	18.4 8.6	,	,	17.2 8.1
Waterskiing	17.6 8.2	17.1 8.0	16.6 7.8	,	,	17.2 8.0
Horseback riding on trails	17.1 8.0	16.3 7.6	15.5 7.2	16.6 7.8	15.4 7.2	16.4 7.6
Handball or racquetball outdoors	,	16.0 7.5	17.2 8.0	,	,	16.3 7.6
Soccer outdoors	,	15.1 7.1	18.1 8.5	,	,	15.9 7.4
Small game hunting	15.4 7.2	15.6 7.3	13.6 6.4	,	,	15.1 7.1
Snorkeling	14.0 6.5	14.7 6.9	14.6 6.8	,	,	14.4 6.7
Ice skating outdoors	,	14.5 6.8	13.6 6.3	,	,	14.2 6.6
Baseball	,	14.2 6.6	12.7 5.9	,	,	13.8 6.4
Mountain climbing	,	13.0 6.1	14.5 6.8	,	,	13.4 6.3
Snowmobiling	11.6 5.4	12.2 5.7	10.8 5.0	12.6 5.9	12.8 6.0	11.9 5.5
Sailing	10.8 5.0	11.0 5.2	11.5 5.4	,	,	11.0 5.2

Activity	Fall 1999 to Summer 2000 (n=21,762)	Fall 2000 to Summer 2001 (n=25,916)	Fall 2001 to Summer 2002 (n=10,767)	Fall 2002 to Summer 2003 (n=10,898)	Fall 2003 to Spring 2004 (n=3,503)	Fall 1999 to Spring 2004, Full Sample (n=72,846)
Snowboarding	9.7 4.5	11.2 5.2	10.9 5.1	11.3 5.3	14.0 6.5	10.8 5.1
Rock climbing	,	9.3 4.3	8.8 4.1	,	,	9.1 4.3
Rowing	9.6 4.5	9.1 4.3	8.1 3.8	,	,	9.1 4.3
Caving	,	9.1 4.3	8.7 4.1	,	,	9.0 4.2
Anadromous fishing	9.3 4.3	9.2 4.3	7.7 3.6	,	,	9.0 4.2
Kayaking	6.7 3.1	8.2 3.8	9.2 4.3	,	14.0 6.5	8.1 3.8
Cross country skiing	8.4 3.9	8.0 3.8	7.5 3.5	7.0 3.3	6.4 3.0	7.8 3.6
Ice fishing	,	6.1 2.9	4.6 2.1	,	,	5.7 2.7
Migratory bird hunting	5.1 2.4	5.1 2.4	4.3 2.0	,	,	4.9 2.3
Snowshoeing	,	4.3 2.0	5.0 2.3	,	,	4.5 2.1
Scuba diving	4.0 1.8	4.0 1.9	4.5 2.1	,	,	4.1 1.9
Orienteering	,	3.9 1.8	3.3 1.5	,	,	3.7 1.7
Surfing	3.1 1.4	4.0 1.9	3.9 1.8	,	,	3.7 1.7
Windsurfing	1.8 0.8	1.7 0.8	1.4 0.6	,	,	1.7 0.8

, Missing values indicate the activity was not included in the NSRE during those time periods.
* Off-road is defined as off of paved or graveled roads.

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Great Trinity Forest Management Plan

RECREATION

Recreation Statistics Update
Report Number 3, October, 2004

Recreation Statistics Update[1]

Update Report No. 3
October, 2004

Trends and Demographics of Off-road Vehicle Users[2]

As the U. S. population grows, so too does demand for outdoor recreation. Demand for off-road vehicle driving and riding has especially grown. In 1960, when the first of the U. S. National Surveys was done for the Outdoor Recreation Resources Review Commission, off-road motorized recreation was not even on the "radar" as a recreational activity. There were, of course, many who rode motor cycles on back country trails, there were many who used 4-wheel-drive vehicles (such as jeeps) to gain access to the back country, with and without roads, but there was no recognition of off-road motorized recreation as a population-wide outdoor activity. But this has changed.

From 1982 to 2000-01, driving motor vehicles off-road (ORV) became one of the fastest growing activities in the country, growing in number of participants over 12 years old by over 100 percent (Cordell et al. 2004, page 37). This growth has continued, as Table 1 below shows. Based on surveying done between the fall of 1999 and the summer of 2000, it was estimated that 37.6 million people 16 or older (17.6% of people that age or older) had ridden or driven motor vehicles off-road at least once in the last 12 months. That number increased incredibly to an estimated 49.6 million by fall 2003/spring 2004 (rising to 23.2% of the population).

Table 1.–Trend in millions and percentage of population 16 or older participating at least once in the last 12 months in off-road motorized vehicle driving or riding

Activity	Fall 1999 to Summer 2000 (n=21,762)	Fall 2000 to Summer 2001 (n=25,916)	Fall 2001 to Summer 2002 (n=10,767)	Fall 2002 to Summer 2003 (n=10,898)	Fall 2003 to Spring 2004 (n=3,503)
Drive off-road*	37.6 17.6%	37.4 17.5%	41.4 19.3%	49.5 23.1%	49.6 23.2%

* Off-road is defined as off of paved or graveled roads.

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[1]This update is based on research information generated for the Forest Service's 2005 Forest and Rangeland Renewable Resources Assessment Update Report.

[2] Authors: K. Cordell, Project Leader, USDA Forest Service, M. Owens, Graduate Student, University of Georgia, G. Green, Research Scientist, University of Georgia, and C. Betz, Outdoor Recreation Planner, USDA Forest Service, all at Athens, GA; and M. Fly and B. Stephens, Professor and Senior Research Associate, University of Tennessee, Knoxville, TN; Collaborators: Gregory Super and Floyd Thompson, USDA Forest Service, Washington, DC.

Given the very rapid growth in the activity of driving motor vehicles off-road, it seems important to better understand who the ORV participants are. Table 2 provides estimates of the numbers of participants by demographic characteristic across three time periods. All data are from the National Survey on Recreation and the Environment (NSRE). Across time periods, we can see that most ORV participants were under 50, male, white and urban. As well, across all demographics in Table 2, numbers of people participating were increasing. Increasing especially rapidly were participants who were 30-50 years old, female, Hispanic, and urban. As participation in this activity rises over time, it will be important to track the changing makeup of ORV participants.

Table 2.--Number of people in the U.S. age 16 or older (in millions) participating at least once in the last 12 months in off-road vehicle use, 1999-2004.

Demographic	Fall 1999 - Summer 2000	Fall 2001- Summer 2002	Fall 2003 - Summer 2004
Total Participating	37.6	41.4	49.6
Age - Under 30	15.1	15.3	18.2
Age - 30-50	16.3	18.6	21.7
Age - 51 & older	6.1	7.4	9.6
Male	23.2	24.9	29.8
Female	14.6	16.7	20.0
White	30.6	34.8	38.9
Hispanic	2.9	2.7	9.3
Non-metropolitan	10.0	10.8	13.6
Metropolitan	27.3	29.9	34.2

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Cordell, H. Ken, et al. 2004. Outdoor Recreation for 21st Century America. State College, PA: Venture Publishing Inc. 293 p.

Great Trinity Forest Management Plan

RECREATION

Recreation Statistics Update
Report Number 4, November, 2004

Recreation Statistics Update[1]

Update Report No. 4
November, 2004

Hispanic Participation in Land-Based Outdoor Recreation Activities[2]

In 1900, 87.9 percent of the U. S. population was White, mostly non-Hispanic White. Blacks (also mostly non-Hispanic) were 11.6 percent of the population. The remaining 0.5 percent of the population was mostly either American Indian or Asian-Pacific Islander. By 1950, Whites composed almost 89.5 percent of the population and Blacks 10 percent. Very few among the population then were of other races or ethnicity. By 1980, however, this had begun to change when Whites composed 83.1 percent, Blacks composed 11.7 percent, and others composed the remaining 5.1 percent. In 1990 a much smaller 75.6 percent of the population was non-Hispanic White, Asian and Pacific Islanders were 2.9 percent, Hispanics were 9 percent and Blacks were 12.1 percent. By 2000, non-Hispanic Whites were just 69.1 percent, a dramatically smaller proportion than in earlier decades. Hispanics comprised 12.5 percent of the U.S. population, exceeding for the first time in this country's history the percentage who are Black. The most recent (August 2004) population estimates from the 2000 Census show the proportion of Hispanics in the United States continuing to grow to 14.1 percent, with Whites dipping slightly to 67.3 percent. Currently about one half of all net immigration to the United States is by people of Hispanic origin. Thirteen states had more net immigration in the 3 years between 2000-2003 than in any previous decade. Leading in net immigration in these 3 years were Georgia, Arizona, North Carolina, and Colorado. North Carolina's Hispanic population grew nearly six-fold and Georgia's nearly five-fold during this period. Obviously, it is increasingly important to better understand this growing segment of the United States' population. Described briefly below are comparisons of recreation participation percentages for 3 segments of our population–White non-Hispanic, Hispanic of Mexican origin, and Hispanic not of Mexican origin.

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[1]This update is based on research information generated for the Forest Service's 2005 Forest and Rangeland Renewable Resources Assessment Update Report.

[2]Authors: K. Cordell, Project Leader, USDA Forest Service, G. Green, Research Scientist, University of Georgia, and C. Betz, Outdoor Recreation Planner, USDA Forest Service, all at Athens, GA; and M. Fly and B. Stephens, Professor and Senior Research Associate, University of Tennessee, Knoxville, TN; Collaborators: Gregory Super and Floyd Thompson, USDA Forest Service, Washington, DC.

Shown in Table 1 are participation rates (percentages of the populations) for 25 land-based outdoor recreation activities. Three things about these participation rate comparisons stand out. <u>First</u>, overall, White participation rates are substantially higher across the listed land-based activities, but for one, day hiking. For many activities (other than hiking), the difference is substantial. For example, the participation rate in gardening for the White population is about 25 percent greater than for Hispanics, driving for pleasure is over 25 percent higher, and hunting approaches 3 times greater. Day hiking stands out in that the Hispanic participation rate is higher than for Whites. <u>Second</u>, Hispanics not of Mexican origin participate in walking, yard games, attending outdoor concerts, and motorized activities at higher rates than Hispanics of Mexican origin. Hispanics of Mexican origin participate at higher rates only for picnicking and day hiking. However, there are more participation rate similarities than differences between Mexican and non-Mexican Hispanics across the activities listed. <u>Third</u>, activities with especially low participation rates by Mexican Hispanics relative to Whites include gardening for fun, driving for pleasure, yard games, visiting farm or agricultural settings, driving off roads, primitive camping and hunting. The statistics in Table 1 hint that as the composition of U. S. population changes even more in the future, it is highly likely that the composition of outdoor activities will also change. With surveys like the National Survey on Recreation and the Environment, we will be better able to monitor and be responsive to these changes.

Table 1.–Comparison of percentages of 3 segments of the U. S. population participating in land-based outdoor activities, 2000-2004.

Activity	Whites not of Hispanic Origin	Hispanics of Mexican Origin	Hispanics not of Mexican Origin
Walk for Pleasure	85.5	62.0	74.6
Family Gathering	75.1	68.0	68.2
Gardening or landscaping for pleasure	70.2	45.0	45.8
Driving for Pleasure	59.1	28.3	34.6
Picnicking	56.7	49.1	45.3
Yard games, e.g., horseshoes	45.8	17.3	23.2
Attend outdoor concerts, plays, etc.	44.4	23.0	34.9
Bicycling	40.6	33.7	35.1
Visit a wilderness or primitive area	37.6	21.2	22.3
Day Hiking	34.4	49.3	41.5
Visit a farm or agric. setting	31.9	16.9	19.1
Developed Camping	30.7	19.1	19.2
Mountain Biking	23.1	18.5	18.0
Drive Off-road	21.1	10.9	12.3
Primitive Camping	19.4	9.0	9.8

Activity	Whites not of Hispanic Origin	Hispanics of Mexican Origin	Hispanics not of Mexican Origin
Hunting	14.0	5.0	5.3
Backpacking	11.8	8.3	10.2
Horseback Riding on Trails	11.0	5.2	5.7
Big Game Hunting	11.0	2.9	3.0
Small Game Hunting	9.1	2.1	2.9
Horseback riding (general)	8.9	8.0	7.9
Mountain Climbing	6.9	4.2	4.5
Rock Climbing	4.9	3.9	2.5
Migratory Bird Hunting	3.0	0.7	1.1
Orienteering	2.1	0.8	0.6

<u>Great Trinity Forest Management Plan</u>

RECREATION

Recreation Statistics Update
Report Number 5, December, 2004

Recreation Statistics Update[1]

Update Report No. 5
December, 2004

Hispanic Participation in Viewing-Learning Outdoor Recreation Activities[2]

In 1900, 87.9 percent of the U. S. population was White, mostly non-Hispanic White. Blacks (also mostly non-Hispanic) were 11.6 percent of the population. In 1990 a much smaller 75.6 percent of the population was non-Hispanic White, Hispanics were 9 percent. Recent (August 2004) population projections based on the 2000 Census show the proportion of Hispanics in the United States continuing to grow to 14.1 percent, with Whites dipping to 67.3 percent. Currently about one half of all net immigration to the United States is by people of Hispanic origin. Obviously, it is increasingly important to understand this growing segment of the population. Described briefly below are comparisons of viewing/learning activity participation percentages for 3 segments of our population–White non-Hispanic, Hispanic of Mexican origin, and Hispanic not of Mexican origin.

Shown in Table 1 are U.S. participation rates (percentages of each of the three populations) for 13 outdoor recreation activities which emphasize viewing, learning, photographing and sometimes gathering as the mode for participation. In *Recreation Statistics Update No. 4*, participation rate comparisons were made for land-based outdoor activities. Three things about the participation rate comparisons in the table below stand out. First, overall, White participation rates are substantially higher across the listed activities, but for one, visiting prehistoric and other archeological sites. For many activities, the difference is large. For example, the participation rate in viewing and photographing natural scenery is 20 to 25 percent greater for non-Hispanic Whites than for Hispanics, visiting historic sites for non-Hispanic Whites is around double the rate for Hispanics, and gathering natural products (such as berries or mushrooms) is also nearly twice the Hispanic rate. Second, Hispanics not of Mexican origin participate in all activities but caving (visiting and exploring caves) at higher rates than Mexican

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Hispanics. For most activities, the difference in participation rates is not large. <u>Third,</u> activities with especially low participation rates by Mexican Hispanics relative to Whites include sightseeing, viewing and photographing wildlife (not including birds), visiting historic sites, and going on boat tours or excursions to see whales or other natural water attractions. The statistics in Table 1 hint that as the composition of U. S. population changes even more in the future, it is highly likely that the composition of outdoor activities may also change. With surveys like the National Survey on Recreation and the Environment, we will be better able to monitor and be responsive to these changes.

Table 1.–Comparison of percentages of 3 segments of the U. S. population participating in viewing/learning outdoor activities, 2000-2004.

Activity	White/ non-Hispanic Percent participating	Hispanic/ Mexican Origin Percent participating	Hispanic/ not Mexican Percent participating
View/Photograph Natural Scenery	67.3	42.1	47.3
Visit Nature Centers, etc.	60.6	49.8	53.1
Sightseeing	57.7	27.9	35.0
View/Photograph Other Wildlife	52.4	24.3	28.3
Visit Historic Sites	50.8	25.0	37.3
View/Photograph Wildflowers, Trees, etc.	50.1	30.9	37.0
Visit a wilderness or primitive area	37.6	21.2	22.3
View/Photograph Birds	37.1	18.3	23.1
Gather Mushrooms, Berries, etc.	33.3	18.1	18.6
View/Photograph Fish	27.4	15.0	19.9
Boat tours or excursions	22.1	8.2	13.4
Visit Prehistoric/Archeological Sites	21.5	15.9	21.6
Caving	5.2	3.2	1.4

Great Trinity Forest Management Plan

RECREATION

Recreation Statistics Update Report Number 9, May, 2005

Recreation Statistics Update

Update Report No. 9
May, 2005

Western and Mid-Western Metropolitan Residents' Participation in Nature-based Outdoor Tourism Activities[1]

Western Metropolitan Areas and Their Residents.–The United States is an increasingly urban nation. Four of every 5 residents now live in a metropolitan area. At the time of the 2000 Census this meant that almost 226 of the Nation's 281 million residents (80%) were living in one of the 276 U.S. metropolitan areas. This was up from 77 percent in 1990. Metro residency is projected to continue its growth adding by 2020 48 million people. Of the largest metro areas in the country, two are in the West, Los Angeles and San Francisco-Oakland. Two are in the Mid-West, Dallas-Fort Worth and Houston.

In Recreation Statistics Update No. 8 (April 2005), we described nature-based outdoor tourism activity participation rates for the major eastern metro areas of the U.S. In this Update (No. 9), we describe the nature-based activity participation rates for 8 western or mid-western metro areas (i.e., metros west of the Mississippi River). They include Dallas-Ft. Worth, Denver, Houston, Los Angeles, Minneapolis, Phoenix, San Francisco, and Seattle. We refer to the activities listed in the accompanying table as tourism activities because participation in them usually requires travel out of the city to public and private areas with developed recreation sites, wildlife, trails, lakes, streams or snow cover. The source of outdoor tourism activity participation rates is the National Survey on Recreation and the Environment (NSRE), a nationwide survey of people 16 or older.

Of the metro areas across the country, Dallas-Fort Worth in the Country's southern Mid-West has been one of the fastest growing--29% growth since 1990. In many of these fast growing Mid-West and West metro areas, the population is quite racially and ethnically diverse. In Los Angeles and Houston, less than one-half the population is non-Hispanic White (39% and 48 %, respectively). More than 2 of every 5 Los Angeles

residents (40%) are Hispanic, followed by Houston (29%) and Dallas-Fort Worth (22%). The San Francisco metro area has by far the largest Asian American population at 18%, followed by Los Angeles (10%). Houston and Los Angeles have the lowest median ages at 32 years each.

***Western Metro Residents' Participation in Outdoor Tourism Activities.**–*The table below features 20 nature-based outdoor tourism activities. They are listed in order by percentage of the U.S. population 16 or older who participated between 2000 and 2004 (last column in the table). In the second to left of the last column, participation percentages of the combined populations of the 8 western metro areas listed across the top of the table are shown. In the column just left of the last column, the ratio of western-to-eastern metro area percentages participating in each activity are shown. Eastern metro participation was discussed in Update No. 8. The numbers in the column under each metro area name is the ratio of the percentage of people in each western metro area who participate in an individual activity divided by the overall percentage participating across the 8 western metro areas combined. Converting the data to ratios more readily shows readers which activities and which metro areas have larger or smaller percentages of people participating. Especially noteworthy are ratios larger than 1.5 (indicating much higher percentages of a particular metro area population participating) or a ratio less than 0.7 (indicating a much lower participation rate). The actual metro participation percentage for each activity is shown in parentheses below each respective ratio.

Generally, larger percentages of Denver, Minneapolis, Phoenix and Seattle populations participate in nature-based tourism activities relative to all the major western metro areas combined. The population of Los Angeles participates at the lowest rates across the 20 activities, followed closely by Houston and Dallas-Fort Worth. The exception for Houston and Dallas are relatively high participation rates for warmwater fishing, big game hunting and small game hunting. Relatively high percentages of Denver residents participate in most of the activities listed, especially primitive camping, coldwater fishing, downhill skiing and cross-country skiing. Minneapolis residents are also fairly active with especially high participation rates in warmwater fishing, canoeing, big game hunting, small game hunting, and cross-country skiing. Phoenix residents participate at relatively high rates only in the two hunting activities. Seattle residents are high relative to western metro areas generally in primitive camping, coldwater fishing, backpacking, rafting, canoeing, and cross country skiing.

Relative to total U.S. population of persons 16 or older, western metro residents participate at notably higher rates in day hiking, developed camping, driving off road, primitive camping, coldwater fishing, backpacking, and small game hunting. Western metro residents participate at a notably lower rate only in canoeing. Relative to eastern metro areas, western metro residents participate at notably higher rates in day hiking, developed camping, driving motor vehicles off road, primitive camping, coldwater fishing, backpacking, and small game hunting. For all other activities, participation rates compared between western and eastern metro residents are similar. Following are the

top ten activities by overall participation rate for the U.S. with the western metro area or areas having the highest participation rates identified:

- Picnicking   Denver and Seattle
- Viewing wildlife   Denver and Minneapolis
- Swimming   Minneapolis
- Day Hiking   San Francisco and Seattle
- Visiting a wilderness   Denver and Seattle
- Bird watching   Minneapolis
- Developed camping   Seattle
- Warmwater fishing   Dallas- Ft. Worth and Minneapolis
- Mountain biking   Denver and Minneapolis
- Driving off road   Denver and Phoenix

Participation ratios for nature-based outdoor tourism activities by major Western metropolitan area and U.S. population overall, 2000-2004.

Activity	Dallas- Ft. Worth	Denver	Houston	Los Angeles	Minne- apolis	Phoenix	San Fran- cisco	Seattle	Western Metro Areas	Ratio West to East	U.S. Total
Picnicking	0.85 (46)	1.20 (64)	0.91 (49)	0.94 (50)	1.13 (61)	0.91 (49)	1.07 (57)	1.23 (66)	53.7	1.01	54.2
View/ photograph other wildlife	0.99 (40)	1.30 (53)	0.93 (38)	0.80 (33)	1.38 (56)	1.00 (41)	1.05 (43)	1.23 (50)	40.9	1.01	45.2
Swimming in lakes, streams, etc.	0.84 (33)	0.95 (38)	1.00 (40)	0.97 (38)	1.30 (51)	0.95 (38)	1.01 (40)	1.13 (45)	39.4	0.93	42.3
Day hiking	0.58 (24)	1.10 (46)	0.62 (26)	1.04 (43)	0.95 (39)	1.05 (44)	1.25 (52)	1.21 (50)	41.5	1.41	32.6
Visit a wilderness or primitive area	0.71 (24)	1.25 (43)	0.76 (26)	0.89 (31)	1.16 (40)	1.19 (41)	1.10 (38)	1.39 (48)	34.4	1.06	32.6
View/ photograph birds	0.95 (28)	0.91 (26)	0.87 (25)	0.89 (26)	1.47 (43)	0.99 (29)	1.09 (32)	1.17 (34)	29.1	0.91	32.5
Developed camping	0.82 (24)	1.20 (35)	0.64 (19)	0.90 (26)	1.13 (33)	0.88 (25)	1.18 (34)	1.47 (43)	29.0	1.39	26.7
Warmwater fishing	1.68 (25)	1.22 (18)	1.25 (18)	0.60 (9)	2.60 (38)	1.23 (18)	0.58 (9)	0.71 (10)	14.6	0.93	22.4

Activity	Dallas-Ft. Worth	Denver	Houston	Los Angeles	Minne-apolis	Phoenix	San Fran-cisco	Seattle	Western Metro Areas	Ratio West to East	U.S. Total
Mountain biking	0.77 (18)	1.33 (30)	0.90 (21)	0.89 (20)	1.44 (33)	0.79 (18)	1.08 (25)	1.26 (29)	22.8	1.06	20.9
Drive off-road	0.99 (17)	1.43 (25)	0.82 (14)	0.87 (15)	1.16 (20)	1.40 (25)	0.94 (16)	1.06 (19)	17.5	1.35	18.6
Primitive camping	0.99 (16)	1.60 (26)	0.70 (11)	0.70 (11)	1.11 (18)	1.31 (21)	0.96 (15)	1.76 (28)	15.9	1.57	16.1
Coldwater fishing	0.55 (7)	2.39 (31)	0.55 (7)	0.89 (12)	0.89 (12)	1.19 (16)	0.86 (11)	1.55 (20)	13.0	1.37	13.4
Backpacking	0.56 (7)	1.41 (19)	0.44 (6)	0.89 (12)	0.86 (11)	1.15 (15)	1.26 (17)	1.72 (23)	13.3	1.37	10.5
Rafting	0.79 (7)	1.36 (12)	1.08 (9)	0.66 (6)	1.42 (12)	1.41 (12)	1.08 (9)	1.55 (13)	8.6	0.96	10.0
Canoeing	1.09 (7)	0.65 (4)	0.95 (6)	0.50 (3)	3.33 (22)	0.55 (4)	1.02 (7)	1.70 (11)	6.6	0.61	9.7
Big game hunting	1.53 (6)	1.48 (6)	2.10 (8)	0.25 (1)	2.33 (9)	1.65 (7)	0.40 (2)	1.43 (6)	4.0	1.25	8.4
Downhill skiing	0.64 (7)	2.09 (21)	0.39 (4)	0.74 (8)	1.48 (15)	0.72 (7)	1.42 (14)	1.42 (14)	10.1	0.94	8.4
Horseback riding on trails	1.03 (8)	1.33 (10)	1.09 (8)	0.89 (7)	1.21 (9)	1.05 (8)	0.93 (7)	0.92 (7)	7.6	1.23	7.7
Small game hunting	1.41 (6)	1.15 (5)	1.76 (7)	0.46 (2)	2.24 (9)	2.02 (8)	0.39 (2)	1.05 (4)	4.1	1.46	7.1
Cross country skiing	0.67 (2)	1.75 (6)	0.11 (0)	0.39 (1)	4.31 (16)	0.28 (1)	1.14 (4)	1.86 (7)	3.6	0.9	3.7

Source: NSRE 2000-2004, Versions 1-16 (except 12).
Note: Top numbers show ratio of metropolitan area participation rate to combined participation rate of all 8 metropolitan areas, with percent of people age 16 and older participating (in parentheses). Percent participating for each metro area was rounded to the nearest whole number.

This Recreation Statistics Update Report is based on recent data that updates the estimated participation statistics reported in *Outdoor Recreation for 21st Century America*, published by Venture Publishing, College Station, PA. Copies of *Outdoor Recreation for 21st Century America* may be obtained from Venture Publishing at their website (http://www.venturepublish.com) or telephone at 1-814-234-4561. This update is based on research information generated for the Forest Service's 2005 Forest and Rangeland Renewable Resources Assessment Update Report. To see more of our research, please visit our website (http://www.srs.fs.fed.us/trends).

Great Trinity Forest Management Plan

RECREATION

Trail Construction and Maintenance Notebook (2007 Edition)

USDA

United States
Department of
Agriculture

Forest Service

Technology &
Development
Program

In Cooperation with

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Trail Construction and Maintenance Notebook

2007 Edition

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Trail Construction and Maintenance Notebook

2007 Edition

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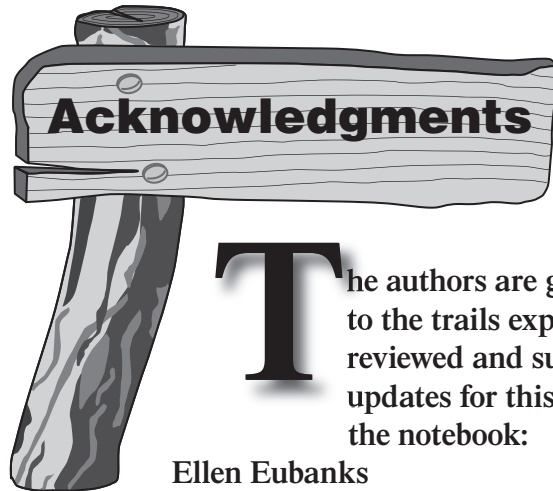
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Introduction

Why write another trail construction and maintenance guide? Good question. Since publication of the first edition of the "Trail Construction and Maintenance Notebook" in 1996, several excellent books about trail construction and maintenance have been published by the International Mountain Bicycling Association (IMBA), the Student Conservation Association (SCA), and the Appalachian Mountain Club, among others. At the same time, this notebook has remained popular, especially because of its pocket size and its wide availability through a partnership between the Forest Service, U.S. Department of Agriculture, and the Federal Highway Administration's Recreational Trails Program.

Based on helpful critiques of our earlier edition, we made numerous changes to reflect the latest thinking about constructing and maintaining trails. Much remains from the original edition.

True to our original intent, the Missoula Technology and Development Center (MTDC) has again pulled together basic trail construction and maintenance information, presented it in an easy-to-understand fashion, and oriented it to the needs of the trail worker. To keep the notebook's size manageable, we did not cover tasks such as detailed planning, environmental analysis, or inventory and monitoring. We've tried to make sure the notebook is consistent with current Forest Service policies and direction, but it is a practical guide for trail work, not a policy document. We worked to keep the notebook small and readable so it would end up in the packs of trail crew workers instead of under a table leg.

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We have included many great references with more detailed information. Many of the Forest Service handbooks and manuals are now available to the general public on the Internet at: *http://www.fs.fed. us/im/directives/.*

Official direction for the USDA Forest Service can be found in:
- Trails Management Handbook (FSH 2309.18)
- Forest Service Standard Specifications for Construction and Maintenance of Trails (EM-7720-103)
- Sign and Poster Guidelines for the Forest Service (EM-7100-15).
- Forest Service Health and Safety Code Handbook (FSH 6709.11)
- Bridges and Structures (FSM 7722 and FSM 7736)

National trail information can be found at: *http://www.fs.fed.us/r3/ measures/TR.htm.*
Of special interest are:
- Trail assessment and condition surveys (TRACS). TRACS is the nationally recommended system for conducting field inventory and condition surveys.

On the TRACS page you will find:
- Trail management objectives (TMOs). These objectives are used to establish the trail standard before the condition survey is conducted.
- TRACS data dictionary. This dictionary standardizes terminology for trail features.
- Trail Fundamentals.

On the Trail Fundamentals page you will find:
- Trail class matrix. This matrix provides definitions for the five national trail classes applicable to all National Forest System trails.

New references include "Trail Solutions: IMBA's Guide to Building Sweet Singletrack" (International Mountain Bicycling Association 2004) and a companion DVD, "Building Mountain Bike Trails: Sustainable Singletrack" (Davies and Outka-Perkins 2006), which show how to plan, design, and build fun, sustainable trails. "Natural Surface Trails by Design" (Parker 2004) explores the art of trail design and

layout. Other new references include a comprehensive book on restoration, "Wilderness and Backcountry Site Restoration Guide" (Therrell and others 2006) as well as the "Accessibility Guidebook for Outdoor Recreation and Trails" (Zeller and others 2006).

There are many regional differences in trail building and maintenance techniques, tools, and terminology. The TRACS data dictionary is an attempt to standardize trail terminology. We hope you aren't offended if your favorite technique has been left out or called a funny name.

Little about trail work is "new." Our culture, though, has forgotten a lot about trails. When we attempt our first trail project, most of us know very little about water and dirt.

Do it Your Way
You might not do things the way they are described in this notebook—that's cool! Understanding why things are done a certain way is at least as important as doing them a certain way. If you know why something is happening, you'll figure out a way to solve the problem. Soak up the core concepts. Experiment and keep track of the results. Be curious. Add new techniques and tactics to your bag of tricks. Get dirty and *HAVE FUN*!

Metrication

Metrication lives! Standard International (SI) units of measurement (metric) are used throughout the text, followed by roughly equivalent English measurements in parentheses. A handy conversion chart on the inside back cover can help the metrically challenged make conversions.

One other word on measurements. Most crews don't haul measuring tapes around to measure things. A really handy way of keeping track of commonly used measures is to mark them on tool handles. For example, if the typical tread for your project is supposed to be 600 millimeters (24 inches), mark 600 millimeters on your tool handle.

3

The Job of the Trail Crew

The most important thing in trail work is your personal well-being and safety. Are you fit? Do you know your limitations? Do you have the skills you need?

Your personal gear, clothing, and safety equipment are important. Let's start with your feet. Trail work can take you into rough country. Cut-resistant or leather nonskid boots, at least 200 millimeters (8 inches) high, offer the best support and ankle protection. They are required by the Forest Service if you are using cutting, chopping, or digging tools. Steel-toed boots are a good choice when working with rock. Ankle-high hiking boots are okay for some trail work. Sneakers or tennis shoes do not give enough support and protection. Be aware of regional differences. In southeastern Alaska, for example, rubber boots are the norm for most trail work.

Pants give more protection than shorts from cuts and scrapes, insects, and sunburn. Long-sleeved shirts are best for the same reasons. Bring your foul-weather gear. You won't forget work gloves more than once. Drinking water, lip moisturizer, sunscreen, sunglasses, insect repellent, and personal medications round out the list of personal items for your pack.

Hardhats are an agency requirement for many types of trail work, especially when swinging tools, working under the canopy of trees, or when there is any chance of being hit on the head. Other safety gear includes eye protection for any type of cutting or rock work, hearing protection near power equipment (85 dB or louder), and dust masks for some types of rock work and in extremely dusty conditions. Don't start the job unless you are properly equipped. Take a look at the Forest Service Health and Safety Code Handbook (FSH 6709.11) for some good information that could save your life.

Your crew will need a first aid kit. At least one person needs to be certified to give first aid and perform CPR (cardiopulmonary resuscitation). The project leader and involved employees will prepare a job hazard analysis that includes:
• An itinerary (planned route of travel, destination, estimated time of departure/arrival)

- The names of the employees on the crew
- Specific work hazards and abatement actions
- An emergency evacuation plan

Hold safety briefings before work begins and whenever conditions change significantly.

Setting Priorities

Priorities depend on many factors. Are you laying out and designing a new trail? If you are, start with good planning and a sustainable design to minimize future maintenance.

Are you assessing an older trail that may not be in the most ideal place? How much maintenance is too much? When do you decide to reroute sections?
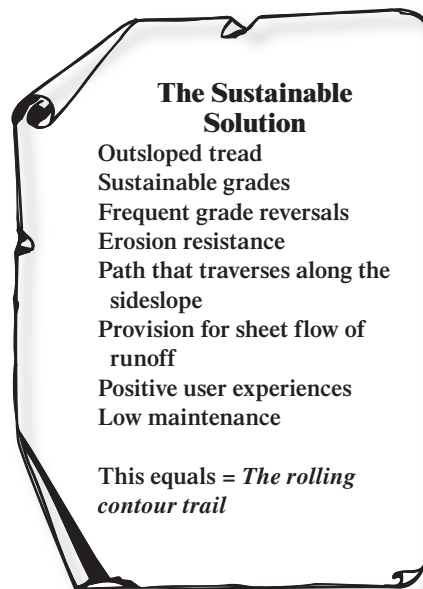
If you're designing a new trail, make sure it will be sustainable (figure 1). What does that mean? Sustainability means creating and maintaining trails that are going to be here for a long time. Trails with tread that won't be eroded away by water and use. Trails that won't affect water quality or the natural ecosystem. Trails that meet the needs of the intended users and provide a positive user experience. Trails that do no harm to the natural environment.

The Sustainable Solution

Outsloped tread
Sustainable grades
Frequent grade reversals
Erosion resistance
Path that traverses along the sideslope
Provision for sheet flow of runoff
Positive user experiences
Low maintenance

This equals = *The rolling contour trail*

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Figure 1—A rolling contour trail resists erosion.

You need teachers and experience to learn how to lay out and design sustainable trails. Learn from the best. Shop around, talk to other trail builders, check out their work. Attend trail building sessions in your area or have a group of experienced trail builders, such as an IMBA Trail Care Crew (*http://www.imba.com/tcc/*) visit your area. Learn, learn, learn. You want people to come off your trail saying, "Wow— that was great! Let's do it again."

The trail crew's task is to keep water off the tread and keep the users on it. The best trail maintainers are those with ***trail eye***, the ability to anticipate physical and social threats to trail integrity and to head off problems.

Because there will always be more work to do than people or time to do it, how do you decide what to do? It's important to:
- Monitor trail conditions closely.
- Decide what can be accomplished as basic maintenance.

- Determine what can be deferred.
- Identify the areas that will need major work.

Trail triage will help you spend your maintenance dollars wisely.

Trail Triage

1. Correct truly unsafe situations. As examples, repair impassable washouts along a cliff and remove blowdown from a steep section of a trail used by packstock.
2. Correct problems that are causing significant trail damage, such as erosion.
3. Restore the trail to the planned design standard. The ease of finding and traveling the trail should match the design specifications for the recreational setting and target users. Actions can range from simply adding reassurance markers along a trail to a full-blown reroute of poorly designed sections of eroded trail.

Whatever the priority, maintain the trail when the need is first noticed to prevent more severe and costly damage later.

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8

Trail Planning

A good trail may appear to have "just happened," but that appearance belies an incredible amount of work in scouting, design, layout, construction, and maintenance. Although this guide focuses on actual dirt work, we want you to understand that solid planning is essential. Keep this in mind when designing, constructing, and maintaining trails (figure 2).

Recreation trails are for all people. They allow us to go back to our roots. Trails help humans make sense of a world increas-

Figure 2—Design and construct your trail to fit the land.

ingly dominated by automobiles and pavement. They put us in touch with our natural surroundings, soothe our psyches, challenge our bodies, and allow us to practice traditional skills.

Human psychology also plays a role. A useful trail must be easy to find, easy to travel, and convenient to use. Trails exist simply because they are an easier way of getting someplace. Many trails, such as wilderness trails, motorcycle routes, or climbing routes, are deliberately challenging with a relatively high degree of risk. Rest assured, however, that if your official trail isn't the *path of least resistance*, users will create their own trail. Your trail must be more obvious, easier to travel, and more convenient than the alternatives or you're wasting your time and money.

Accessible Trails

The Forest Service Trail Accessibility Guidelines (FSTAG), which became official agency policy in May 2006, recognize and protect the environment and the natural setting while integrating accessibility where possible. These guidelines are available at *http://www.fs.fed. us/recreation/programs/accessibility.*

Forest Service trail designers must approach the design of hiker or pedestrian trail projects that connect to an accessible trail or trailhead with the intent of developing trails that are accessible to all users, including those with disabilities. Four "conditions for departure" waive the accessibility requirements for most existing primitive, long-distance trails, and new trails built on very steep terrain. The guidelines apply only on National Forest System lands.

To help trail designers integrate the requirements of the Trail Accessibility Guidelines into planning, design, construction, and maintenance of trails, the Forest Service developed the "Accessibility Guidebook for Outdoor Recreation and Trails." The guidebook provides detailed information about accessibility requirements in an

Best Friends

The three best friends of a trail worker are:
- A good baseline inventory of the trail
- A current condition survey
- Problem area reports

Hang out with these friends... get a clue.
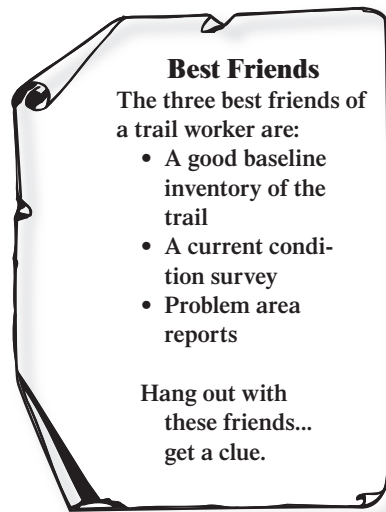
easy-to-use format with photos, illustrations, design tips, hotlinks, and sidebars. The guidebook is available at *http://www.fs.fed.us/recreation/programs/accessibility.*

Avoiding Trail Disasters

If you've ever encountered a trail disaster, chances are that it resulted from short-circuited planning. Acts of God aside, some of the worst trail problems result from not doing the hard work of thinking before putting on the gloves and hardhat. Some glaring examples are:

- Building out-of-rhythm sections (abrupt turns). Why did this happen? The trail's rhythm and flow weren't checked before cutting it in.
- Water funneling down and eroding the tread. Why did this happen? The trail grade was designed too steep.
- Multiple trails. Why did this happen? The trail wasn't laid out in the best place to begin with.

Planning is stupidity avoidance. Do good planning for all levels of trail work.

Good planning also includes monitoring the trail's condition. It's hard to do good planning until you have some idea of the current situation and trend.

Our focus in this notebook is field work, but other important work goes into trail planning. Requirements for trail planning vary, but they usually include consulting soil scientists, bridge and geotechnical engi-

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neers, fisheries and wildlife biologists, recreation planners, landscape architects, and persons skilled in documenting environmental and permitting requirements.

Planning the Route on the Map

Be certain you know the trail management objectives (TMOs) for your trail—things like the intended users, desired difficulty level, and desired experience. TMOs provide basic information for trail planning, management, and reporting.

Use topographic maps and aerial photos to map the potential route. On the map, identify control points—places where the trail has to go, because of:
- Destination
- Trailheads
- Water crossings
- Rock outcrops

Include *positive control points*—features such as a scenic overlook, a waterfall, or lakes.
Avoid *negative control points*—areas that have noxious weeds, threatened and endangered species, critical wildlife habitat, or poor soils.

The 10-Percent Guideline

When plotting the trail on a map, connect the control points, following contour lines. Keep the grade of each uphill and downhill section less than 10 percent. Plotting your trail with 10-percent grades on a topographic map will help keep the route at a sustainable grade. When you get into the field to start scouting the route, you'll have better flexibility to tweak the grades.

Percent Grade

- Grade can be expressed as a percent or an angle. Percent is easier to understand.
- *Percent* grade equals the *rise* (elevation change) divided by the *run* (horizontal distance) multiplied by 100.
- Example: $\dfrac{\text{rise of 10 feet}}{\text{run of 100 feet}}$ x 100 = 10 percent
- Elevation change, up or down, is always a positive number.

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Trail Design

There is a real art to trail layout. Some basics can be taught, but the person locating the trail must develop an eye for laying a trail out on the ground. This skill can only be developed with experience.

You will want to look over the Forest Service Trails Management Handbook (FSH 2309.18), Parker's "Natural Surface Trails by Design" (2004), IMBA's "Trail Solutions" (2004), and MTDC's "Building Mountain Bike Trails: Sustainable Singletrack" DVD (Davies and Outka-Perkins 2006). These references have a lot of good information to help you do a good job of trail layout.

Scouting the Route in the Field

Tools to scout the route include: clinometer, compass, altimeter, GPS receiver, flagging of different colors, wire pin flags, roll-up pocket surveyor's pole, permanent marker to write notes on the flagging, field book, probe to check soil depth to bedrock, and maps. The objectives of scouting or reconnaissance are to:

- Verify control points and identify additional control points that you did not spot when you were studying the maps and aerial photos.
- Verify that the mapped route is feasible.
- Find the best alignment that fits all objectives.

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- Identify additional positive control points to enhance the user's experience.
- Validate that the route is reasonable to construct and maintain.

Hints for Locators

- Don't trust an eyeball guess for grade; use your clinometer (**clino**).
- Large trees often have natural benches on their uphill side. It's better to locate your trail there than on the downhill side where you'll sever root systems and generally undermine the tree. Your specifications will tell you how close the trail can be to the tree.
- Look for natural platforms for climbing turns or switchbacks. They save construction costs and better fit the trail to the land.
- Cross ravines at an angle rather than going straight up and down the ravine banks.
- Flag locations for grade reversals.
- Look for indications of shallow bedrock, such as patches of sparse vegetation.
- Flag the centerline location, particularly in difficult terrain.
- Look for small draws to locate grade reversals. The trail should climb gently for a few feet on each side of the draw.
- Avoid laying a trail out on flat terrain because water has no place to drain.

Field scouting requires sound knowledge of map and compass and of finding your way on the ground. Begin with the theoretical route, then try different routes until you find the best continuous route between control points. *Walk, walk, walk*. Keep field notes of potential routes.

It may be useful to hang reference flags at potential control points or features so they are easier to relocate later.

Reconnaissance is easiest with two people. You and your partner need to use a clinometer to determine sustainable grades.

The Half Rule

Building sustainable trail grades helps keep maintenance at bay. So what makes a grade sustainable? This design element comes from IMBA's "Trail Solutions" book (2004). It's called the *half rule*.

The half rule says that the trail grade should be no more than half the sideslope grade (figure 3). This rule really helps when putting trails on gentle sideslopes. For example, if you're working on a hill with a
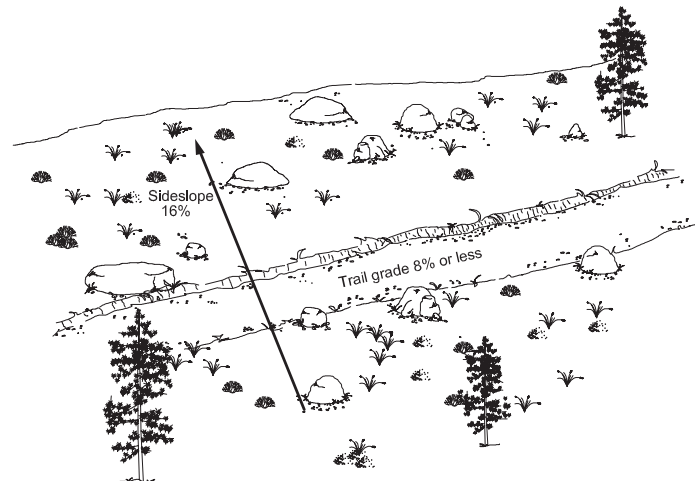
Figure 3—The trail grade shouldn't be more than half the grade of the sideslope. This is the half rule.

6-percent sideslope, your trail grade should be no more than 3 percent. If the trail is any steeper, it will be a fall-line trail.

Fall-line trails let water funnel down, causing erosion and ruts. As sideslopes get steeper, trails designed using the half rule can be too steep. Use your judgment and knowledge of the particular area.

Trail Specifications

Specifications are important too. You'll want to refer to the Forest Service Trails Management Handbook (FSH 2309.18) for guidelines on building almost any type of trail.

All trails are not created equal. Ideally, each trail is designed, constructed, and maintained to meet certain specifications. These specifications are based on the recreational activities the trail is intended to provide, the amount of use, and the physical characteristics of the land. Ecological and esthetic considerations are also important.

For example, a narrow winding trail might be the right choice for foot traffic in the backcountry (figure 4), while a wider trail tread with broad sweeping turns would be appropriate for an ATV (all-terrain vehicle) route. A smooth trail with gentle grades (figure 5) is more appropriate for an interpretive trail or a trail designed for persons with disabilities. Challenging trails that include rocky boulder fields and some jumps might be designed for mountain bikes and motorcycles.

The steepness of the hillside determines how difficult a trail is to build. The steeper the hillside, the more excavation will be needed to cut in a stable backslope. Trail grade also has a direct bearing on how much design, construction, and maintenance work will be needed to establish solid tread and keep it solid. Grades range from 1 percent for wheelchair access to 50 percent or greater for scramble routes. Most high-use trails should be constructed with an average trail grade in the

5- to 10-percent range. Trails of greater difficulty can be built at grades approaching 15 percent if solid rock is available. Trails steeper than 20 percent become difficult to maintain in the original location without resorting to steps or hardened surfaces.

Figure 4—A narrow, winding trail might be the right choice for foot traffic in the backcountry.

Figure 5—Two friends enjoy an accessible trail that allows them to hike through the rain forest.

Flagging

Use *flagging tape* to mark the trail opening or corridor. Use colors that stand out from the vegetation. Fluorescent pink should work in most areas.

You will need to use the clino to keep the trail's grade within the limits of the half rule.

Using the Clino: Zeroing Out
- You and your partner stand on flat ground facing each other.
- Look through the clino and line up the horizontal line on zero.
- Open your other eye and see where the horizontal line intersects a spot on your partner.
- Use this spot on your partner for reading grades with the clino.
- Always read the scale on the right—this is the percent scale.

Two or More Persons Flagging—Stand on the centerline point, direct your partner ahead to the desired location, then take a reading with your clino. When the desired location is determined, the front person ties a piece of flagging on vegetation with the knot facing the intended trail, then moves ahead. The person with the clino moves up to the flagging and directs the next shot. A third person can be scouting ahead for obstacles or good locations.

One-Person Flagging—Stand at a point that is to be the centerline and tie flagging at eye level. Then move about 3 to 6 meters (10 to 20 feet) to the next centerline point and sight back to the last flag. When you have the desired location, tie another piece of flagging at eye level.

Flagging the Route—Flagging marks your intended trail layout on the ground. While flagging the route, you will discover impassable terrain, additional control points, and obstacles that weren't evident on the map. Use different colors of flagging for the other possible routes as you lay in the trail options. Always use a clino to measure sustainable grades.

Go Flashing
If you're working in heavy brush and you can't see your partner through the clino, have your partner wiggle a bright flashlight.

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Start by tying flagging to the branches of trees at eye level and about every 3 meters (10 feet). Don't forget to tie the knot so that it faces the intended trail location. This way, if another crew continues the work, they will know your intentions.

Don't scrimp. Flagging is cheap compared with the time spent locating the route. Animals carry off flagging, and wind blows it down. Flagging that is close together helps trail designers and builders visualize the flow of the trail.

If you are working in an open area without trees or shrubs, use pin flags instead of flagging.

Marking the Final Alignment—Pin flags mark the exact location of the trail tread (figure 6). ***Pin flags*** can be placed on the trail's center-line or on its uphill or downhill side. Just make sure the crew knows where the trail will be relative to the pin flags. Place pin flags every 3 meters (10 feet) or so. More is better.

Figure 6—Pin flags mark the exact location of the trail tread and give you a good feel for the flow of the trail.

> **Smart Idea**
>
> **Always use a clino to measure grades.**
>
> **Tie the knot of the flagging so it faces the intended trail.**
>
> **Line your intended trail with pin flags. Use plenty of these flags—they will help you visualize the trail flow.**
>
> **Run or walk this route. Make final adjustments to get the trail's flow just right before cutting any vegetation.**
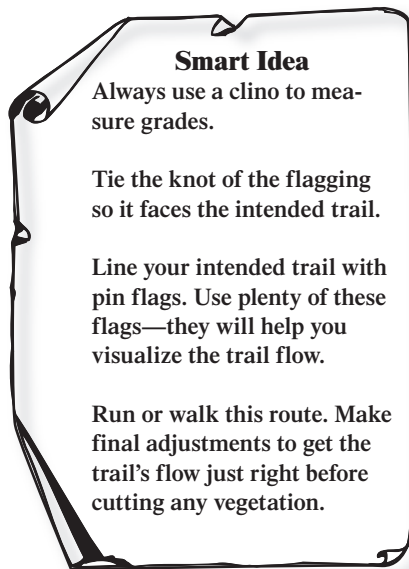
Now, run or walk the trail. This gives you a good feel for the flow of the trail. Make adjustments and move the flags if a turn feels too sharp or a section has too much straightaway. When your trail alignment feels really good and you're satisfied with the locations of the pin flags, have the land manager check your design. You'll need to have the manager's approval before cutting any vegetation or removing any dirt.

Light on the Land

No discussion of trails is complete without attention to esthetics. We're talking scenic beauty here. Pleasing to the eye.

The task is simple. An esthetically functional trail is one that fits the setting. It lies lightly on the land and often looks like it just "happened."

Well-designed trails take advantage of natural drainage features, reducing maintenance that might be needed, while meeting the needs of the users. The trail might pitch around trees and rocks, follow natural benches, and otherwise take advantage of natural land features (figure 7).

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Figure 7—Well-designed trails take advantage of natural land features.

The best trails show little evidence of the work that goes into them. A little extra effort spent limbing properly, scattering cut vegetation widely, blending backslopes, avoiding drill hole scars, raking leaves back over the scattered dirt, and restoring borrow sites pays off in a more natural-looking trail. Be a master. Do artful trail work.

Natural Forces at Work
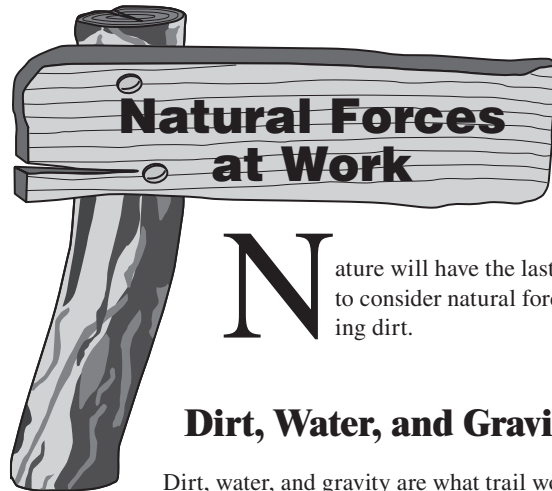
N ature will have the last word. It's best to consider natural forces before moving dirt.

Dirt, Water, and Gravity

Dirt, water, and gravity are what trail work is all about. *Dirt* is your trail's support. Terra firma makes getting from point A to point B possible. The whole point of trail work is to get dirt where you want it and to keep it there. *Water* is the most powerful stuff in your world. *Gravity* is water's partner in crime. Their mission is to take your precious dirt to the ocean. The whole point of trail work is to keep your trail out of water's grip (figure 8).

Figure 8—Water and gravity join forces to erode trail tread.

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It's much more important to understand how the forces of water and gravity combine to move dirt than it is to actually dig dirt. If you put in many years building trails, you will see hundreds of examples of trails built with little understanding of the forces at hand. You will save time, money, and your sanity if you get grounded in the basic physics.

Water in the ***erode mode*** strips tread surface, undercuts support structures, and blasts apart fill on its way downhill. The amount of damage depends on the amount of water involved and how fast it is moving.

Water has ***carrying capacity***. More water can carry more dirt. Faster water can carry even more dirt. You need to keep water from running down the trail! When and where you can do that determines the sort of water control or drainage structure you use.

Water also can affect soil strength. While the general rule of thumb is that drier soils are stronger (more cohesive) than saturated soils, fine, dry soils may blow away. The best trail workers can identify basic soils in their area and know their wet, dry, and wear properties. They also know plant indicators that tell them about the underlying soil and drainage.

Signs of Success

You have mastered dirt, water, and gravity when you can:
- Keep surface water from running down the trail.
- Keep tread material on the trail and keep it well drained.

Critter Effects

Gravity has a partner—the critter. Critters include packstock, pocket gophers, humans, bears, elk, deer, cows, and sheep. Critters burrow through the tread, walk around the designated (but inconvenient) tread,

tightrope walk the downhill edge of the tread, shortcut the tread, roll rocks on the tread, chew up the tread, or uproot the tread.

Gravity waits in glee for critters to loosen up more soil. If you recognize potential critter effects (especially from humans, deer, elk, domestic livestock, and packstock), you can beat the system for awhile and hang onto that dirt:
- Don't build switchbacks across a ridge or other major "game route."
- Don't let tread obstacles like bogs or deeply trenched tread develop.
- Make it inconvenient for packstock to walk the outer edge of your tread.

Your trail strategies are only as good as your understanding of the critter's mind.

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Surface Water Control
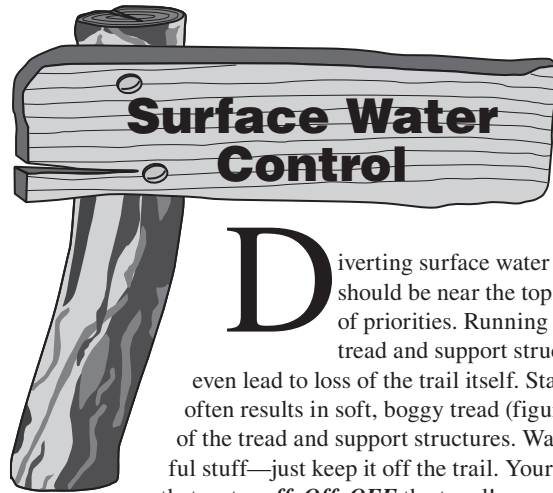
Diverting surface water off the trail should be near the top of your list of priorities. Running water erodes tread and support structures, and can even lead to loss of the trail itself. Standing water often results in soft, boggy tread (figure 9) or failure of the tread and support structures. Water is wonderful stuff—just keep it off the trail. Your job is to keep that water *off, Off, OFF* the tread!

Figure 9—Standing water results in soft, boggy tread.

The very best drainage designs are those built into new construction. These include frequent grade reversals and outsloping the entire tread. The classic mark of good drainage is that it's self maintaining, requiring minimal care.

Sheet Flow

When rain falls on hillsides, after the plants have all gotten a drink, the water continues to flow down the hill in dispersed sheets—called *sheet flow* (figure 10). All the design elements for a rolling contour trail—building the trail into the sideslope, maintaining sustainable grades, adding frequent grade reversals, and outsloped tread—let water continue to sheet across the trail where it will do little damage.

Rain collects on hill and flows down in dispersed sheets, called sheet flow

Water runs across trail that has a sustainable grade and outsloped tread
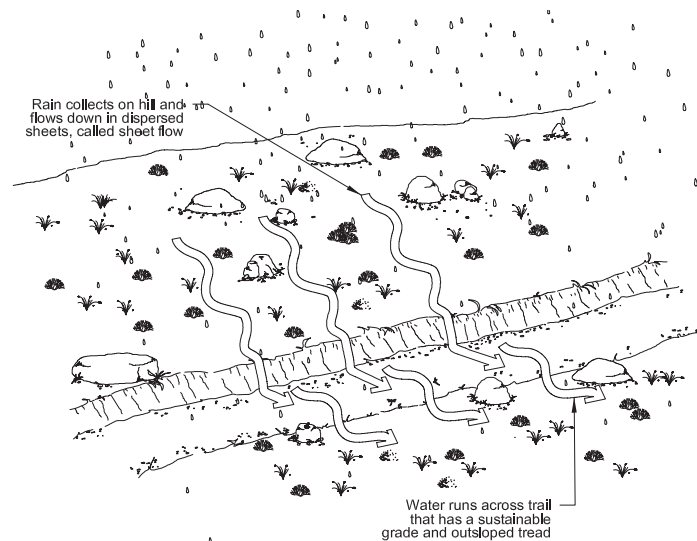
Figure 10—Design elements for a rolling contour trail let water sheet across the trail. Sheet flow prevents water from being channeled down the trail, where it could cause erosion.

Grade Reversals

Sometimes, grade reversals are called grade dips, terrain dips, Coweeta dips, or swales. For less confusion, let's call them ***grade reversals***. The basic idea is to use a reversal in grade to keep water moving across the trail. Grade reversals are designed and built into ***new trails***.

A trail with grade reversals and outsloped tread encourages water to continue sheeting across the trail—not down it. The beauty of grade reversals is that they are the most unobtrusive of all drainage features if they are constructed with smooth grade transitions. Grade reversals require very little maintenance.

Grade reversals take advantage of natural dips in the terrain (figure 11). The grade of the trail is reversed for about 3 to 5 meters (10 to 15 feet), then "rolled" back over to resume the descent. Grade reversals should be placed frequently, about every 20 to 50 feet. A trail that lies lightly on the land will take advantage of natural dips and draws for grade reversals. The trail user's experience is enhanced by providing an up-and-down motion as the trail curves up and around large trees (figure 12) or winds around boulders.

Figure 11—Grade reversals are much more effective than waterbars and require less maintenance. Grade reversals with outsloped tread are the drainage structure of choice.

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Figure 12—Enhance the user's experience and create a grade reversal by curving the trail around large trees and rocks.

Draining Water Off Existing Trails

Water will always find the path of least resistance—most likely your trail! Gullies form as water eats away the tread material on steep trails. Puddles sit in low-lying areas that leave the water nowhere to go. When water starts destroying your trail, trail users start skirting around the damage. The trail becomes wider or multiple new trails are formed.

Getting water off the trail takes more than digging a drainage ditch. Find out where the water is coming from, then find a way to move it off the trail.

When a crew takes a swipe at the berm with a shovel or kicks a hole through it—that's useless drainage control. These small openings are

rapidly plugged by floating debris or the mud-mooshing effect of passing traffic. The erosion lives on.

Knicks

Puddles that form in flat areas on existing trails may cause several kinds of tread damage. Traffic going around puddles widens the trail (and eventually the puddle). Standing water usually weakens the tread and the backslopes. Water can cause a bog to develop if the soils are right. Traffic on the soft lower edge of a puddle can lead to **step-throughs**, where users step through the edge of the trail, breaking it down. Step-throughs are one of the causes of tread creep.

The **knick** is an effective outsloped drain. Knicks are constructed into **existing trails** (figure 13). For a knick to be effective, the trail tread must have lower ground next to it so the water has a place to drain. A
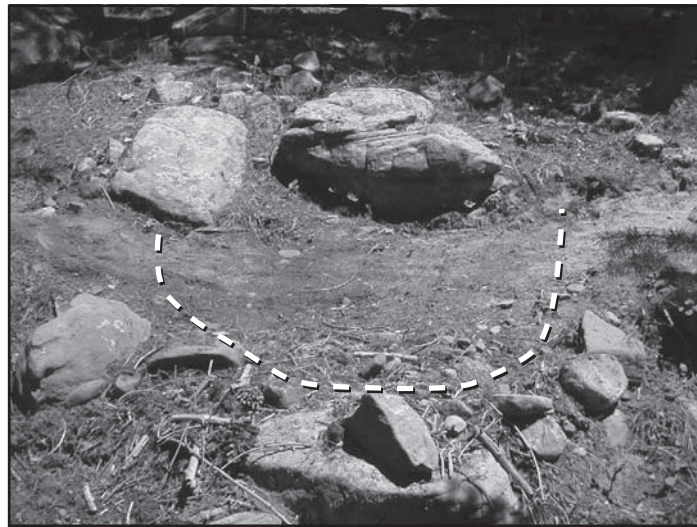
Figure 13—Knicks constructed into existing trails will drain puddles from flat areas.

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knick is a shaved down semicircle about 3 meters (10 feet) long that is outsloped about 15 percent in the center (figure 14). Knicks are smooth and subtle and should be unnoticeable to users.
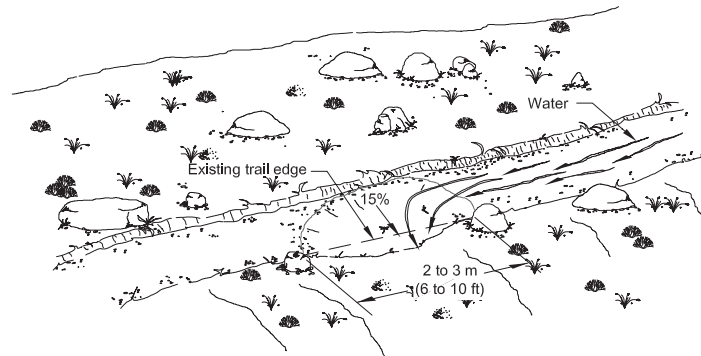
Figure 14—A knick is a semicircle cut into the tread, about 3 meters (10 feet) long and outsloped 15 percent in the center.

If terrain prevents such outsloping, the next best solution is to cut a *puddle drain* at least 600 millimeters (24 inches) wide, extending across the entire width of the tread. Dig the drain deep enough to ensure that the water will flow off the tread. Feather the edges of the drain into the tread so trail users don't trip. Plant rocks or other large stationary objects (guide structures) along the lower edge of the tread to keep traffic in the center. In a really long puddle, construct several drains at what appear to be the deepest spots.

Rolling Grade Dips

Another way to force water off *existing trails* is to use a *rolling grade dip*. A rolling grade dip is used on steeper sections of trail. It also works well to drain water off the lower edge of contour trails. A rolling grade dip builds on the knick design. A rolling grade dip is a knick with a long ramp about 4 ½ meters (15 feet) built on its downhill side (figure 15). For example, if a trail is descending at a 7-percent grade, a rolling grade dip includes:

- A short climb of 3 to 5 meters (10 to 20 feet) at 3 percent
- A return to the descent (figure 16).

Water running down the trail cannot climb over the short rise and will run off the outsloped tread at the bottom of the knick. The beauty of this structure is that there is nothing to rot or be dislodged. Maintenance is simple.

Figure 15—Rolling grade dips direct water off steeper sections on existing trails.
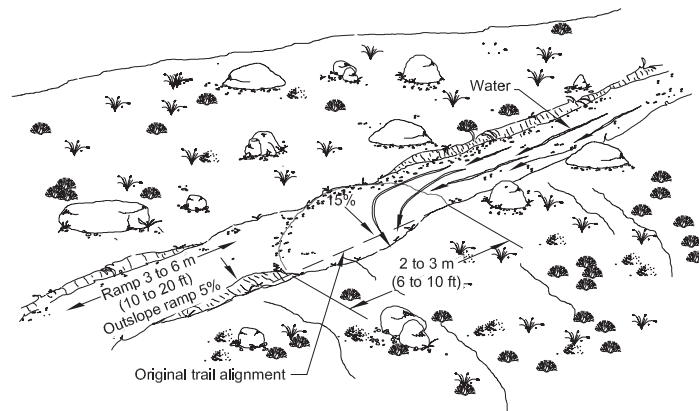
Figure 16—A rolling grade dip builds on the knick design. It helps direct water off steeper sections of existing trail.

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Rolling grade dips should be placed frequently enough to prevent water from building up enough volume and velocity to carry your tread's surface away. Rolling grade dips are pointless at the top of a grade. Midslope usually is the best location. The steeper the trail, the more rolling grade dips will be needed. Rolling grade dips should not be constructed where they might send sediment-laden water into live streams.

Waterbars

Waterbars are commonly used drainage structures. Make sure that waterbars are installed correctly and are in the right location. Water moving down the trail turns when it contacts the waterbar and, in theory, is directed off the lower edge of the trail (figure 17).
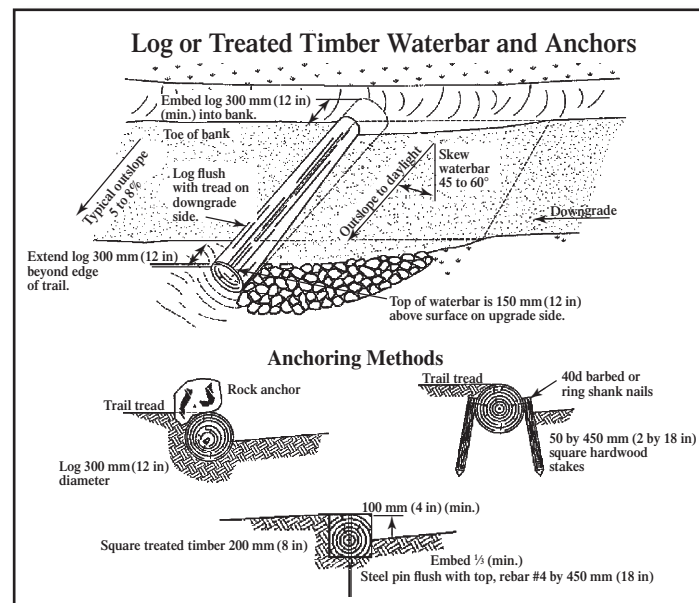
Figure 17—Logs used for waterbars need to be peeled (or treated with preservative), extended at least 300 millimeters (12 inches) into the bank, staked or anchored, and mostly buried.

Dips Are In, Bars Are Out

For existing trails with water problems, we encourage the use of rolling grade dips or knicks instead of waterbars. Here's why. By design, water hits the waterbar and is turned. The water slows down and sediment drops in the drain.

Waterbars commonly fail when sediment fills the drain. Water tops the waterbar and continues down the tread. The waterbar becomes useless. You can build a good rolling grade dip quicker than you can install a waterbar, and a rolling grade dip works better.

On grades of less than 5 percent, waterbars are less susceptible to clogging unless they serve a long reach of tread or are constructed in extremely erodible tread material. On steeper grades (15 to 20 percent), waterbars are prone to clogging if they are at less than a 45-degree angle to the trail. Waterbars are mostly useless for grades steeper than 20 percent. At these grades a very fine line exists between clogging the drain and eroding it (and the waterbar) away.

Most waterbars are not installed at the correct angle, are too short, and don't include a grade reversal. Poorly constructed and maintained waterbars become obstacles and disrupt the flow of the trail. The structure becomes a low hurdle for travelers, who walk around it, widening the trail.

A problem with wooden waterbars is that horses can kick them out. Rock, if available, is always more durable than wood (figure 18). Cyclists of all sorts hate waterbars because the exposed surface can be very slippery, leading to crashes when a wheel slides down the face of the waterbar. As the grade increases, the angle of the waterbar (and often the height of its face) is increased to prevent sedimentation, raising the crash-and-burn factor.

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Rock Waterbar

Rock extends 12 in minimum into bank

Skew waterbar 45 to 60°

Outslope 5%

Rock protrudes 4 in minimum above surface on the upgrade side.

Bury two-thirds of each rock
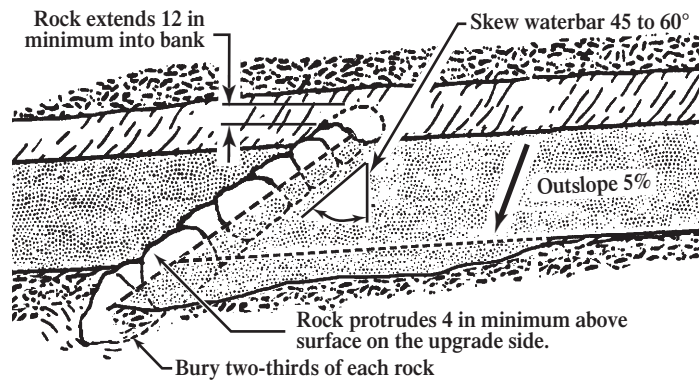
Figure 18—Waterbars need to be constructed at a 45- to 60-degree angle to the trail. Rock waterbars are more durable than wood.

Are waterbars ever useful? Sure. Wood or rock waterbars are useful on foot and stock trails where a tripping hazard is acceptable, especially at grades less than 5 percent. Also consider reinforced or armored grade dips where you don't have much soil to work with and in areas that experience occasional torrential downpours.

A variation from the traditional waterbar is the ***waterbar with riprap tray***. The riprap tray is built with rock placed in an excavated trench. The tops of the rocks are flush with the existing tread surface, so they're not an obstacle to traffic. Next, construct a rock waterbar. Use ***rectangular rocks***, chunkers, butted together, not overlapped. Start with your heaviest rock at the downhill side—that's your ***keystone***. Lay rocks in from there until you tie into the bank. Bury two-thirds of each rock at a 45- to 60-degree angle to the trail.

Add a retainer bar of rock angled in the opposite direction from the waterbar. The downhill edge of the retainer bar is at an angle so it nearly touches the downhill edge of the waterbar (figure 19). Fill the space between the waterbar and retainer with compacted tread material.

Reinforced Armored Grade Dip
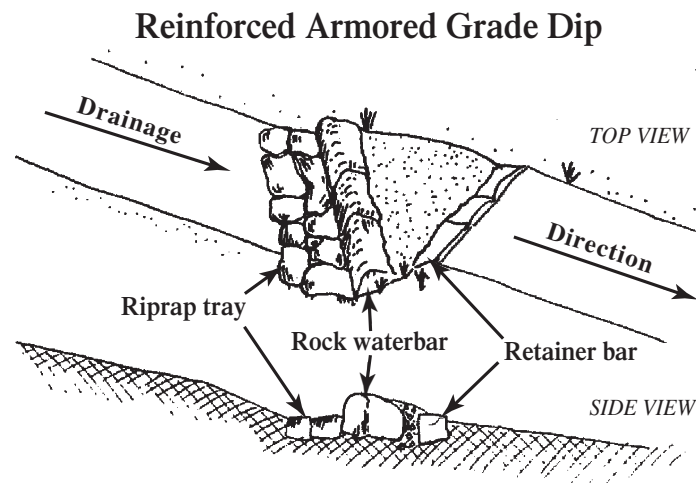
Figure 19—A waterbar with a riprap tray.

Maintaining the Drain

The number one enemy of simple drains is sediment, especially at waterbars. If the drain clogs, the water you are trying to get rid of either continues eroding its way down the tread, or just sits there in a puddle.

The best drains are self-cleaning; that is, the flow of water washes sediment out of the drain, keeping it clean. In the real world most drains collect debris and sediment that must be removed or the drain will stop working. Because it may be a long time between maintenance visits, the drain needs to handle annual high-volume runoff without failing (figure 20).

The best cure for a waterbar that forces the water to turn too abruptly is to rebuild the structure into a rolling or armored grade dip.

Downslope—direction
of waterflow

TRAIL

Waterbar
constructed
at 45° angle.
Reset loose or
missing rocks
and logs.

Thoroughly dig material
out of this area—at least two
shovel blades wide. Use for backing
below waterbar.

Reinforce
outlet area
if eroded.

TREAD
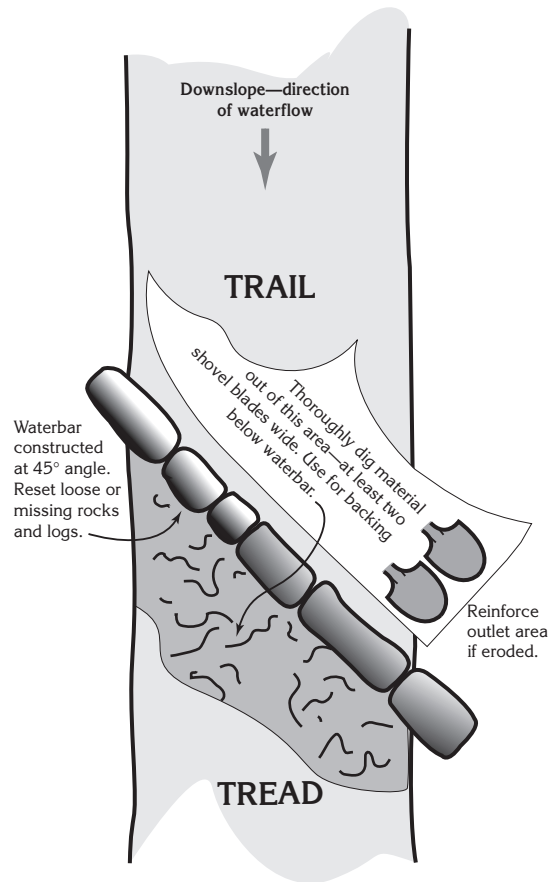
Figure 20—The key to waterbar maintenance is to ensure that sediment will not clog the drain before the next scheduled maintenance. Embed the rocks or logs a little deeper, cover them with soil, and you have a reinforced waterbar.

Walking in the Rain

A lot of learning takes place when you slosh over a wet trail in a downpour and watch what the water is doing and how your drains and structures are holding up. Figure out where the water is coming from and where it's going. Think about soil type, slope, distance of flow, and volume of water before deciding your course of action.

Relocating Problem Sections of Trail

If you've tried various drainage methods and water is still tearing up your trail, it's time to think seriously about rerouting the problem sections. Reroutes are short sections of newly constructed trail. This is your chance to incorporate all the good design features of a rolling contour trail that encourages water to sheet across the trail. Remember the good stuff:

- Locating the new section of trail on a sideslope
- Keeping the trail grade less than half of the grade of the hillside
- Building with a full bench cut to create a solid, durable tread
- Constructing plenty of grade reversals
- Outsloping the tread
- Compacting the entire trail tread

Make sure the new section that connects to the old trail has nice smooth transitions—no abrupt turns.

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Some short sections of eroded trails may not be major problems. If the trail surface is rocky—and water, use, and slopes are moderate—this section could eventually stabilize itself. A short section of eroded trail may cause less environmental damage than construction of a longer rerouted section. Weigh your options wisely.
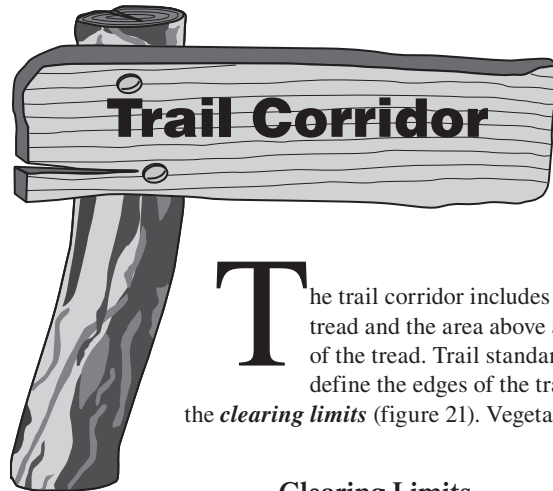
Trail Corridor

T he trail corridor includes the trail's tread and the area above and to the sides of the tread. Trail standards typically define the edges of the trail corridor as the *clearing limits* (figure 21). Vegetation is trimmed

Clearing Limits

Clearing limit uphill

Clearing limit downhill

C_L

Saw branches flush with trunk rather than cutting into the tree.

Trailway

Trailbed
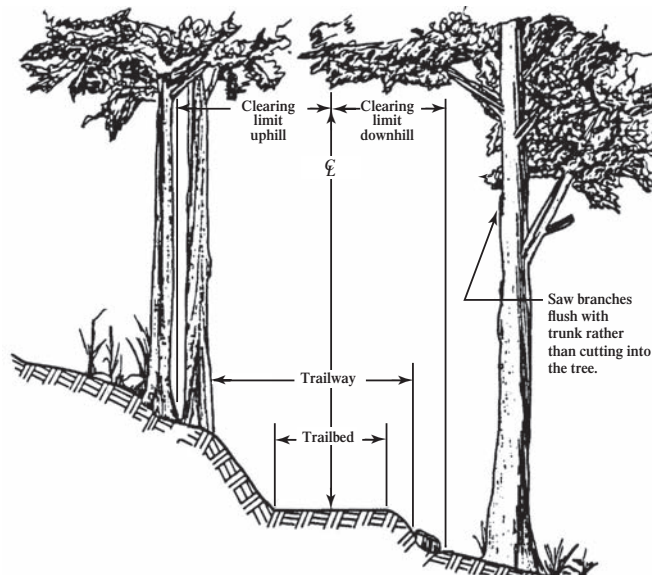
Figure 21—Terms describing the trail corridor clearing limits. You need to understand these terms to clear a trail to specifications.

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back and obstacles, such as boulders and fallen trees, are removed from the trail corridor to make it possible to ride or walk on the tread.

The dimensions of the corridor are determined by the needs of the target users and the challenge of the trail. For example, in the Northern Rockies, trail corridors for traditional packstock are cleared 2.5 meters (8 feet) wide and 3 meters (10 feet) high. Hiking trails are cleared 2 meters (6 feet) wide and 2.5 meters (8 feet) high. Check with your local trail manager to determine the appropriate dimensions for each of your trails.

Clearing and Brushing

Working to wipe out your trail is no less than that great nuclear furnace in the sky—Old Sol, the sun. Old Sol and the mad scientist, Dr. Photosynthesis, convert dirt and water into a gravity-defying artifice called a plant. Seasoned trail workers will attest to the singular will and incredible power of plants. No sooner is a trail corridor cleared of plants than new ones rush toward this avenue of sunlight.

Plants growing into trail corridors or trees falling across them are a significant threat to a trail's integrity. Brush is a major culprit. Other encroaching plants such as thistles or dense ferns may make travel unpleasant or even hide the trail completely. If people have trouble traveling the trail tread, they'll move over, usually along the lower edge, or make their own trail. Cut this veggie stuff out (figure 22)!

In level terrain, the corridor is cleared an equal distance on either side of the tread's centerline. For a hiking trail, this means that the corridor is cleared for a distance of 1 meter (3 feet) either side of center. Within 300 millimeters (1 foot) of the edge of the tread, plant material and debris should be cleared all the way to the ground. Farther than 500 millimeters (1.5 feet) from the trail edge, plants do not have to be cleared unless they are taller than 500 millimeters (1.5 feet) or so. Fallen logs usually are removed to the clearing limit.

Figure 22—This trail needs to be brushed. Cut the veggie stuff out.

On moderate to steep sideslopes, a different strategy may be useful. Travel along the lower (outer) edge of the tread is a common cause of tread failure. You can use trailside material to help hold traffic to the center of the tread. A downed log cut nearly flush with the downhill

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edge of the trail will encourage travelers to move up to avoid it. Rocks, limbed trees, and the like can all be left near the lower edge of the tread to guide traffic back to the center so long as the guide material doesn't prevent water from draining off the trail (figure 23).

Figure 23—Rocks and logs help to keep the trail in place. Remember, this is a path through nature, not a monument to Attila the Hun.

The key is to make sure that this guide material does not interfere with travel on the center of the tread and does not block drainage. For example, bikers need enough room for their pedals to clear the backslope on one side of the trail and the guide materials on the other.

Something's Gotta Go

If time and budgets are tight, consider brushing only the uphill side of the trail. This approach keeps users off the trail's downhill edge and keeps the trail in place.

On the uphill side of the trail, cut and remove material farther from the centerline. For instance, on slopes steeper than 50 percent you may want to cut fallen logs or protruding branches within 2 meters (6½ feet) or more from the centerline (horizontal distance). This is particularly true if you're dealing with packstock because they tend to shy away from objects at the level of their head.

Clearing a *movable corridor* rather than clearing to a fixed height and width takes some thought. Doing so may be difficult for inexperienced crews.

Finally, remember that the scorched earth look created by a corridor with straight edges is not very pleasing to the eye. Work with natural vegetation patterns to feather or meander the edges of your clearing work so you don't leave straight lines. Cut intruding brush back at the base of the plant rather than in midair at the clearing limit boundary. Cut all plant stems close to the ground. Scatter the resulting debris as far as practical. Toss stems and branches so the cut ends lie away from the trail (they'll sail farther through brush as well). Don't windrow the debris unless you really and truly commit to burn or otherwise remove it (and do this out of sight of the trail).

Rubbing the cut ends of trailside logs or stumps with soil reduces the brightness of a fresh saw cut. In especially sensitive areas, cut stumps flush with the ground and cover them with dirt, pine needles, or moss. Rub dirt on stobs or bury them. Here's where you can use your creativity. A carefully trimmed corridor can give a trail a special look, one that encourages users to return.

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Some trails may have to be brushed several times a year, some once every few years. Doing a little corridor maintenance when it is needed is a lot easier than waiting until plant growth causes expensive problems.

Removing Trees

Usually, trees growing within the corridor should be removed. Remember that those cute little seedlings eventually grow into pack-snagging adolescent trees. They are a lot easier to pull up by the roots when they are small than they are to lop when they grow up.

Prune limbs close to the tree trunk. For a clean cut, make a shallow undercut first, then follow with the top cut. This prevents the limb from peeling bark off the tree as it falls. Do not use an ax for pruning.

If more than half of the tree needs pruning, it is usually better to cut it down (figure 24). Cut trees off at ground level and do not leave pointed stobs.

Figure 24—Something's wrong with these trees! Cut trees out when they need excessive pruning.

Logging out a trail means cutting away trees that have fallen across it. The work can be hazardous. The size of the trees you are dealing with, restrictions on motorized equipment, and your skill and training determine whether chain saws, crosscut saws, bow saws, or axes are used. Safety first!

You need training to operate a chain saw or a crosscut saw. Your training, experience, and level of certification can allow you to buck trees already on the ground or to undertake the more advanced (and hazardous) business of felling standing trees. Be sure you are properly trained and certified before cutting standing or fallen trees. Using an ax to cut standing or fallen trees poses similar hazards. Some trees may be felled more safely by blasting. Check with a certified blaster to learn where blasting is feasible.

Removing fallen trees is a thinking person's game. The required training will help you think through problems, so we won't relate the details here.

Cut fallen trees out as wide as your normal clearing limits on the uphill side, but closer to the trail on the downhill side. Roll the log pieces off the trail and outside the clearing limits on the downhill side. Never leave them across ditches or waterbar outflows. If you leave logs on the uphill side of the trail, turn or bury them so they won't roll or slide onto the trail.

Sometimes you'll find a fallen tree lying parallel with the trail. If the trunk of the tree is not within the clearing limits and you decide to leave it in place, prune the limbs flush with the trunk. Limbing the tree so it rests on the ground helps the trunk decay faster.

It is hard to decide whether or not to remove *leaners*, trees that have not fallen but are leaning across the trail. If a leaner is within the trail clearing zone, it should be removed. Beyond that, it is a matter of discretion whether a leaner needs to be cut. You need to consider the amount of use on the trail, how long it will be before the trail is maintained again, the soundness of the tree, and the potential hazard the leaner is creating (figure 25). Felling a leaner, especially one that is hung up in other trees, can be very hazardous. Only highly qualified

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sawyers should work on leaners. Blasting is another way to remove leaners safely. When in doubt, tie flagging around the leaner and notify your supervisor.

Based on injury statistics, felling standing trees (including snags) is one of the most dangerous activities for trail workers. Do not even consider felling trees unless you have been formally trained and certified. Bringing in a trained sawyer is cheaper than bringing in a coroner.

Figure 25—If you are uncomfortable with your ability to safely cut a tree because of the hazards or your lack of experience, walk away.

Trail Foundation

Here's how you can make sure your trail has a strong, long-lasting foundation.

Rolling Contour Trails

Constructing contour trails into the sideslope requires excavating the side of the hill to provide a solid, stable trail tread. Stay away from flat areas because water has nowhere to go. Keep grades sustainable by using the half rule and add plenty of grade reversals. Slightly outsloping the tread (about 5 percent) is a must to help move water across the trail.

Full-Bench Construction

Trail professionals almost always prefer *full-bench* construction. A full bench is constructed by cutting the full width of the tread into the hillside and casting the excavated soil as far from the trail as possible (figure 26). Full-bench construction requires more excavation and leaves a larger backslope than partial-bench construction, but the trailbed will be more durable and require less maintenance. You should use full-bench construction whenever possible.

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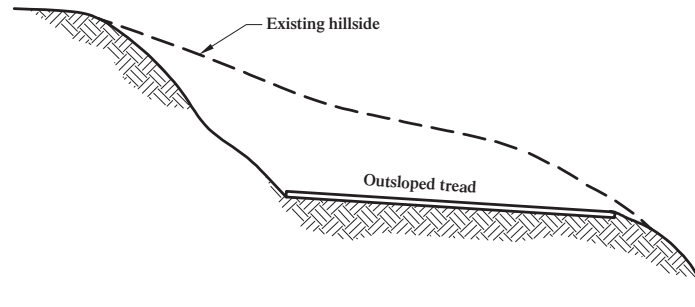
Figure 26—A full-bench trail is constructed by cutting the full width of the tread into the hillside. The tread needs to be outsloped at least 5 percent.

Partial-Bench Construction

Partial-bench construction is another method to cut in a trail, but it takes a good deal of trail-building experience to get this method right. The trail tread will be part hillside and part fill material (figure 27).
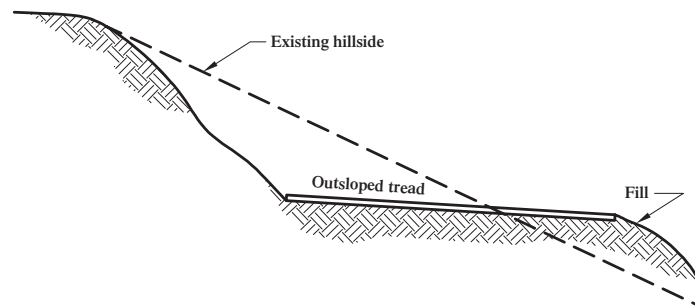
Figure 27—With partial-bench construction, the trail tread is part hillside and part fill material. The tread needs to be outsloped at least 5 percent.

The fillslope needs to be composed from good, solid material like rock or decay-resistant wood. And it has to get compacted evenly—this is the puzzle to solve. Solving Sudoku puzzles doesn't guarantee you'll get this one!

Backslope—The backslope is the excavated, exposed area above the tread surface. The backslope should match the angle of repose of the parent material (the sideslope). You may come across trail specifications calling for 1:1 backslope. This means 1 meter vertical rise to 1 meter horizontal run.

Most soils are stable with a 1:1 backslope. Solid rock can have a steeper 2:1 backslope, while less cohesive soils may need a 1:2 backslope (figure 28).
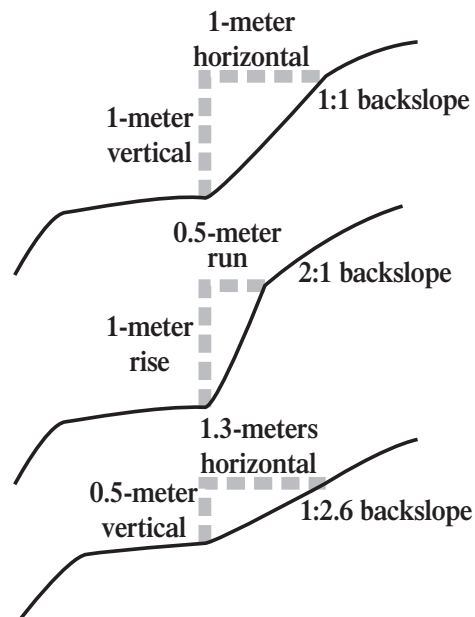
Figure 28—Backslopes are noted as a ratio of vertical rise to horizontal distance, or "rise" to "run."

Bottom line, angle the backslope until loose material quits falling down onto the trail tread. Stabilize the entire backslope by compacting it with the back of a McLeod.

Stable Backslopes

Look at the surrounding landscape and soil to see areas that are stable. Create a somewhat gentler backslope than you think necessary. Although you will initially expose more raw soil, the chances of your trail remaining stable and revegetating are greater than if you leave a backslope so steep that it keeps sloughing.

One option to reduce backslope excavation is to construct a retaining wall. This can be less obtrusive than huge backslope excavations and more stable if the wall is well constructed.

Fillslope—The fillslope is that area below the tread surface on the downhill side. A full-bench tread will not have any fill on this side of the trail. Fillslopes are critical. Fillslopes often need to be reinforced with retaining or crib walls to keep them from failing. Fillslope failures are common and will wipe out the trail. That's why most trailbuilders prefer full-bench trails.

Moving Dirt

Looking at construction plans is one thing, but going out and building a rolling contour trail is quite another. Here is a proven method that works even for the complete novice. This procedure is for the actual dirt moving once vegetation has been cleared.

- Place pin flags to keep the diggers on course.
- Straddle a centerline flag and face uphill. Swing your Pulaski or other tool to mark the area to be cleared. Where the tool strikes the hillside will be approximately the top of the backslope. The steeper the slope, the higher the backslope.

Do this at each centerline flag, then scratch a line between the tool strikes. This defines the area to be dug to mineral soil. Clear about the same distance below the flag. Keep the duff handy by placing it uphill. It will be used later. Don't clear more trail than can be dug in a day unless you know it isn't going to rain before you can complete the segment.

- Stand on the trail and work the tread parallel to the direction of travel. Level out the tread and get the right outslope. Don't continue facing uphill when you're shaping the tread, despite the tendency to do so.
- Make sure that the width of the rough tread is about the length of a Pulaski handle. The finished tread will be about right for a good hiking trail.
- Make sure grade reversals and other drainage structures are flagged and constructed as you go.
- Shape the backslope about as steep as the original slope. Backslope ratios are hard to understand. Instead, look at the natural slope and try to match it.
- Round off the top of the backslope, where the backslope meets the trail tread, and the downhill edge of the trail. Keeping these areas smooth and rounded will help water sheet across the trail.
- Walk the trail to check the tread's outslope. If you can feel your ankles rolling downhill, there is too much outslope (figure 29). The outslope should be barely detectable to the eye. A partially filled water bottle makes a good level or you can stand a McLeod on the trail tread—the handle should lean slightly downhill.
- Compact the entire tread, including the backslope, with the back of a McLeod. Don't leave compaction up to trail users. They will only compact the center, creating a rut that funnels water down the middle of the trail.
- Place the duff saved earlier onto the scattered dirt that was tossed downhill. The duff helps naturalize the outside edge and makes the new trail look like it has been there for years.
- Be careful not to create a berm with the duff.

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Water bottle as a level.
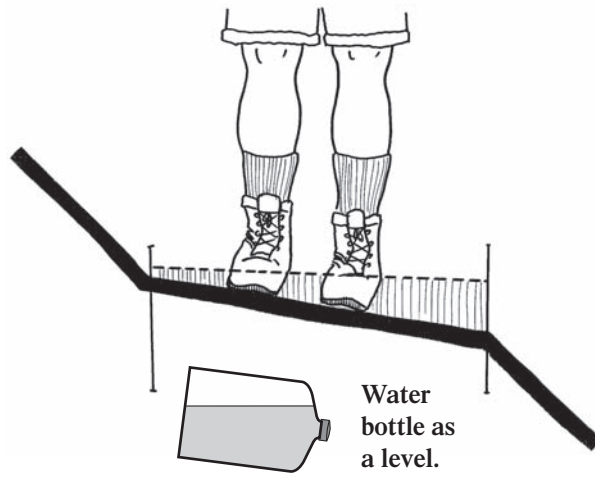
Figure 29—If your ankles start to roll, the tread has too much outslope.
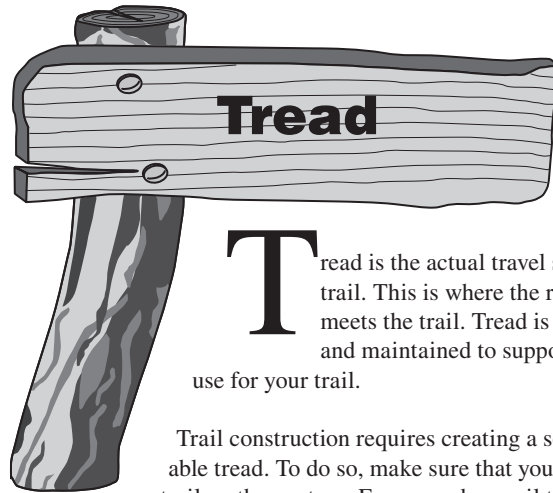
Tread

Tread is the actual travel surface of the trail. This is where the rubber (or hoof) meets the trail. Tread is constructed and maintained to support the designed use for your trail.

Trail construction requires creating a solid, sustainable tread. To do so, make sure that you locate the trail on the contour. Forces such as soil type, annual precipitation, and other factors may influence how long the tread remains stable before maintenance is needed.

Soil type and texture have a major influence on soil drainage and durability. Texture refers to the size of individual soil particles. Clay and silt are the soil components with the smallest particles. Small particles tend to be muddy when wet and dusty when dry. Clay and silt don't provide good drainage. Sand is made of large particles that don't bind together at all and are very unstable.

The best soil type is a mixture of clay, silt, and sand. If your soil is lacking any one of these, you can attempt to add what's missing. Knowing the soil types that you will encounter when building trails will help you develop a solid, stable tread. A lot of information on soils can be found at the USDA Natural Resources Conservation Service (*http://soil.usda.gov*) office or at your county extension service office.

Get To Know Your Soil
With the Ribbon Test

Roll a handful of moist soil into a tube shape with both hands. Squeeze it between your thumb and forefinger to form the longest and thinnest ribbon possible.

Texture	Feel	Ribbon
Sand	Grainy	Can't form a ribbon
Loam	Soft with some graininess	Thick and very short
Silt	Floury	Makes flakes rather than a ribbon
Sandy Clay	Substantial graininess	Thin, fairly long—50 to 76 mm (2 to 3 inches)—holds its own weight
Clay	Smooth	Very thin and very long—76 mm (3 inches)

The tread surface should match the intended use. Easier trails should have a smooth tread surface. Backcountry trails can be rougher and more challenging. Leaving some obstacles in the trail helps slow down users and reduce conflict.

Tread is also the travel surface on structures such as turnpikes and puncheon. Tread, whenever elevated, should be slightly crowned (higher in the center than on either side) to drain better.

Outsloping

An outsloped tread is one that is lower on the outside or downhill side of the trail than it is on the inside or bankside. Outsloping lets water sheet across the trail naturally. The tread should be outsloped at least 5 percent.

Loss of outslope is the first maintenance problem that develops on all trails. If you can do nothing else when budgets are tight, reestablish the outslope. Doing so pays big dividends.

Removing Roots and Stumps

Removing roots and stumps is hard work. Explosives and stump grinders are good alternatives for removing stumps, but chances are you'll have to do the work by hand. Often, a sharpened pick mattock or Pulaski is used to chop away at the roots. If you are relying on some type of winch system to help you pull out the stump, be sure to leave the stumps high enough to give you something to latch onto for leverage.

Not all roots and stumps are problems. You should not have to remove many large stumps from an existing trail. Before you remove a stump, consider whether other crews might have left it to keep the trail from creeping downhill.

Rule of Thumb for Roots

- If roots are perpendicular to the tread, fairly flush, and not a tripping hazard, leave them.
- Remove roots that are parallel with the tread. They help funnel water down the trail and create slipping hazards.
- Route your trail above large trees. Building below trees undermines their root systems—eventually killing the trees.

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Rock Removal

Rock work for trails ranges from building rock walls to blasting solid rock. These tasks involve specialty work. When rock needs to be removed, a good blaster can save a crew an astounding amount of work. When rock needs to be used, someone building a rock retaining wall may be a true artisan, creating a structure that lasts for centuries. Rock work requires good planning and finely honed skills.

Brains First, Muscle Last

Remember that the two most common injuries in rock work are pinched (or smashed) fingers and tweaked (or blown out) backs. Both sets of injuries are a result of using muscles first and brains last. High-quality rock work is almost always a methodical, even tedious, task. Safe work is ALWAYS faster than taking time out for a trip to the infirmary.

The secret to moving large rocks is to think first. Plan where the rock should go and anticipate how it might roll. Be patient—when rocks are moved in a hurry they almost always end up in the wrong place. Communicate with all crewmembers about how the task is progressing and what move should occur next.

Tools of the trade include:
- Lots of high-quality rockbars. Don't settle for the cheap digging bars. You need something with high tensile strength.
- Pick mattock.
- Sledge hammer.
- Eye protection, gloves, and hardhat. Don't even think of swinging a tool at a rock without wearing the required personal protective equipment.
- Gravel box, rock bag, rucksack, rock litter—all useful for carrying rocks of various sizes.

- Winch and cable systems. Some rocks can be dragged or lifted into place.
- All sorts of motorized equipment, including rock drills and rock breakers.

Blasting can help remove rocks or greatly reduce their size. Careful blasting techniques can produce gravel-sized material. Motorized equipment can be used to split boulders or to grind down obstacles in the tread. Chemical expansion agents can be poured into holes drilled into large rocks, breaking them without explosives. Drills and wedges can be used to quarry stone for retaining walls or guide structures. Devices like the Boulder Buster, Magnum Buster, and BMS Micro-Blaster crack rocks without explosives and can be used by persons who are not certified blasters.

Your specific trail maintenance specifications may call for removing embedded rocks. Use good judgment here. Often, large rocks are best removed by blasting. Other solutions include ramping the trail over them, or rerouting the trail around them.

Rocks should be removed to a depth of at least 100 millimeters (4 inches) below the tread surface, or in accordance with your specific trail standards. Simply knocking off the top of a rock flush with the existing tread may leave an obstacle after soil has eroded around the rock.

Rockbars work great for moving medium and large rocks. Use the bars to pry rocks out of the ground and guide them off the trail. When crewmembers have two or three bars under various sides of a large rock, they can apply leverage to the stone and virtually float it to a new location with a rowing motion. Use a small rock or log as a fulcrum for better leverage.

It may seem like fun at the time, but avoid the temptation to kick a large stone loose. When rocks careen down the mountainside they may knock down small trees, gouge bark, wipe out trail structures, or start rockslides.

Even worse, an out-of-control rock might cross a trail or road below you, hitting someone. If there is any possibility that people might be

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below while rocks are being moved, close the trail or road, or post lookouts in safe locations to warn travelers.

You might construct a barrier of logs anchored by trees before trying to move the rock, preventing it from gaining momentum. Once a rock is moving, do not try to stop it.

When you need to lift rocks, be sure to keep your back straight and lift with the strong muscles of your legs. Sharing the burden with another person can be a good idea.

To load a large rock into a wheelbarrow, lean the wheelbarrow back on its handles, roll the rock in gently over the handles (or rocks placed there) and tip the wheelbarrow forward onto its wheels. Keep your fingers clear any time you deal with rocks.

Use Brains Not Brawn for Heavy Lifting
When dealing with rocks, work smarter, not harder. Skidding rocks is easiest. Rolling them is sometimes necessary. Lifting rocks is the last resort.

Often small rocks are needed for fill material behind crib walls, in turnpikes and cribbed staircases, and in voids in sections of trail built in talus (rock debris). Buckets and wheelbarrows are handy here. So are canvas carrying bags. If you are part of a large crew, handing rocks person-to-person often works well. Remember, it's usually not a good idea to twist your upper body while you are holding a heavy rock.

Tread Maintenance

A solid, outsloped surface is the objective of trail maintenance. Remove and scatter berm material that collects at the outside edge

of the trail. Reshape the tread and restore the outslope. Maintain the tread at the designed width. Remove all the debris that has fallen on the tread—the sticks and stones and candy wrappers. Maintenance includes removing obstacles such as protruding roots and rocks on easier trails. It also means repairing any sections that have been damaged by landslides, uprooted trees, washouts, or boggy conditions. Compact all tread and sections of backslope that were reworked.

Slough and Berms

On hillside trails, **slough** (pronounced **sluff**) is soil, rock, and debris that has moved downhill to the inside of the tread, narrowing the tread. Slough needs to be removed (figure 30). Doing so is hard work. Slough that doesn't get removed is the main reason trails "creep" downhill.
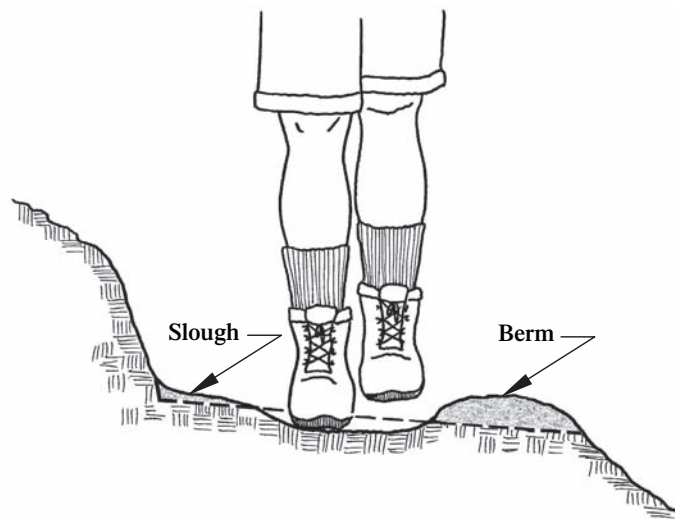
Figure 30—Remove the slough and berm, leaving the trail outsloped so water will run off.

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Loosen compacted slough with a mattock or Pulaski, then remove the soil with a shovel or McLeod. Reshape the tread to restore its outslope. Avoid disturbing the entire backslope unless it is absolutely necessary to do so. Chop off the toe of the slough and blend the slope back into the hillside. Remember to compact the tread thoroughly.

Berms are made of soil that has built up on the outside of the tread, forming a barrier that prevents water from sheeting off. Berms form when water erodes trail tread that wasn't compacted during construction, depositing it on the edge of the trail. Water runs down the tread, gathering volume and soil as it goes. Berm formation is the single largest contributor to erosion of the tread. Removing berms is always the best practice.

Berms may form a false edge, especially when berms are associated with tread creep. False edge is unconsolidated material, often including significant amounts of organic material, that can't bear weight. This is probably the least stable trail feature on most trails and a major contributor to step-throughs and wrecks.

If berms persist, an insloped turn may be an option. Essentially this is a turn with a built-up berm. Insloped turns will improve trail flow and add an element of fun on off-highway vehicle and mountain bike trails. Special attention needs to be placed on creating proper drainage. This requires a high level of trail-building experience and a good understanding of waterflow.

Tread Creep

Does your contour trail display:
- Exposed bedrock or roots along the uphill side of the tread?
- Tread alignment that climbs over every anchor point and drops before climbing to the next anchor point?
- Pack bumpers (downhill trees scarred by packstock panniers)?

All three are indications that the tread surface has been eroded and compacted by travel along the outside edge. Insidious tread creep is at work. Tread creep should be stopped or the trail will eventually become very difficult or dangerous to travel (figure 31).

Figure 31—A classic case of tread creep. This trail needs help now because the tread is moving downhill.

What causes tread creep? The answer is simple. Most livestock, wheeled traffic, and some hikers have a natural tendency to travel the outside edge of sidehill trails. Sloughing makes the edge of the trail the flattest place to walk. Backslopes that are too steep may slough material onto the tread, narrowing the trail. The trail becomes too narrow. The result is that traffic travels closer to the outside edge (figure 32). Your job is to bring the trail back uphill to its original location and keep it there.

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Causes of Trail Creep
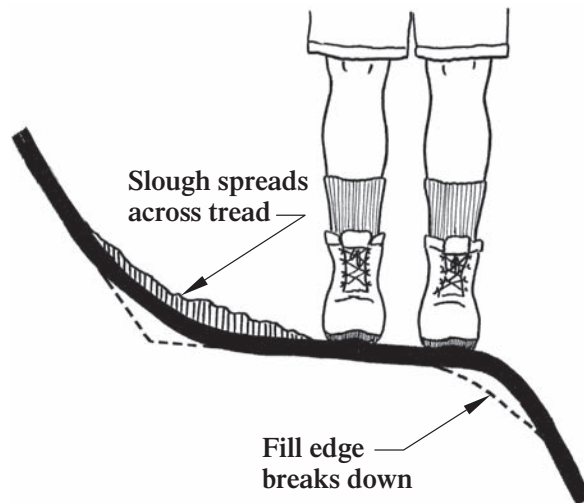
Figure 32—Tread creep at work—sloughing and soft fillslopes.

To fix tread creep, cut the backslope properly, remove slough, and reestablish the 5-percent outslope. Take advantage of large stationary objects (guide structures) to prevent animals and people from walking along the edge. Trees, the ends of logs, rocks, and stumps that are left close to the downhill edge of the trail will keep traffic walking closer to the middle.

Tread material between guide structures might creep downhill, creating a situation where the trail climbs over every tread anchor and descends again, a *daisy chain*. At the bottom of these dips, water and sediment collect. This is the weakest portion of the tread and the most prone to catastrophic failure. The tread can be so soft that packstock may punch completely through the tread (called a step-through) or bicycles and motorcycles may collapse the edge, leading to bad wrecks.

Where soil is in short supply, you may have to install a short retaining wall and haul in tread material. The tread should be benched back into the slope in the original alignment. Guide structures should be installed on the outside edge of the tread to keep traffic toward the center.

A note on guide structures: If you use a rock, be sure it is big enough that at least two-thirds of it may be buried so people or bears won't roll it away (figure 33). Guide structures should be placed at random distances so they don't act like a wall to trap water on the tread. You might need to make the trail a little wider to accommodate the guide structure.

Stabilizing Tread Creep
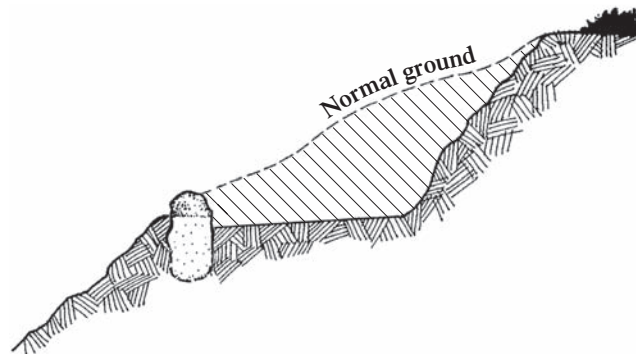
Figure 33—Guide rock properly installed to help prevent tread creep. Do not create a continuous barrier that impedes water drainage.

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Trails in Wet Areas
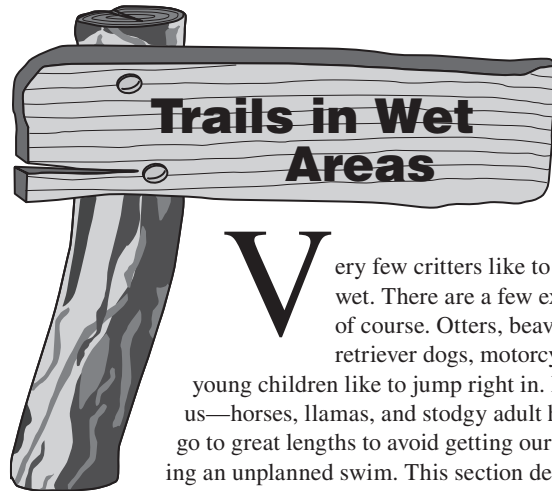
Very few critters like to get their feet wet. There are a few exceptions, of course. Otters, beavers, goofy retriever dogs, motorcyclists, and young children like to jump right in. But the rest of us—horses, llamas, and stodgy adult hikers—often go to great lengths to avoid getting our feet wet or taking an unplanned swim. This section deals with a range of options for getting trail traffic from one side of wet ground to the other. See "Wetland Trail Design and Construction" (Steinholtz and Vachowski 2007) for additional information.

Because nearly every technique for fixing trails in boggy areas is expensive and needs to be repeated periodically, relocating the problem section of trail should be considered first. Scouting for suitable places to relocate trails and reviewing soil maps is time well spent. The alternative route should traverse the sideslope for better drainage. Don't reroute a problem section of trail to another boggy piece of ground. If you do, the result will be two problem trail sections instead of one.

Moving up in cost and complexity, two types of structures—turnpikes and puncheon—are commonly constructed to keep trails dry through wet or boggy areas. Using geosynthetics in combination with these techniques can result in a better tread with less fill. Rock armoring is popular in some areas where hardened trails are needed.

A trail bridge may be needed in situations where long spans will be high above the ground or for crossing streams. Bridges require special designs fitted to each type of use. Engineering approval is needed before constructing either a standard or specially designed bridge.

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Boardwalks are common in some parts of the country, particularly in parts of Alaska and in the Southeast. They can range from fairly simple structures placed on boggy surfaces to elevated boardwalks over marshes or lake shores, such as those found at some interpretive centers (figure 34).

Figure 34—This boardwalk relies on pilings for support. Helical earth anchors also could be used to support the structure.

Geosynthetics

Geosynthetics are synthetic materials (usually made from hydrocarbons) that are used with soil or rock in many types of road and trail construction. Geosynthetics offer alternatives to traditional trail construction practices and can be more effective in some situations.

Geosynthetics perform three major functions: separation, reinforcement, and drainage. Geosynthetic materials include geotextiles (construction fabrics), geonets, sheet drains, and geocells. All these materials become a permanent part of the trail and must be covered with soil or rock. If the material is exposed, it can be damaged by trail users and may cause users to slip or trip.

Geotextiles (figure 35) are the most widely used geosynthetic material. Sometimes they are called construction fabrics. They are made from long-lasting synthetic fibers bonded to form a fabric that is used primarily for separation and reinforcement over wet, unstable soils. They have the tensile strength needed to support loads and can allow water, but not soil, to seep through.
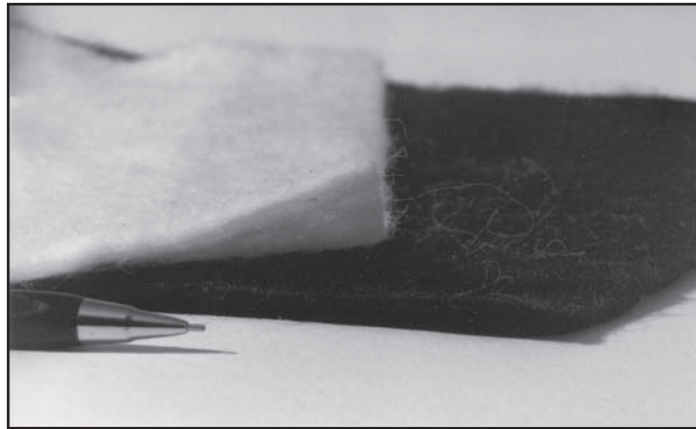
Figure 35—Felt-like geotextiles are easier to work with than heat-bonded, slit-film, or woven products with a slick texture.

Geotextiles are often used when constructing turnpikes or causeways. The geotextiles separate the silty, mucky soil beneath the fabric from the mineral, coarse-grained, or granular soil placed as tread material on top of the geotextile. The importance of separation cannot be over-emphasized. It takes only about 20 percent silt or clay before mineral soil takes on the characteristics of mud—and mud is certainly not

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what you want for your tread surface. Most geotextiles commonly used in road construction work are suitable for trail turnpikes. The fabric should allow water to pass through, but have openings of 0.3 millimeter (0.01 inch) or smaller that silt can't pass through.

Geotextiles need to be carefully sized, trimmed, and sometimes fastened down before they are covered with fill. The fabric needs to be overlapped at joints and trimmed to fit over bedrock. The fabric must be covered with tread material.

Some geotextiles are sensitive to ultraviolet light. They decompose readily when exposed to sunlight. Always store unused geotextile in its original wrapper.

Geonets or *geonet composites* (figure 36) have a thin polyethylene drainage core that is covered on both sides with geotextile. They are used for separation, reinforcement, and drainage. Because geonets have a core plus two layers of geotextile, they provide more reinforcement than a single layer of geotextile.
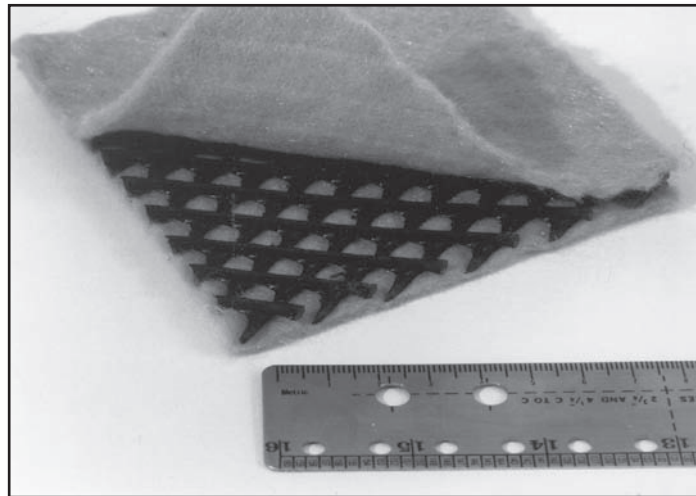
Figure 36—The net-like core of geonet allows water to drain through it.

Sheet drains are made with a drainage core and one or two layers of geotextile. Usually, the core is made of a polyethylene sheet shaped like a thin egg crate. The core provides an impermeable barrier unless it has been perforated by the manufacturer. When used under the trail tread material, sheet drains provide separation, reinforcement, and drainage. Because they have greater bending strength than geotextiles or geonets, less tread fill may be needed.

Sheet drains or geonets can be used as drainage cutoff walls (figure 37). If the trail section is on a sideslope where subsurface water saturates the uphill side of the trail, a cutoff wall can be constructed to intercept surface and subsurface moisture, helping to drain and stabilize that section of trail.

Drainage Cutoff Walls
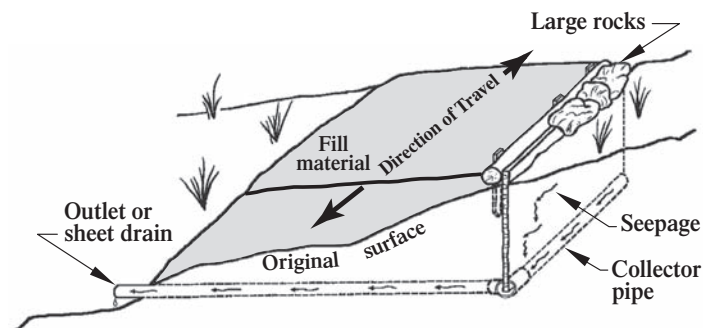
Figure 37—A sheet drain or geonet can be used to intercept seepage.

Geocells usually are made from polyethylene strips bonded to form a honeycomb structure. Each cell is backfilled and compacted (figure 38). Geocells are good for reinforcement, reduce the amount of fill material required, and help hold the fill in place. Geocell usually has geotextile underneath it for separation from saturated soils. The grids need to be covered and compacted with at least 76 millimeters (3 inches) of tread material so they will never be exposed. Exposed geocells present a substantial hazard to foot traffic and vehicles, which will lose traction.

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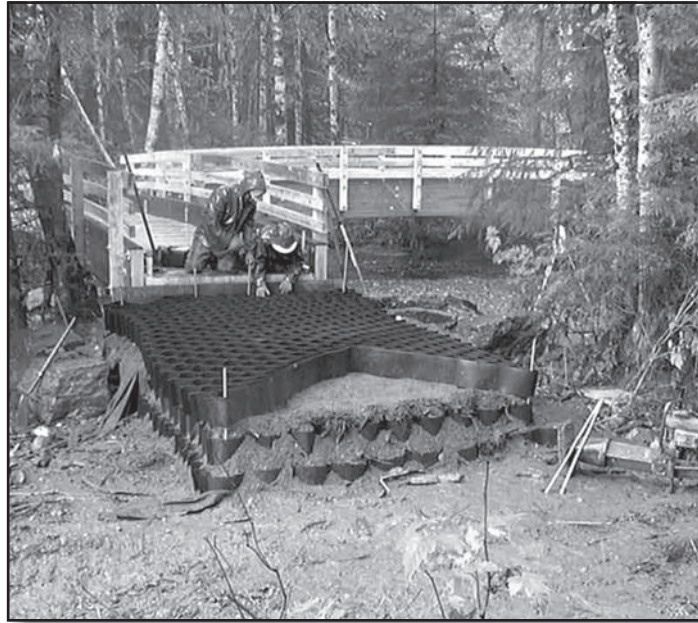
Figure 38—Geocells are good for tread reinforcement and help hold fill in place.

Rock Underdrains

Rock underdrains (often called *French drains*) are ditches filled with gravel. They can be used to drain a spring or seep running across the trail. Wrap the gravel with geotextile to help prevent silt from clogging the rock voids. Start with larger pieces of rock and gravel at the bottom, topping off with smaller aggregate (figure 39). Finish the drain with 150 millimeters (6 inches) of tread material so that the surface matches the rest of the trail.

Rock Underdrain or French Drain

END VIEW

TOP VIEW
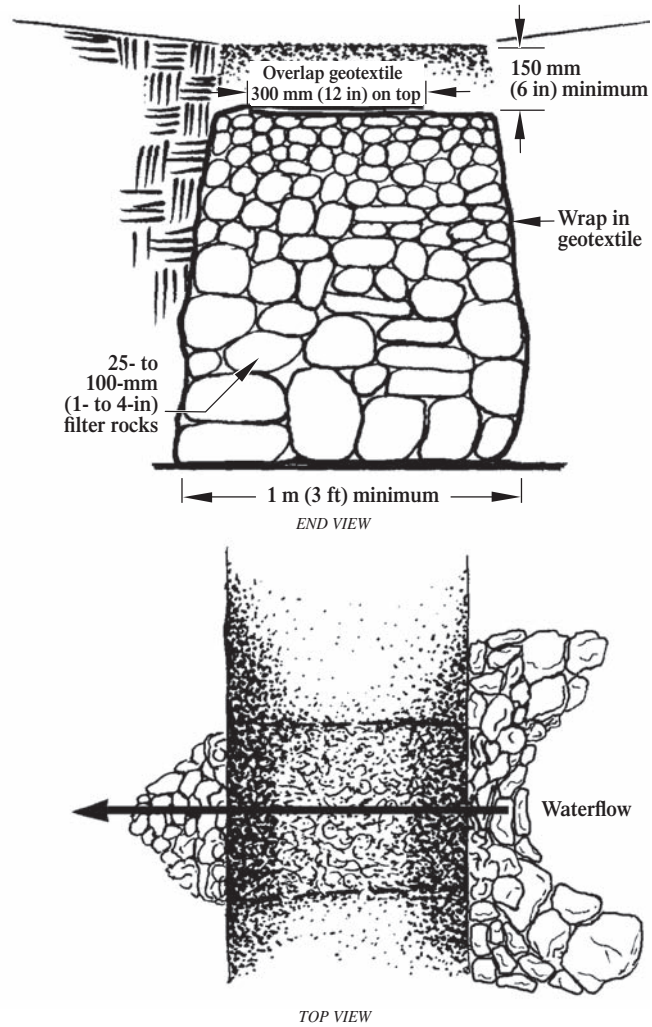
Figure 39—Wrapping rock underdrains with geotextile helps prevent them from clogging. Rock underdrains are used to drain low-flow springs and seeps.

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Turnpikes

Turnpikes elevate a trail above wet ground. The technique uses fill material from parallel side ditches and from areas offsite to build up the trail base so it is higher than the water table. Turnpike construction can provide a stable trail base in areas with a high water table and fairly well- to well-drained soils. Turnpikes are practical for trail grades up to 10 percent (figure 40).

Turnpike With Leadoff Ditch
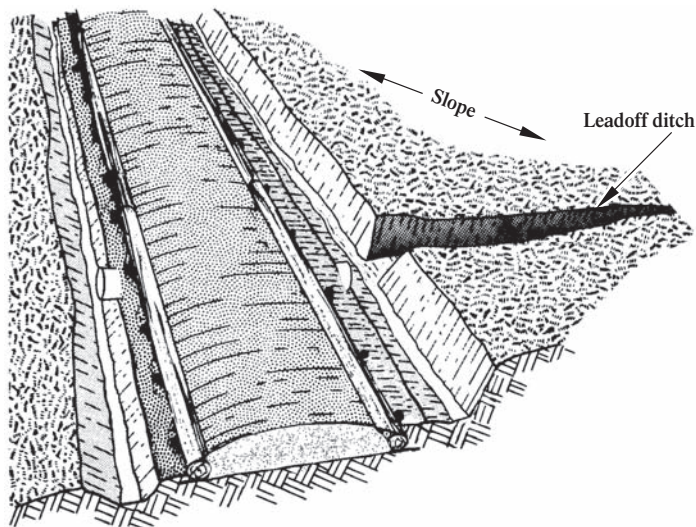
Figure 40—Turnpikes raise a trail above wet ground.

A turnpike should be used primarily in flat areas with wet or boggy ground that have up to 20-percent sideslope. Turnpikes are easier and cheaper to build than puncheon and may last longer.

Finding Fill

Often you need fill material to construct turnpikes. Look for a site that has suitable tread material close to the work site. This is called a borrow pit.

Good places for a borrow pit include:
- **Creek bottoms that are replenished by storms and seasonal waterflow**
- **Bases of slopes or cliffs where heavy runoff or gravity deposits sand and gravel**

Don't destroy aquatic or riparian habitat with your pit. Rehabilitate the pit when you're done. Grade the pit out to natural contours with topsoil and debris, then revegetate.

Begin your turnpike by clearing the site wide enough for the trail tread plus a ditch and retainer log or rocks on either side of the trail tread. Rocks, stumps, and stobs that could rip geotextiles or that protrude above the turnpike tread should be removed or at least cut below the final base grade.

Ditch both sides of the trail to lower the water table. Install geotextile or other geosynthetic materials and retainer rocks or logs. Geotextile and geocell should go under any retainer rocks or logs (figure 41). Use high-quality tread material as fill above the geotextile.

Firm mineral soil, coarse-grained soils or granular material, or small, well-graded angular rocks are needed for fill. Often gravel or other well-drained material must be hauled in to surface the trail tread. If good soil is excavated from the ditch, it can be used as fill. Fill the trail until the crown of the trail tread is 50 millimeters (2 inches) or has a minimum 2-percent grade above the retainers. It doesn't hurt for the fill to be a little too high to begin with, because it will settle.

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Geotextile Placement
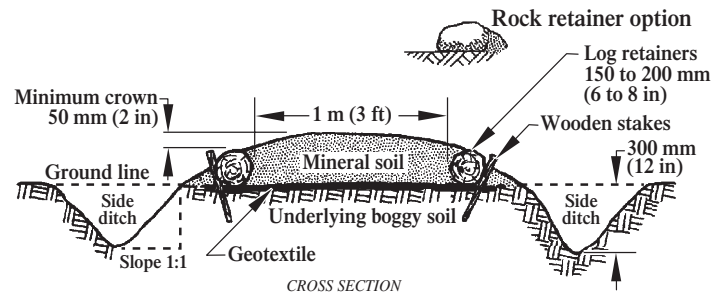
Figure 41—Place geotextile under the retainer logs or rocks before staking the geotextile in place.

Construct a dip or a drainage structure at each end of the turnpike where necessary to keep water from flowing onto the structure. Keep the approaches as straight as possible coming onto a turnpike, to mini-mize the chance that stock or motorbike users will cut the corners and end up in the ditches. Turnpike maintenance, especially recrowning, is particularly important the first year after construction; the soil will have settled then. Make sure the ditches are cleaned out and are deep enough to drain the turnpike (figure 42).

Figure 42—Turnpike maintenance includes recrowning the tread, cleaning out the ditches, and making sure the ditches are deep enough.

An alternative method, one that not only provides separation between good fill and clay but also keeps a layer of soil drier than the muck beneath, is called encapsulation, or the *sausage encapsulation technique* (figure 43). Excavate 250 to 300 millimeters (10 to 12 inches) of muck from the middle of the turnpike. Lay down a roll of geotextile the length of the turnpike. The geotextile should be wide enough to fold back over the top with a 300-millimeter (1-foot) overlap. Place 150 millimeters (6 inches) of good fill, or even rocks, on top of the single layer of geotextile, then fold the geotextile back over the top and continue to fill with tread material. Rocks or logs can be used for retainers. Rocks last longer.

Sausage or Encapsulation Technique

CROSS SECTION
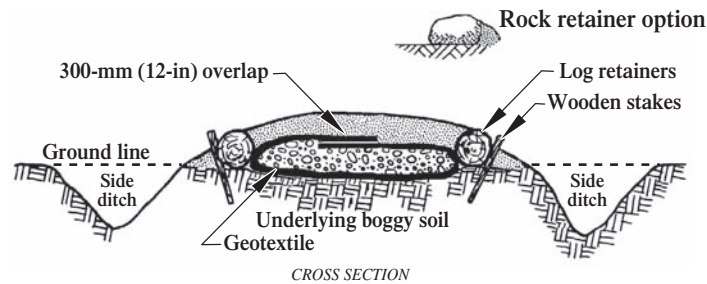
Figure 43—Sausage encapsulation is another way to raise a trail above wet areas.

If you use logs, they should be at least 150 millimeters (6 inches) in diameter and peeled. Lay retainer logs in one continuous row along each edge of the trail tread. The logs can be joined by notching them (figure 44). In some species, notching may cause the logs to rot faster. Anchor the logs with stakes (figure 45) or, better yet, large rocks along the outside. Anchors are not needed on the inside, because the fill and surfacing will hold the retainer logs.

The most important considerations are to keep the water level below the trail base and carry the water under and away from the trail at frequent intervals.

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Notched Retainer Log

Spike

Notching

Notching
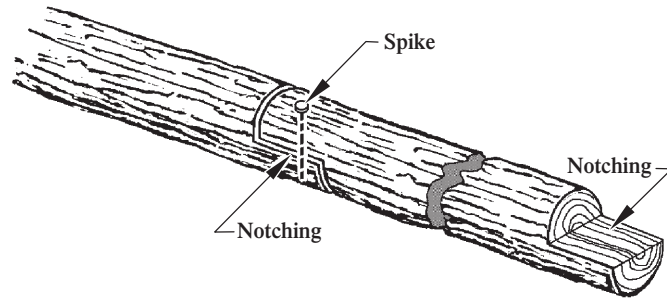
Figure 44—Retainer logs are joined with spikes.

Sapling Stake

Ground level

Stobs 50- to 75-mm
(2- to 3-in) long

Stakes about
400-mm (16-in) long

Sharpen the
big end of the sapling.
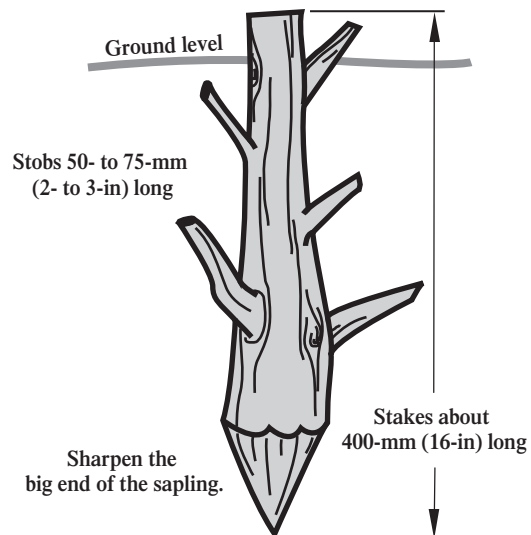
Figure 45—Try this old Alaska trick if your stakes tend to work up out of boggy ground.

Turnpikes Without Ditches

A turnpike without ditches is sometimes called a ***causeway.*** These structures are viable alternatives where a hardened tread is needed and groundwater saturation is not a problem. Turnpikes without ditches have been used successfully throughout the Sierra Nevada and elsewhere to create an elevated, hardened tread across seasonally wet alpine meadows. The surface can also be reinforced with large stones, called armoring, paving, or flagstone. Often multiple parallel paths are restored and replaced with a single causeway (figure 46). These structures can create less environmental impact than turnpikes with ditches because they do not lower the water table. The risk is that in highly saturated soils the turnpike without ditches could sink into the ground, a problem that geotextile can help prevent.

Turnpikes Without Ditches
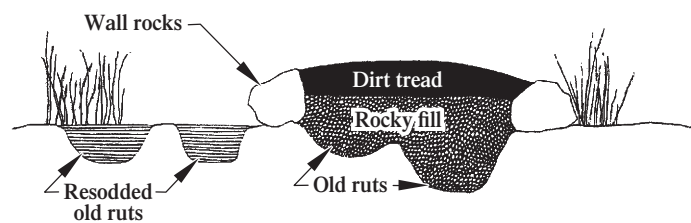
Figure 46—Turnpikes without ditches, sometimes called causeways, create an elevated, hardened tread across seasonally wet areas and can replace multiple parallel paths.

Puncheon

When the ground is so wet the trail cannot be graded and there's no way to drain the trail, use puncheon.

Puncheon is a wooden walkway used to cross bogs or deep muskeg, to bridge boulder fields, or to cross small streams (figure 47). It can be used where uneven terrain or lack of tread material makes turnpike construction impractical. Puncheon is also preferred over turnpikes where firm, mineral soil cannot be easily reached. Puncheon can be supported on muddy surfaces better than a turnpike, which requires effective drainage.

Puncheon
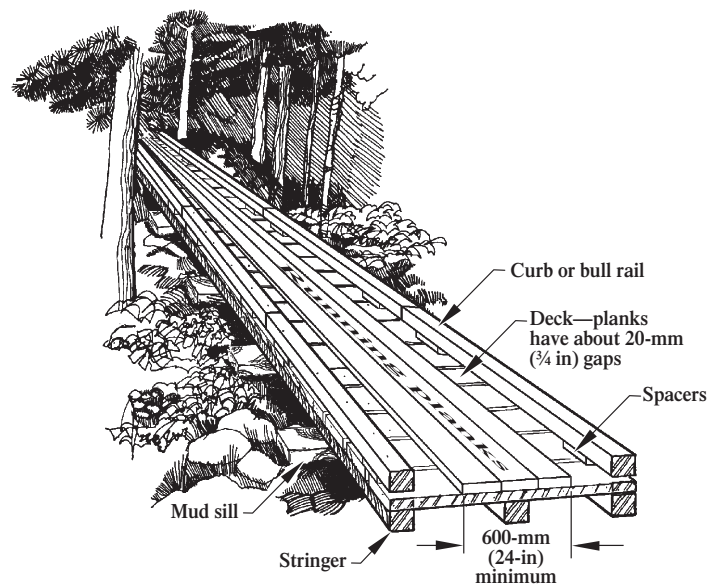
Figure 47—Puncheon is a wooden walkway used when trails cross bogs, deep muskeg, large boulder fields, or small streams.

Puncheon resembles a short version of the familiar log stringer trail bridge. It consists of a deck or flooring made of sawed, treated timber or native logs placed on stringers to elevate the trail across wet areas that are not easy to drain. Puncheon that is slightly elevated is termed standard puncheon (figure 48).

Figure 48—Standard puncheon is slightly elevated above the ground.

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Here's how to build puncheon. First of all, the entire structure must extend to solid mineral soil so soft spots do not develop at either end. Approaches should be straight for at least 3 meters (10 feet) coming up to the puncheon. Any curves either approaching or on the puncheon add to the risk of slipping, especially for stock, mountain bike riders, and motorcycle riders.

To begin construction, install mud sills to support the stringers. Mud sills can be made of native logs, treated posts, short treated planks, or precast concrete parking lot wheel blocks. The mud sills are laid in trenches at both ends of the area to be bridged at intervals of 1.8 to 3 meters (6 to 10 feet, figure 49). They are about two-thirds buried in firm ground. If firm footing is not available, use rock and fill to solidify the bottom of the trench, increase the length of the sill log to give it better flotation, or use more sills for enough floatation. Enclosing rock and fill in geotextile minimizes the amount of rock and fill required. For stability, especially in boggy terrain, the mud sills should be as long as practical, up to 2.5 meters (8 feet) long.
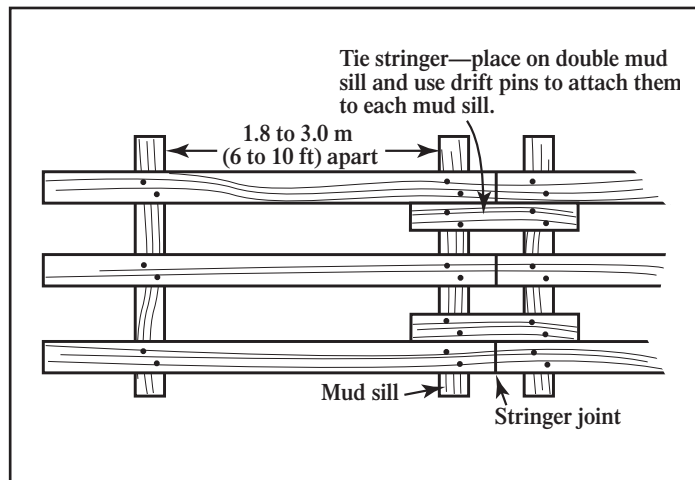
Figure 49—Proper layout of puncheon, showing mud sills and stringers.

Stringers made from 200-millimeter- (8-inch-) diameter peeled logs or treated timbers are set on top of the mud sills. They should be at least 3 meters (10 feet) long and about the same length and diameter. Stringers also need to be level with each other so the surface of the puncheon will be level when the decking is added. Two stringers are adequate for hiking trails, but for heavier traffic, such as packstock, three stringers are recommended.

Notch the mud sills, if necessary, to stabilize the stringers and to even out the top surfaces (figure 50). To hold the stringers in place, toe-nail spikes through the stringers to the mud sills or drive No. 4 rebar through holes in the stringers.
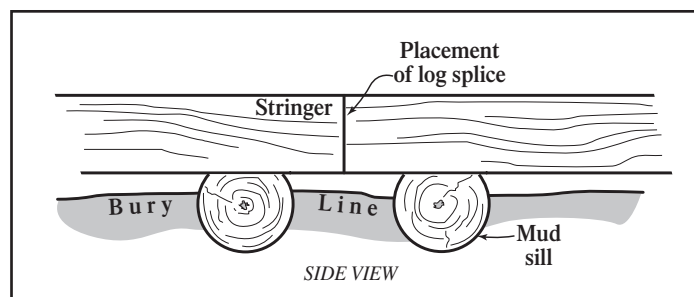
Figure 50—When using logs, notch the mud sill—not the stringer. Don't notch the sill more than one third of its diameter.

Next comes the decking. Decking pieces are fastened perpendicular to the stringers. The decking thickness will vary, depending on the loads the structure will need to support. Decking can be as short as 460 millimeters (18 inches) for a limited-duty puncheon for hikers. For stock or ATV use, decking should be 1.2 to 1.5 meters (4 to 5 feet) wide.

Do not spike decking to the center stringer, if you have one, because center spikes may work themselves up and become obstacles. Leave at least a 20-millimeter (3⁄4-inch) gap between decking pieces to allow water to run off (figure 51). Decking should be placed with tree growth rings curving down. This encourages water to run off rather than soak in and helps to prevent cupping.

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Steel drift pins, bolts, or rebar

25-mm (1-in) spacers

Curb

Running planks

Decking

Stringers

Bury

Notched mud sill logs

Line
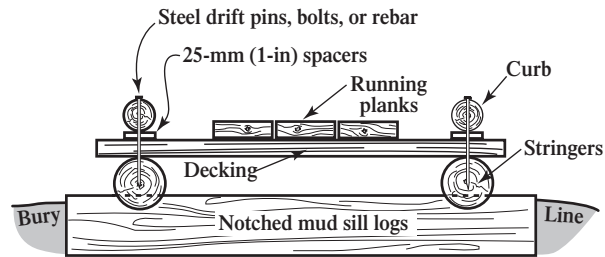
Figure 51—Place the stringers far enough apart to support the full width of the decking.

Running planks are often added down the center for stock to walk on. Often the running planks are untreated because horseshoes wear down the plank before wood has a chance to rot. Do not leave gaps between running planks because they can trap mountain bike or motorcycle wheels.

Curbs, also called bull rails, should be placed along each side of the puncheon for the full length of the structure to keep traffic in the center. To provide for drainage, nail spacers between the curb logs and the decking.

Finally, a bulkhead (sometimes called a backing plate) needs to be put at each end of the structure to keep the stringers from contacting the soil (figure 52). If the plate stays in place, do not spike it to the ends of the stringers. Spiking causes the stringers to rot faster.

Spacer   Decking

Curb

Trail grade

Rock fill

Stringer

Mineral soil

Mud sill
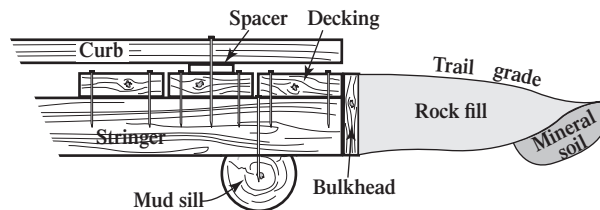
Bulkhead

Figure 52—Place a bulkhead or backing plate at each end of the puncheon. Approaches should have a rising grade so water will not run onto the structure.

Subsurface Puncheon

Subsurface puncheon is used in standing water or bogs. It is constructed with mud sills, stringers, and decking flush with or under the wetland's surface. This design depends on continual water saturation for preservation (figure 53). Moisture, air, and favorable temperatures are needed for wood to rot. Remove any one of these and wood won't rot. A good rule for reducing rot is to keep the structure continually dry or continually wet. Totally saturated wood will not rot because no air is present. Cover the surface between the curb logs with a layer of gravel, wood chips, or soil to help keep everything wet (figure 54).

Subsurface Puncheon
With Covered Tread Surfacing
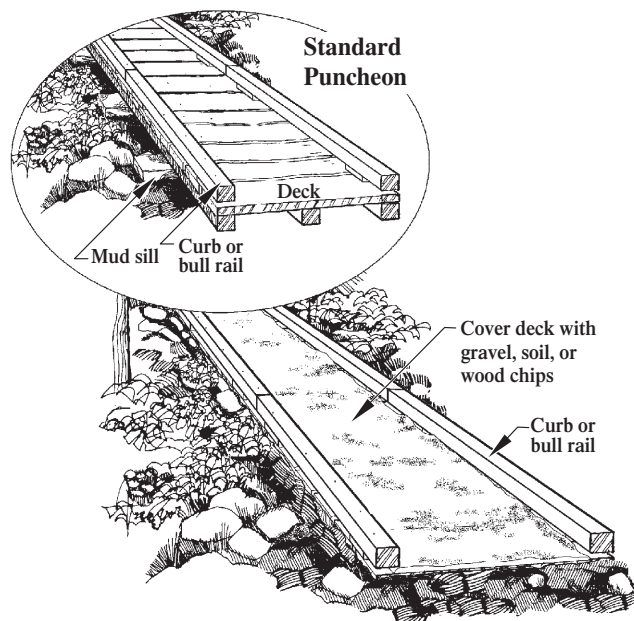
Figure 53—Cover the tread surface between the curb rails with gravel, wood chips, or soil to keep everything wet, preventing decay.

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Figure 54—Subsurface puncheon covered with soil and rock.

Corduroy

Corduroy is basically a primitive type of puncheon. It consists of three or more native logs laid on the ground as stringers with logs laid side-by-side across them and nailed in place (figure 55). Corduroy should always be buried, with only the side rails exposed. Corduroy is notorious for decaying quickly and consuming large amounts of material. It should be used only as a temporary measure and is not recommended for new construction. The use of corduroy may indicate that your trail has been poorly sited.

Corduroy

Cover with soil

Decking
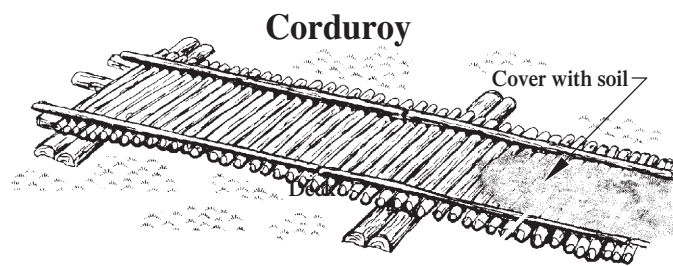
Figure 55—Corduroy should be considered a temporary fix until a more permanent structure can be installed.

Crossing Streams and Rivers
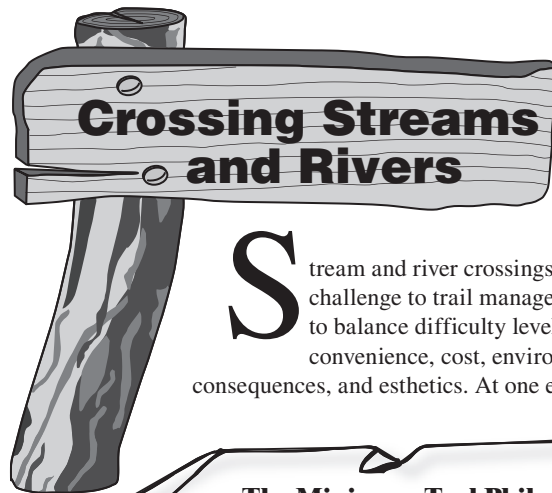
Stream and river crossings present a challenge to trail managers who need to balance difficulty levels, safety, convenience, cost, environmental consequences, and esthetics. At one end of the use

The Minimum Tool Philosophy

The minimum tool philosophy suggests that we get the job done with the least long-term impact while still meeting management objectives. A few minimum tool questions for crossings are:

- Do we really need a bridge here? Do we really need to cross here early in the spring?
- Will someone be killed or injured if we don't provide an easier crossing?
- Is this really the best place to cross this stream?
- What alternatives do we have to cross this stream, including not crossing it at all?
- Can we afford this crossing?
- What are the environmental and social consequences of a given type of crossing here?
- Can we commit to long-term inspections and maintenance?
- Who will really care if we don't build (or replace) a bridge?

It's a wonderful thing to keep one's feet dry, but keeping those feet dry in the backcountry is expensive.

spectrum, a bridge can allow people with disabilities, toddlers, and users who are new to the outdoors to experience the trail with little risk. But bridges are expensive. Wilderness visitors who expect a challenge may prefer a shallow stream ford. During high water, these folks may opt for a tightrope walk across a fallen log. Each kind of water crossing has consequences for the recreation experience and the lands being accessed. Choose wisely from the spectrum of options before committing present and future resources to any given crossing.

Shallow Stream Fords

A shallow stream ford is a consciously constructed crossing that will last for decades with a minimum of maintenance (barring major floods) and will provide a relatively low challenge to users.

The idea behind a shallow stream ford is to provide solid footing at a consistent depth from one bank to the other (figure 56). Most fords are designed to be used just during low to moderate flows. A ford for hikers and packstock, such as llamas and pack goats, should be no deeper than 400 to 600 millimeters (16 to 24 inches, about knee high) during most of the use season. A horse ford shouldn't be deeper than 1 meter (39 inches).

Fords should be located in wider, shallower portions of the stream. The approaches should climb a short distance above the typical high water line so that water isn't channeled down the tread (figure 57). Avoid locations where the stream turns, because the water will undercut approaches on the outside of a turn.

The tread in the ford should be level, ideally made of rock or medium-sized gravel that provides solid footing. The plan is to even out the waterflow through the ford so the gravel-sized material isn't washed away, leaving only cobble or boulders. Make sure you don't block passage for fish and other aquatic organisms.

Shallow Stream Ford

Grade reversal above
the high-water line
on both banks.

Downgrade

Embed rock dam
into each bank at
least 300 mm (12 in).

Streambank

Install 60 kg (130 lb)
stepping rocks on
upstream edge of tread.

Streamflow

300-mm (12-in) spacing

Hand-placed rocks,
60 kg (130 lb) min

Downgrade

High-water
line

Construct tread of
gravel and rock smaller
than 75 mm (3 in).

PLAN VIEW
NOT TO SCALE

Figure 56—Build fords when the water is low. Place stepping stones for hikers.

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Figure 57—Fords should be established in wider, shallower portions of a stream. Approaches should climb a short distance above the high-water line.

Several rows of stepping stones or rocks can be placed upstream from the tread to begin evening out the flow and slowing the water before it enters the ford. Be sure these rows of rocks are not too close to the trail or water flowing over them might scour the tread.

On trails receiving motorized use, rocks or concrete pavers (figure 58) can strengthen the trail tread and stream approaches for a solid crossing.

Well-constructed shallow stream fords are almost maintenance free. Watch for deep spots developing in the crossing. Floods or seasonal runoff can wash away the approaches. Debris can be trapped in the line of stepping stones, altering flow characteristics. Approaches can erode or turn into boggy traps. Maintenance consists of retaining or restoring an even, shallow flow and solid footing. When working in streams, consult the land manager and a fishery biologist to find out what you can and cannot do.
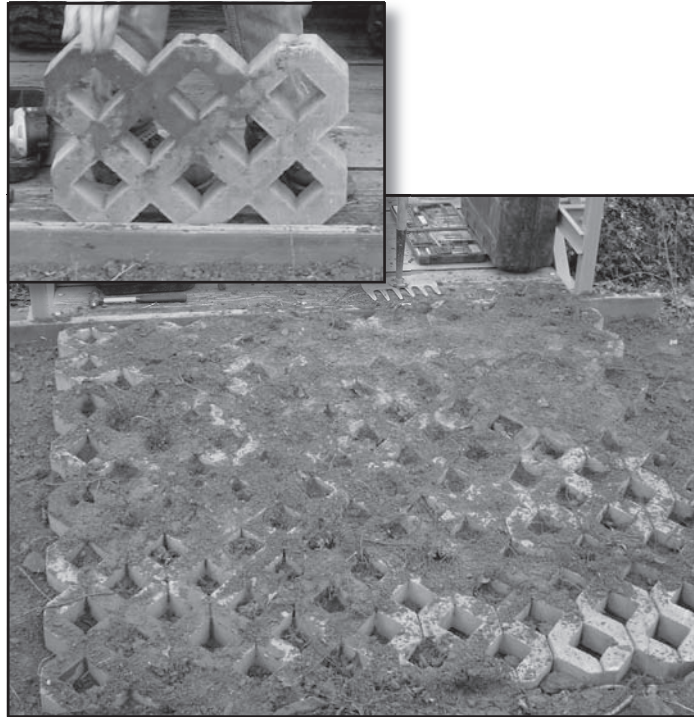
Figure 58—Concrete pavers are good for hardening trails and approaches for motorized use. The voids need to be filled.

Culverts

Culverts are probably the best way to move small volumes of water under a trail (figure 59). The tread extends over the culvert without interruption. Metal or plastic culverts can be installed easily, or culverts can be constructed out of rock.

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Figure 59—Culverts are a good option for moving small volumes of water under a trail.

To install metal or plastic culverts, dig a ditch across the trail as wide as the culvert and somewhat deeper. Bed the culvert in native soil shaped to fit it. There needs to be enough drop (about 3 percent) from one side of the trail to the other to keep water flowing through the culvert without dropping sediment. The culvert needs to be covered with 150 millimeters (6 inches) or more of fill. Cut the culvert a little longer than the trail's width, and build a rock facing around each end to shield the culvert from view and prevent it from washing loose. Often a rock-reinforced spillway will reduce headcutting and washouts on the downhill side of the culvert.

The local trail manager may have definite preferences for metal, plastic, wood, or rock culverts. Synthetic materials may be taboo in wilderness. Plastic is lighter than metal, easy to cut, and less notice-able. Aluminum or plastic are preferred over steel in acidic soils. Painting the ends of aluminum or steel culverts helps camouflage them. A culvert should be big enough to handle maximum storm runoff and allow it to be cleaned easily. Usually this means the culvert should be at least 260 millimeters (9 inches) in diameter.

Rock culverts offer workers a chance to display some real trail building skills (figure 60). Begin by laying large, flat stones in a deep trench to form the bottom of the culvert. In some installations, these rocks may not be necessary. Then install large, well-matched stones along either side of the trench. Finally, span the side rocks with large, flat rocks placed tightly together so they can withstand the expected trail use. Cover the top rocks with tread material to hide and protect the culvert. These culverts need to be large enough to clean out easily. The rocks should not wiggle.

Rock Culvert
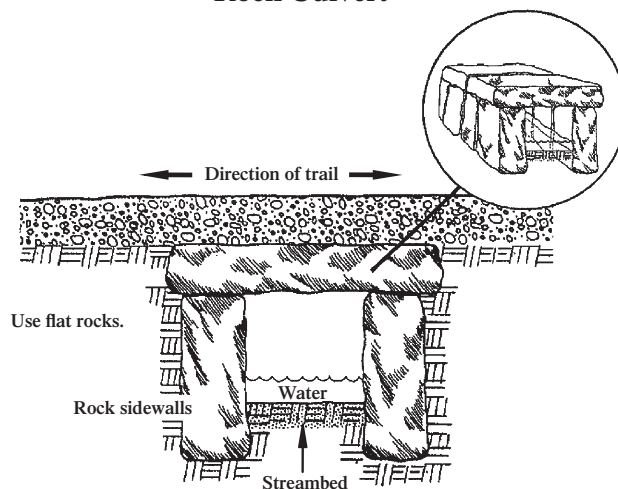
Figure 60—Rock culverts may have stones laid along the culvert's bottom. The perfect rocks shown here are seldom found in nature.

Water flowing toward a culvert often carries a lot of silt and debris. If the water slows as it goes into the culvert, the silt and debris may settle out, clogging the culvert. A good way to help prevent this problem is by constructing a *settling basin* at the inlet to the culvert (figure 61). This basin should be at least 300 millimeters (1 foot) deeper than the base of the culvert. Sediment will settle out in the basin, where it is much easier to shovel away, rather than inside the culvert.

Rock Culvert

Streamflow

Excavated settling basin

Trail

Rock

culvert

Tread
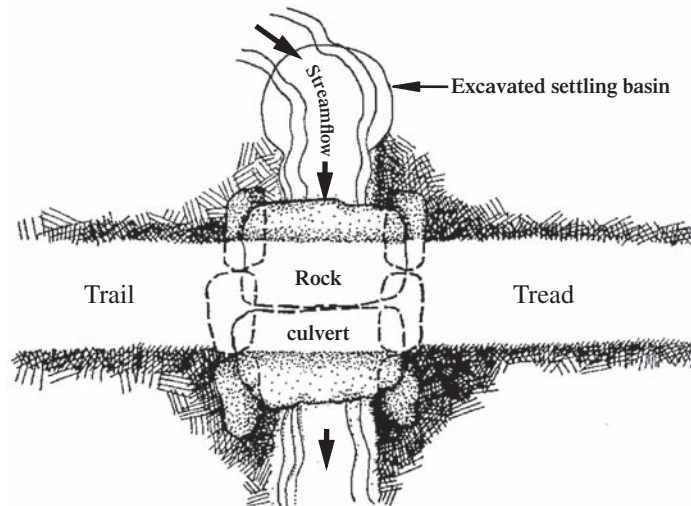
Figure 61—Settling basins help prevent culverts from clogging with silt and debris.

Bridges

Trail bridges range from a simple foot bridge with a handrail (figure 62) to multiple span, suspended, and truss structures. In the Forest Service, handrails are required on all bridges unless an analysis (design warrant) shows that the risk of falling off the bridge is minimal or the trail itself presents a higher risk. All bridges require a curb.

Design Approval
On national forests, all bridges require design approval from engineering before being constructed. Some regions have standardized, approved designs for simple bridges.

Figure 62—A simple footbridge with a handrail.

On hiking trails, log footbridges (figure 63) can be used to cross streams or to provide access during periods of high runoff. Log foot-bridges consist of a log, sills, and bulkheads. The log needs drainage and airspace to keep it from rotting. The foot log should be level and well anchored. Notch the sill—not the log—when leveling the foot log. The foot log should be no less than 457 millimeters (18 inches) in di-ameter. The top surface should be hewed to provide a walking surface that is at least 250 millimeters (10 inches) wide. Don't let the log or rails sit on the bare ground. Remove all bark from logs and poles.

If the foot log is associated with a shallow stream ford, be sure to posi-tion the log upstream or well downstream of the ford. Logs immedi-ately below the crossing can trap travelers who lose their footing in the ford.

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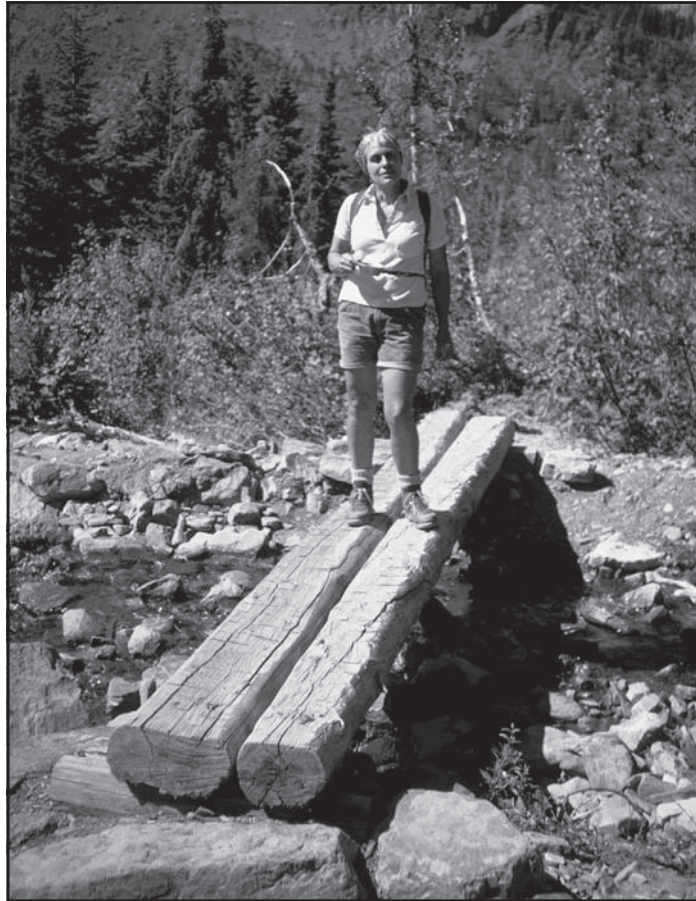
Figure 63—A log footbridge. The sill can be notched to accommodate the logs, but not vice versa. Photo has been digitally altered.

Choosing the materials for a bridge is not a simple process. Even the use of native material for a simple foot log has consequences. For example, most untreated logs of a durable wood (like coastal Douglas-fir) have a useful life of less than 20 years. Yet it may take 100 years

Handrails

In the Forest Service, handrails are required unless an analysis (design warrant) shows they are not needed. If you have handrails, construct them according to plan. Improperly constructed handrails are a big liability, because they probably will not be strong enough.

for a log to grow big enough to support visitor traffic and winter snow loads. The typical bridge has three to four stringers. Multiply this replacement-to-growth ratio by several replacement cycles and you can see how it's possible to create a slow-motion clearcut around a bridge site.

Often, materials are imported to avoid the problem of "clearcuts" near the bridge. Pressure-treated wood, metal, concrete, wood laminates, and even fiber-reinforced polymers are being used in bridges. Many of these materials must be trucked or flown to a bridge site and the old materials must be hauled out. All this is really expensive. Yet the cost of transporting durable materials may be less than the cost of frequently rebuilding structures made with native materials. It's possible to mix-and-match steel or other "unnatural but hidden" components with wood facing and decking to achieve a natural appearance.

Unless your bridge is preassembled and flown right onto a prepared set of abutments, you'll end up moving heavy materials around the bridge site. Be careful not to allow winch guylines and logs to scar trees and disturb the ground. Damage done in a moment can last for decades.

Other types of trail bridges include multiple-span, suspended, and truss structures (figure 64). A two-plank-wide suspended footbridge with cable handrails is more complex than it looks. Midstream piers for multiple span structures need to be designed by qualified engineers to support the design loads and to withstand the expected flood events. It does no one any good to win the National Primitive Skills Award for building a gigantic bridge by hand—only to have it fail a year later because of a design or construction oversight.

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Figure 64—A suspension trail bridge typical of the Northern Rockies.

Bridges are expensive, so it makes sense to take good care of them. Check foot logs and bridges annually for problems. Loose decking, planking, curbs, or handrails should be repaired as soon as possible. Clean debris and organic material from all exposed wood surfaces on the bridge or supporting structures. Structural members should be checked for shifting, loose, or missing spikes or bolts. Approaches need to be well drained so water does not run onto the bridge.

Report any of the following problems to a qualified bridge inspector who can determine whether the bridge should remain open to traffic: rotten wood; bent, broken, or disconnected steel members; large checks, splits, crushed areas, or insect damage in wood members; permanent sag or excessive deflection; erosion around abutments; broken concrete; concrete with cracks larger than 3 millimeters (⅛ inch); or exposed rebar.

The Forest Service requires all bridge structures to be inspected by a certified bridge inspector at least every 5 years.

A good online resource for more information is MTDC's "Trail Bridge Catalog" (Eriksson 2000).

Additional Trail Elements
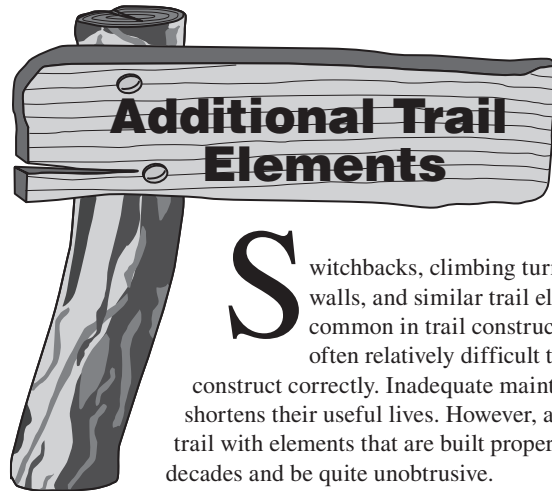
Switchbacks, climbing turns, retaining walls, and similar trail elements are common in trail construction. They are often relatively difficult to design and construct correctly. Inadequate maintenance greatly shortens their useful lives. However, a well-designed trail with elements that are built properly can last for decades and be quite unobtrusive.

The best way to learn how to build trail elements is to seek someone who has a reputation for designing and building well-thought-out switchbacks, climbing turns, or walls. Have that expert conduct a seminar for your crew or actually participate in the construction of a trail you're working on.

Switchbacks and climbing turns are used to reverse the direction of travel on hillsides and to gain elevation quickly (figure 65). What is the difference between the two? A *climbing turn* is a reversal in direction that maintains the existing grade going through the turn without a constructed landing. Climbing turns have a wider turn radius and are used on gentle slopes, typically 15 percent or less. Ideally, 7-percent sideslopes are best.

A *switchback* is also a reversal in direction, but it has a relatively level constructed landing. Switchbacks are used on steeper terrain, usually steeper than 15 percent. Switchback turns have pretty tight corners because of the steeper grades. Usually, special treatments such as approaches, barriers, and drainages need to be considered. Both of these turns take skill to locate. Choosing when to use each one is not always easy.

Switchbacks and Climbing Turns
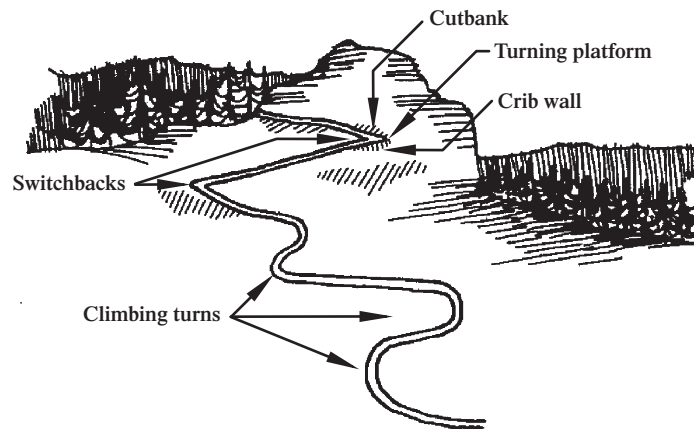
Figure 65—Climbing turns should be built on gentler sideslopes, usually 15 percent or less. Ideally, 7-percent sideslopes are best.

Understanding user psychology (human or animal) is more important to the success of climbing turns and switchbacks than to the success of any other trail element. The turns must be easier, more obvious, and more convenient than the alternatives. Climbing turns work best when terrain or vegetation screens the view of travelers coming down the upper approach toward the turn. Avoid building sets of these turns on open hillsides unless the terrain is very steep. It's usually best not to build turns, or the connecting legs of a series of turns, on or across a ridge. The local critters have trav-

Don't Overdo It
Keep in mind the minimum tool philosophy and build only as many trail elements as you absolutely need to reach your goal.

Plan carefully to avoid impassable or very difficult terrain, reducing the need for switchbacks and climbing turns.

eled directly up and down these ridges since the last ice age. They are not going to understand why you are building low hurdles in their path, and they will not be forced onto your trail and turns.

Climbing Turns

Climbing turns are the trail element most often constructed inappropriately. The usual problem is that a climbing turn is built (or attempted) on steep terrain where a switchback is needed. A climbing turn is built on the slope surface, and where it turns, it climbs at the same rate as the slope itself. Climbing turns work best when built on slopes of 15 percent or less.

The advantages of climbing turns in appropriate terrain is that a wider radius turn of 4 to 6 meters (13 to 20 feet) is relatively easy to construct (figure 66). Trails that serve off-highway-vehicle traffic often use insloped, or banked turns so that riders can keep up enough speed for
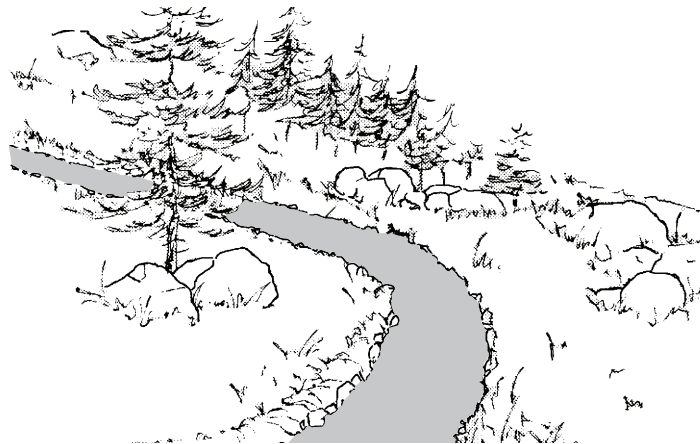
Figure 66—Climbing turns continue the climb through the turn. They can be insloped or outsloped. Add grade reversals at both approaches to keep water off the turn.

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control. Climbing turns are also easier than switchbacks for packstock and bikes to negotiate (figure 67). Climbing turns are usually less expensive than switchbacks because much less excavation is required and fill is not used.

Figure 67—Climbing turns are easier for packstock and cyclists to negotiate than switchbacks.

The tread at each end of the turn should be full-bench construction, matching that of the approaches. As the turn reaches the fall line, less material will be excavated. In the turn, the tread should not require excavation other than that needed to reach mineral soil.

To prevent shortcutting, wrap the turn around natural obstacles or place guide structures along the inside edge of the turn. The psychologically perfect place to build climbing turns is through dense brush or dog-hair thickets of trees. Always design grade reversals into both of the approaches to keep water off the turn.

Switchbacks

Switchbacks are used in steep terrain (figure 68). Suitable terrain for a switchback becomes harder to locate and maintenance costs increase as the sideslope becomes steeper. Sideslopes from 15 to 45 percent are preferred locations for switchbacks. Although switchbacks can be constructed on sideslopes of up to 55 percent, retaining structures are needed on such steep slopes.
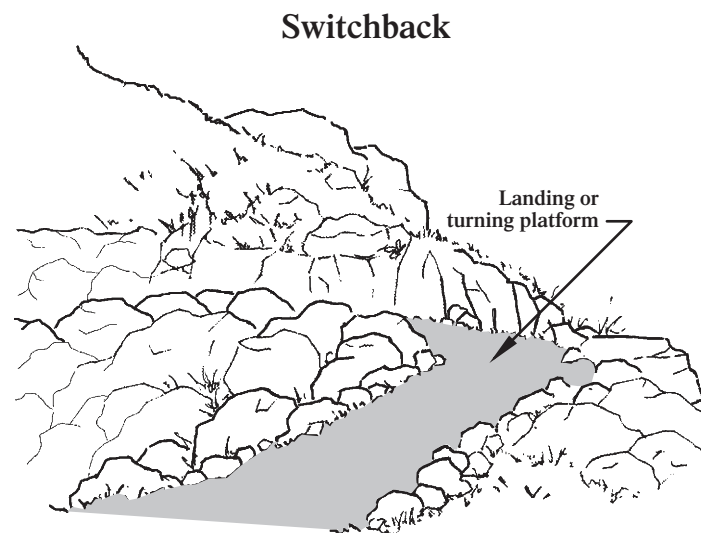
Switchback

Figure 68—A switchback with a turning platform.

Switchback turns are harder to build correctly than climbing turns, but they keep tread stable on steeper terrain. Most switchbacks are constructed to a much lower standard than is needed. The key to successful switchback construction is adequate excavation, using appropriate structures to hold the fill in place, and building psychologically sound approaches.

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Look for natural platforms when you are scouting for possible switchback locations. Use these platforms as control points when locating the connecting tread. Suitable platforms will save you a lot of time later by reducing the amount of excavation and fill needed.

A switchback consists of two approaches, a landing or turning platform, a drain for the upper approach and platform, and guide structures. The upper approach and the upper half of the turning platform are excavated from the slope. Part of the lower approach and the lower half of the turn are constructed on fill (figure 69).

Figure 69—Part of the lower approach and the lower half of this switchback are constructed on fill.

The approaches are the place where most of the trouble starts with switchback turns. The approaches should be designed for the primary user group. In general, the last 20 meters (65 feet) to the turn should be as steep as the desired level of difficulty will allow. This grade should be smoothly eased to match that of the turn in the last 2 to 3 meters (6 ½ to 10 feet).

Do not flatten the grade for 20 meters (65 feet) before the turn. If anything, steepen the approach grades to foster the sense that the switchback is the most convenient way of gaining or losing altitude (figure 70). There is absolutely nothing as infuriating as walking a nearly flat grade to a distant switchback turn while looking several meters over the edge at the nearly flat grade headed the other direction. You can build a Maginot Line of barricades and still not prevent people, packstock, and wildlife from cutting your switchback. The only exception is a trail designed primarily for wheeled vehicles where a flatter approach makes it easier for riders to control their vehicles.

Figure 70—The rocks help prevent users from being tempted to cut this switchback.

As the upper approach nears the turn, a grade reversal should be constructed. The tread below this point should be insloped until the halfway point in the turn. Both sides of this drain ditch should be backsloped to an angle appropriate for the local soil. As the turn is reached, the tread should be 0.5 to 1 meter (19 to 39 inches) wider than the approach tread. This is particularly important on small radius turns and for wheeled vehicles. It's less necessary for hikers and packstock.

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The turn can be a smooth radius ranging from 1.5 to 3 meters (5 to 10 feet) or a simple Y-shaped platform. A smooth radius turn is important if the trail's use includes wheeled traffic or packstrings. The Y platform works for hikers (figure 71). The turn platform is nearly flat, reaching no more than a 5-percent grade. The upper side is excavated from the

Switchback With Rock Retaining Wall

Backslope (refer to trail excavation details)
Insloped tread
Batter 2:1
Outsloped tread
Drain ditch
Retaining wall
Original ground line
Retaining wall

SIDE VIEW

Outslope
Upgrade
Inslope
Cut slope
Drain ditch
Landing (0- to 5-percent outslope)
Retaining wall
Upgrade
Outslope
Fill slope
Retaining wall

TOP VIEW
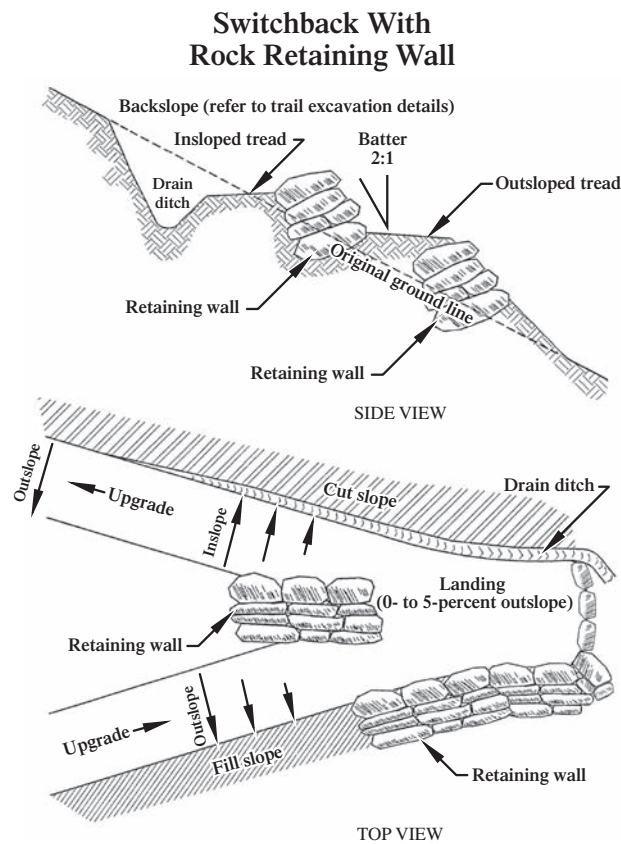
Figure 71—A switchback with a "Y" turning platform, suitable for hiking trails.

sideslope and borrow is used to construct the fill on the lower side. Switchbacks on steep sideslopes can require very large excavations to reach a stable backslope angle and provide clearance for packstock loads. The greater the turn's radius, the wider the platform, or the flatter the turn, the more excavation that will be required. A point may be reached where a retaining wall is needed to stabilize the backslope.

The amount of tamped fill required on the lower side of the turn will usually be at least as much as was excavated from the upper side unless a retaining wall is used to support the fill. A retaining wall is absolutely necessary where the terrain is steeper than the angle of repose for the fill material.

The tread in the upper portion should be insloped, leading to a drain along the toe of the backslope. This drain should extend along the entire backslope and be daylighted (have an outlet) where the excavation ends. Construct a spillway for the drain to protect the adjacent fill from erosion. You may need guide structures—rock walls or logs are common—on the inside of the turn to keep traffic on the trail.

Construct the approach on the lower side of the turn on tamped fill. The retaining wall should extend for most of this length. The tread on the lower portion of the turn should be outsloped. The fill section transitions into the full-bench part of the approach; the approach changes grade to match the general tread grade.

Try to avoid "stacking" a set of switchback turns on a hillside. Long legs between turns help reduce the temptation to shortcut. Staggering the turns so that legs are not the same length reduces the sense of artificiality (figure 72). Keep the grade between turns as steep as the challenge allows. Remember, travelers will cut switchbacks when they feel it's more convenient to do so than to stay on the tread. The designer's goal is to make travel on the trail more attractive than the shortcut.

Maintaining climbing turns and switchbacks requires working on the tread, improving drainage, and doing any necessary work on retaining walls, guide structures, and barricades. The tread should be insloped or outsloped as necessary, slough should be removed to return the tread to design width, and tread obstacles should be removed.

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Switchbacks

Less Desirable
frequent short
(or stacked)
switchbacks

Preferred
fewer long
switchbacks
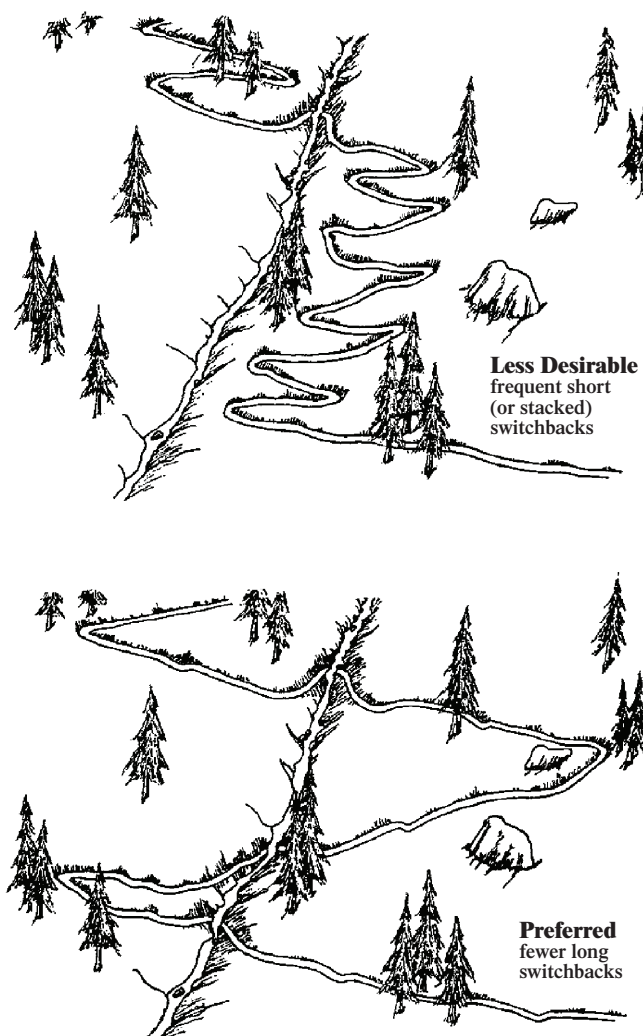
Figure 72—Long sections of trail between switchbacks are usually better than
short sections—fewer switchbacks will be needed, with fewer turns to shortcut.

Retaining Walls

Retaining structures keep dirt and rock in place. The retaining wall keeps fill from following the call of gravity and taking the tread with it. Retaining walls are useful for keeping scree slopes from sliding down and obliterating the tread, for keeping streams from eroding abutments, and for holding trail tread in place on steep sideslopes.

Two common retaining structures are the *rock retaining wall* and the *log crib wall*. Of course, rock is more durable and lasts longer than wood.

Rock retaining walls are used when a sturdy wall is needed to contain compacted fill (figure 73) or to hold a steep excavated backslope in place (figure 74). Rock retaining walls are also called *dry masonry* because no mortar is used between the rocks.

Figure 73—A rock retaining wall is needed to hold compacted fill.

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Figure 74—A rock retaining wall holding a steep, excavated backslope in place.

Ideally, the bigger the rock, the better. Big rocks are less likely to shift or become dislodged. At least half of the rocks should weigh more than 60 kilograms (130 pounds). The best rock is rectangular with flat surfaces on all sides. Round river rock is the worst.

To build a rock retaining wall, excavate a footing to firm, stable dirt or to solid rock. Tilt the footing slightly into the hillside (***batter***) so the rock wall will lean into the hill and dig it deep enough to support the foundation tier of rocks (these are usually the largest rocks in the wall). Ideally, the footing is dug so that the foundation tier is embedded for the full thickness of the rocks.

The batter should range from 2:1 to 4:1 (figure 75). Factors determining this angle include the size and regularity of the rock, the depth of header rocks, and the steepness and stability of the slope. At batter angles steeper than 4:1 or so, cement, internal anchors, or both, may be needed for stability.

Rock Retaining Wall Terminology

Batter: The amount that the wall leans into the hillside.

Outslope

Tread

Backfill: Mineral soil and/or small rock.

Capstone: Rock with sufficient mass and/or shape to provide a stable top course.

Tie stone or header rock: Rock that is longer to extend or "tie" the wall into the backfill.

Foundation course: The bottom layer of rock that provides a stable and insloped base—usually the largest rocks. They must be keyed into solid ground, not fill.

Figure 75—Terms used to describe rock retaining walls.

The *keystone* is laid into the footing and successive tiers are laid. For each tier, overlap the gaps between rocks in the next lower tier, called breaking the joints. Each tier should be staggered slightly into the hill to create the desired amount of batter. *Header rocks* are long rocks turned and placed so that they extend deep into the hillside. Using header rocks is particularly important if the wall's cross section widens as the wall gets higher.

Rocks in each successive tier should be set so they have at least three points of good contact with the rocks below. Good contact is defined as no wobble or shifting under a load without relying on shims (or chinking) to eliminate rocking. Shims are prone to shifting and should not be used to establish contact, especially on the face of the wall, where they can fall out. Add backfill and tamp crushed rocks into the cracks as you build.

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The Right Rock
In reality, you have to use the rock that is available. Small walls can be constructed successfully from small rocks. The key is the foundation and batter. Remember to save some large rocks for the *capstones*. A final point—most rock can be shaped with a few good blows with a rock hammer and carbide-tipped rock chisel. Placing rock on dirt rather than another rock before striking it will help ensure that the rock breaks where you want it to.

Log walls are designed to keep compacted fill in place (figure 76). Construct wood walls by interlocking logs or beams, pinned or notched (for logs) at the joints. Lay sill logs at right angles to the direction of travel and alternate tiers of face logs and header logs (figure 77).

Each successive tier is set to provide enough batter to resist creep pressure from the slope and to reduce pressure on the face logs from the fill. The ends of the header logs are seated against the backslope of the excavation for stability. As fill is tamped in place, filler logs are placed inside the structure to plug the spaces between the face logs. Filler logs are held in place by the fill.

Figure 76—Crib walls help keep compacted fill in place.

Crib Wall
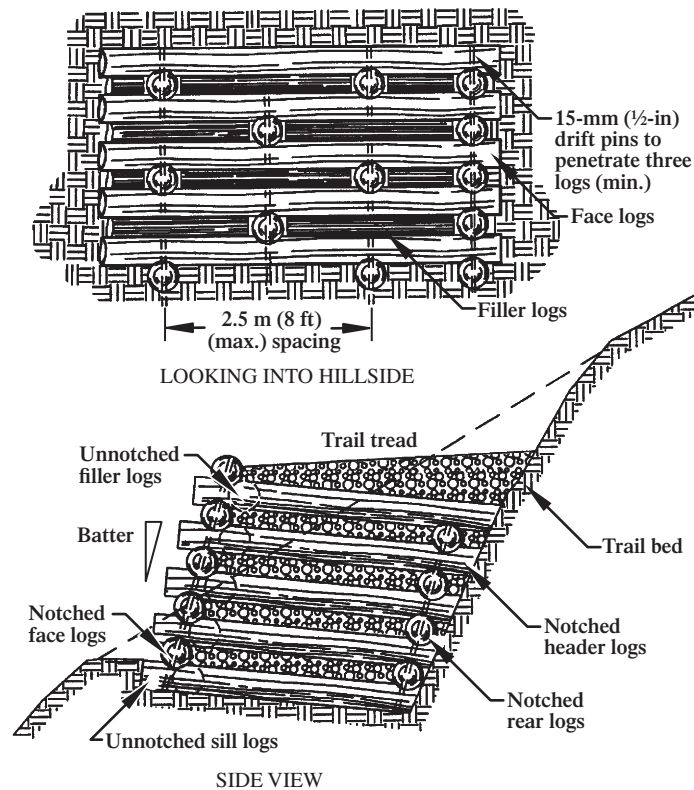
Figure 77—The characteristics of a crib wall. Treated logs are recommended.

Outslope the tread to keep water from saturating the fill and excavation. Use guide structures to keep traffic off the edge of the tread.

All retaining structures should be checked carefully for shifting, bulging, or loose structural material. Make sure that all the footings are protected from erosion. Anchor guides should be secure.

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Wire baskets (often called *gabions*) are another retaining structure. Gabions are wire baskets filled with rock (figure 78). The baskets are wired together in tiers and can be effective where no suitable source of well-shaped rock is available. Gabions look more artificial (in the eyes of traditionalists at any rate) and may not last as long as a rock wall, depending on the type of wire used and the climate.

Figure 78—Wire baskets, often called gabions, are another retaining structure.

Steps

Steps are used to gain a lot of elevation in a short distance. Steps are common on steep hiking trails in New England and elsewhere and less common (but not unheard of) on western trails used by horses and mules. Wooden steps of all configurations are common in coastal Alaska (figure 79).

Figure 79—A step-and-run boardwalk in Alaska.

Sometimes steps are used on an existing trail to fix a problem caused by poor trail location or design. Often, the result is out of character with the desired experience and esthetics of the trail. Before you construct steps, make sure they are consistent with the expectations of those the trail is designed to serve.

Your goal is to design the height (rise) and depth (run) of the steps to match the challenge desired. Steps are harder to negotiate as the rise increases. The difficulty also increases as the steps are closer together.

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Yet as the trail becomes steeper, the step must either be higher or the distance between steps must be shorter. Steps can be built into a trail that traverses the slope. This allows the traveler to gain elevation rapidly, without the scary steepness of a stairway.

The components of a step are: the rise, the run, a landing on easier grades, and often retainer logs (figure 80). The rise is the height of the face of each step. The run is the distance from the edge of one step to the base of the next step's face. The landing is the extension of the run above the step. In structures where the landing is composed of tamped fill material, logs are used to retain the fill.

Overlapping Rock Stairway

Individual Steps—Rock

Individual Steps—Logs
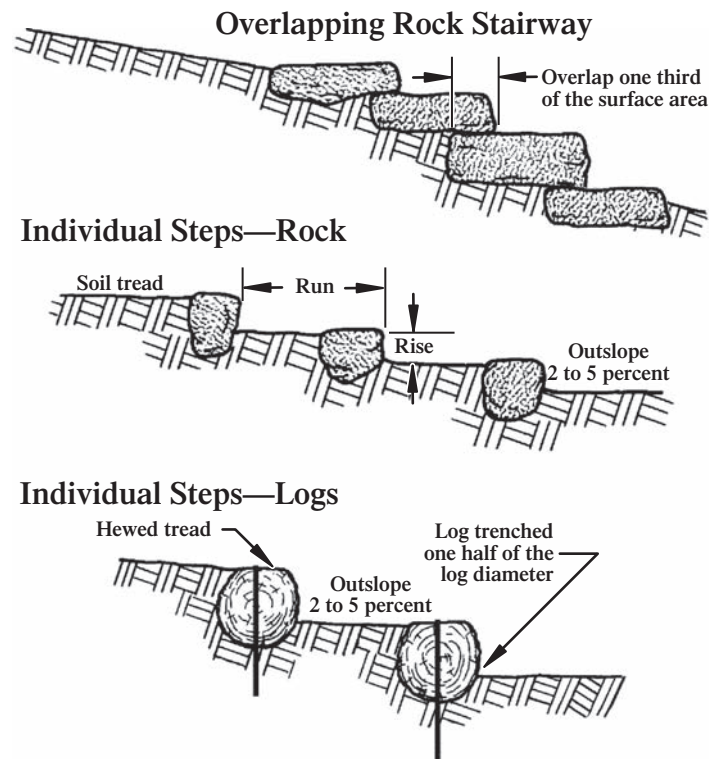
Figure 80—Common types of steps.

Hikers, especially backpackers, generally don't like steps and will walk alongside them if there is any opportunity. The steps need to be comfortable to climb or they won't be used. This means keeping the rise a reasonable 150 to 200 millimeters (6 to 8 inches) and the run long enough to hold a hiker's entire foot, 254 to 305 millimeters (10 to 12 inches, figure 81). It's helpful to corral the sides of steps with rocks to encourage users to stay on the steps.

Stair Proportions
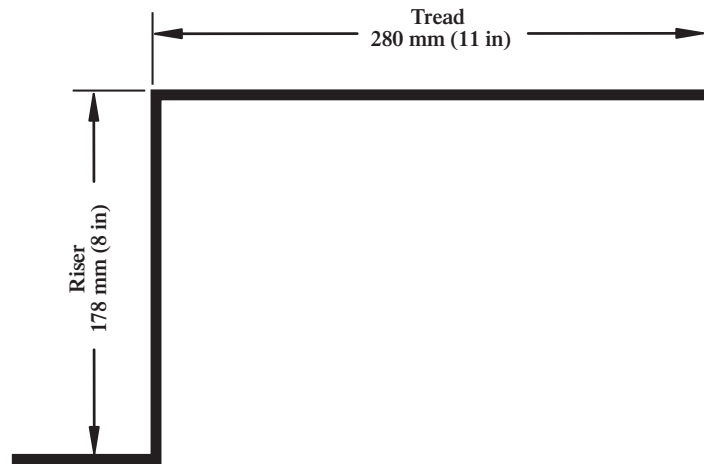
Figure 81—A general rule of thumb for stairs: twice the riser plus the tread should equal 635 to 686 millimeters (25 to 27 inches).

The most important area of the step is usually the tread. This is where most users step as they climb. The top of the step (and landing) should be stable and provide secure footing. The edge of the step should be solid and durable. The face or riser of each step should not slope back too far. This is particularly important as the rise of the step increases.

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If the stairway climbs straight up the hill, each step should be slightly crowned to drain water to the edges or be sloped slightly to one side. When the trail traverses a slope, each step and landing should be out-sloped slightly. Water should not be allowed to descend very far down a set of steps or to collect on the landing. A grade reversal or drain dip is a good idea where the trail approaches the top of the steps.

Build stairways from the bottom up, at a break in the grade. Bury the first rock; it will act as an anchor. The most common mistake is to start part way up a grade. If you do so, the trail will wash out below the stairs. The bottom step should be constructed on a solid, excavated footing. If it is constructed on top of exposed rock, it should be well pinned to the footing. Each successive step is placed atop the previous step (figure 82). Wood steps are usually pinned to each other and to the footing. Dry masonry rock steps usually rely on the contact with the step below and with the footing to provide stability (figure 83).

Step Construction

Start the first step at the break in grade

The tendency is to start up here.
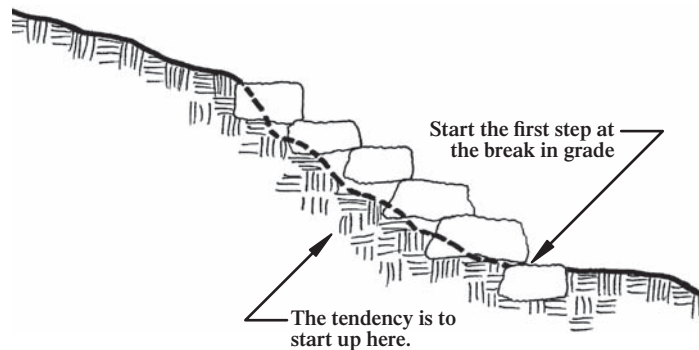
Figure 82—Begin laying steps at the bottom of a grade rather than midway.

Figure 83—Each dry masonry rock step needs to contact the step below.

Steps with landings are a bit harder to secure because the steps do not overlap. Each step can be placed in an excavated footing and the material below the rise removed to form the landing of the next lower step. Usually, this is the most stable arrangement. Or the step can be secured

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on the surface and fill can be used to form a landing behind it. When the landing consists of tamped fill, the material used to provide the rise does double duty as a retaining structure. These steps must be seated well to prevent them from being dislodged by traffic. For stock use, landings should be long enough, about 2 meters (6 ½ feet), to hold all four of the animal's feet (figure 84).

Figure 84—For stock use, landings should be long enough to hold all four of the animal's feet, or about 2 meters (6 ½ feet) long.

In all steps, the key is to use the largest material possible and to seat it as deeply as possible. Rocks should be massive and rectangular. On steps that traverse a slope, it helps to seat the upper end of the step in footings excavated into the slope.

Pavers

Pavers can be used to armor switchback turns and steeper slopes, especially on trails designed for motorized traffic (figure 85). Some styles of pavers allow vegetation to penetrate them; others have voids that can be filled with soil, gravel, or other suitable material. In highly erodible soils, pavers combined with geotextiles are an option.

Figure 85—Pavers can be used to armor sections of trail for motorized traffic.

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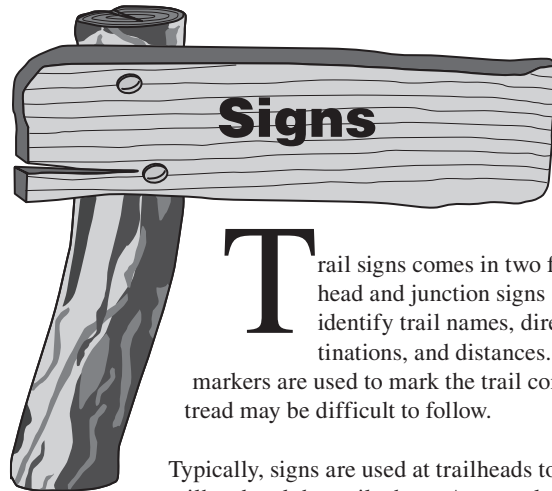
Signs

Trail signs comes in two forms. Trailhead and junction signs are used to identify trail names, directions, destinations, and distances. Reassurance markers are used to mark the trail corridor when the tread may be difficult to follow.

Typically, signs are used at trailheads to identify the trailhead and the trails there. At some locations, destinations accessed by these trails and the distances to the destinations will be displayed. Signs also are used at system trail junctions (and road crossings) to identify each trail by name and indicate its direction. Signs may identify features, destinations, and occasionally, regulations, warnings, or closures.

Reassurance markers include cut blazes on trees; wood, plastic, or metal tags; posts; and cairns. Reassurance markers are more useful as the tread becomes more difficult to identify and follow. These markers help travelers identify the trail corridor when the tread is indistinct, the ground is covered with snow, or when the route is confused by multiple trails or obscured by weather, such as dense fog. National trails usually are marked periodically with specially designed tags.

The number of signs or reassurance markers depends primarily on the planned user skill level. Low-challenge trails typically will be signed with destinations and distances. Usually, the trail will be so obvious that reassurance marking is necessary only at points where users might be confused. As the desired opportunity for challenge rises, the amount of information given by signs usually drops to trail identification and direction. You may find special guidelines for wilderness areas.

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Installing Signs

Trail signs are made of a variety of materials; the most typical is Carsonite or wood. Usually, signs are mounted on posts or trees. Signs in rocky areas should be mounted on a post seated in an excavated hole or supported by a well-constructed cairn.

Wooden posts may be obtained onsite or hauled in. Onsite (native) material is usually less expensive, but may have a shorter useful life. Native material looks less artificial; it may be preferred in primitive settings. Purchased posts should be pressure treated. Their longer lifespan will offset the higher initial purchase and transportation costs. Round posts appear less artificial than square posts and provide more options for custom alignment of signs at trail junctions. Posts should be at least 150 millimeters (6 inches) in diameter.

Signs should be placed where they are easy to read, but far enough from the tread to leave clearance for normal traffic. Different agencies have special rules regarding signs. Make sure you're following the rules that apply to your trail. In deep snow country, try to locate the post in relatively flat surroundings to reduce the effects of snow creep, which can carry signs down the hill.

Sign Plans

The number and types of signs and reassurance markers should be detailed in a sign plan for the area you are working in. Consistent with the plan, signs and markers should be esthetically appropriate, visible, in useful locations, and well maintained. Install no more signs than necessary.

Spikes or lag screws can be used at the base of the post to improve anchoring (figure 86). Seat the post in the hole and keep it vertical while you drop a few rocks into the hole to secure it. Tamp these rocks with a rockbar or tool handle to jam them into place. Continue to place rocks and dirt in the hole, tamping as you go. Top off the hole with mounded soil to accommodate settling and to prevent water from puddling around the post.

Signpost Installation
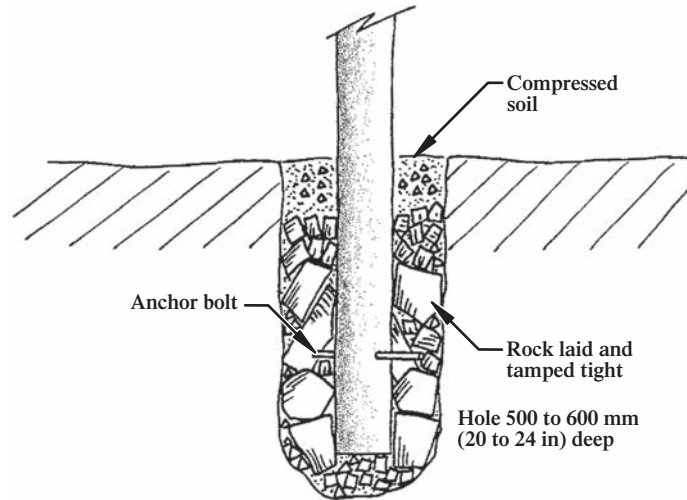
Figure 86—The key to placing solid posts is to tamp the rock and soil with a rockbar as you fill the hole.

In rocky areas or very soft soils (such as those next to a turnpike), signposts can be supported by a cairn. Horizontally placed spikes or lag screws should be used at the base for anchors. Chinking the cairn with smaller rocks helps tighten the post against the larger stones. "Anchoring Trail Markers and Signs in Rocky Areas" (Watson 2005) provides instructions for installing signposts without using heavy tools and equipment.

Signs should have holes already drilled so they can be attached to the post. Level each sign and secure it with galvanized lag screws or, better yet, through-bolts that have a bolt head and washer on one side and a washer and nut on the other. Galvanized hardware reduces rust stains on the sign. New wood preservatives like ACQ (alkaline copper quaternary compound) are highly corrosive to aluminum and carbon steel. Use triple-dipped galvanized fasteners. Galvanized washers should

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be used between the head of the screw and the sign face to reduce the potential for the sign to pull over the screw. In areas where sign theft is a problem, use special theft-prevention hardware.

The bottom edge of signs should be set about 1.5 meters (60 inches) above the tread. The sign's top edge should be 50 millimeters (2 inches) below the top of the post. Where snow loads are a problem, the post can be notched and the signs seated full depth in the post. Treated posts will be susceptible to rotting where they are notched, so they should be spot treated with preservative.

Use caution when mounting signs to trees. The sign should be obvious to travelers and legible from the tread. If signs mounted on trees doesn't meet these conditions, use a post instead. Mount signs to trees with galvanized lag screws and washers, rather than spikes. That way, the sign can be loosened periodically to accommodate tree growth. Leave a gap between the sign and the tree to allow for the growth.

Installing Reassurance Markers

Reassurance markers are used only where the trail is not obvious. If the tread is obvious during the regular use season, these markers aren't needed. Reassurance markers may be helpful if a trail is hard to follow because the tread is indistinct, regularly covered with snow during part of the normal use season, or if weather conditions (such as fog) make the trail hard to distinguish at times. Reassurance markers also are helpful at junctions with nonsystem (informal) trails, or where multiple trails cause confusion.

Place reassurance markers carefully. They should be clearly visible from any point where the trail could be lost. This is a judgment call, often controversial, based on the challenge level served by the trail and the conditions along it. Higher challenge trails need fewer markers; lower challenge trails may need more.

Each marker location should be flagged before installation and checked for visibility in the desired direction of travel. Each location should be marked in both directions (on both sides of the same tree) so there is no question whether or not the marker is official. The marking decisions should be based on traffic traveling in both directions. Be conservative with markers. It's better to improve tread visibility than to rely on markers, except on high-challenge trails where tread frequently may not be visible at all.

The classic reassurance marker is a blaze cut on a tree. The standard Forest Service *blaze* should always be used to differentiate it from the freeform blazes and antler rubbings that appear on nonsystem trails (figure 87). Cut blazes carefully because a mistake can't be repaired. If a blaze is consistently buried by snow during part of the use season, the

Blazes and Marker Tags

Top blaze:
100 mm (4 in)
wide and 50 mm
(2 in) tall

Vertical
space
between
blazes:
50 to 100 mm
(2 to 4 in)

Lower blaze:
100 mm (4 in)
wide and 200 mm
(8 in) tall

Distance from
the ground:
1.5 m (5 ft)
for foot trails

Blaze

Marker tag

1.5 m (5 ft) min.
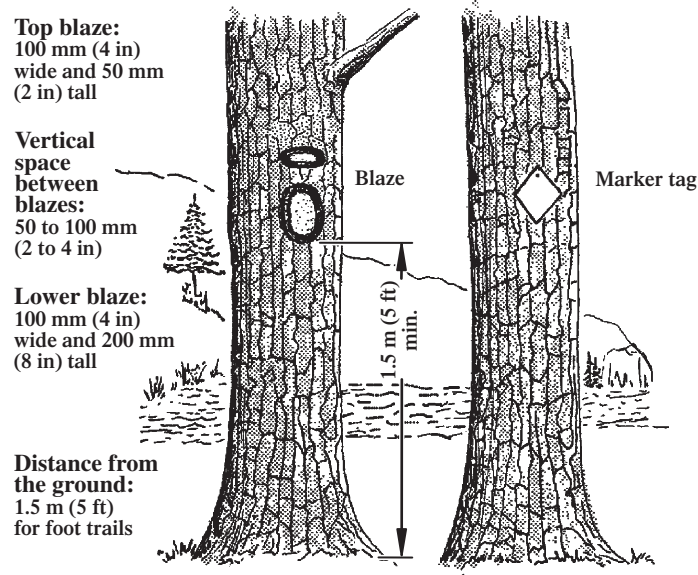
Figure 87—Blaze trees on both sides. Cut the blaze no deeper than needed for clear visibility. Blazes are no longer cut into trees in many parts of the country.

blaze can be cut higher on the tree, but not so high that it becomes difficult to locate from the tread. Cut blazes may, on rare occasions, need to be freshened—recut them carefully.

Blazes are no longer cut on trees in many parts of the country. Check with your local trail manager to learn what's appropriate. Policies vary across the Nation.

Different types of blazes may be used on some specially designated trails, such as the Appalachian Trail. *Blazers* (sometimes called marker tags) are used when higher visibility is desired and esthetic considerations are not critical. The most common tags are colored diamonds of plastic or metal, reflective for night use or nonreflective when called for in the trail management plan. Various colors are used. These tags should be mounted on trees using aluminum nails. Allow 12 millimeters (½ inch) or so behind the tag for additional tree growth. Directional arrows, where appropriate, should be placed in a similar fashion. Markers also can be mounted on wooden or fiberglass posts.

Blazers should be checked for continued usefulness. If the tread is more obvious than when these markers were originally installed, consider removing some. If folks are getting lost, restore more visible tread, move existing blazers to more visible locations, or add a few more where they will be most effective. Remove all signs and blazers that don't fit the plan for the area.

Painted blazes are sometimes used. Be absolutely sure to use a template of a size and color specified in your trail management plan. Don't let just anyone start painting blazes.

Cairns are used in open areas where low visibility or snow cover makes it difficult to follow the tread or where the tread is rocky and indistinct. Two or three stones piled one on top of the other—sometimes called rock ducks—are no substitute for cairns and should be scattered at every opportunity. Cairns are similar in construction to rock cribs and consist of circular tiers of stones (figure 88).

Cairns

Use flat stones and overlap the joints.

Slope stones inward.

Do not use small stones wedged in cracks for structural support.

Use large stones to build the base.

900 mm (35 in)

750 mm (30 in) min.
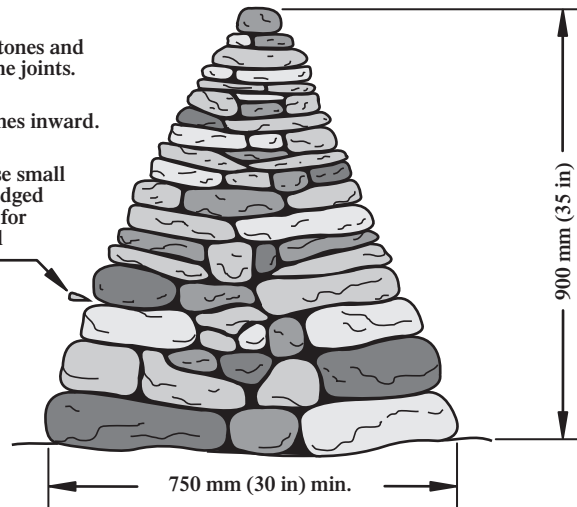
SIDE VIEW

Overlap all joints.

Pack the center with rubble.

Illustrations courtesy of the Appalachian Mountain Club's Trail Adopter Handbook.
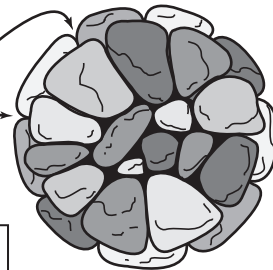
TOP VIEW
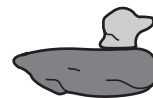
Rock Duck

Figure 88—Two- or three-stone rock ducks are no substitute for cairns and should not be built.

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Make the base of the cairn wide enough to provide enough batter for stability. In really deep snow country, you may need to add a long guide pole in the center as the cairn is built. If it's appropriate to remove the guide pole during the summer, a pipe can be built into the center of the cairn, allowing the guide pole to be removed easily.

Cairns should be spaced closely enough that the next cairn is visible in either direction from any given cairn during periods of poor visibility (such as dense fog). Cairns should be placed on small rises (not in swales). If cairns are used in areas of large talus, use a 2-meter (6.5-foot) guide pole in the center to distinguish the cairn from other piles of rock. The best time to decide where to place cairns is during a day with poor visibility.

In some settings, *guide poles* are more effective than cairns. They are most useful in snowfield crossings to keep traffic in the vicinity of the buried trail. Guide poles should be long enough to extend about 2 m (6.5 ft) above the top of the snowpack during the typical season of use. Guide poles should be at least 100 mm (4 in) in diameter. They should be sturdy enough to withstand early season storms before the snow can support them and to withstand pressures from snow creep later in the season. Avoid placing guide poles in avalanche paths. Don't mark trails for winter travel if they cross known avalanche paths.

Guide poles are also used in large meadows where tall grasses make cairns hard to spot, or where there is too little stone for cairns.

Maintaining Signs and Markers

Sign maintenance consists of remounting loose or fallen signs, repairing or replacing signs, and resetting or replacing leaning, damaged, rotting, or missing posts.

If the sign is missing, a replacement sign should be ordered and installed. Consider why the sign is missing. If the sign was stolen, consider using theft-resistant hardware to mount its replacement. If

Photo Sign Inventories

Before-and-after photos help document what is happening to signs in the field and how new signs look before the forces of nature (and visitors) resume work. A good sign inventory with photos makes it easier to order replacements for missing or completely trashed signs.

the sign was eaten by wildlife, consider less palatable materials. If weather or natural events munched the sign, consider stronger materials, a different location, or a different system for mounting the signs.

For signs mounted on trees, you may need to loosen the lag screws slightly to give the tree growing room. If the sign is on a post, check to make sure that it is snugly attached. Replace rotting posts. Don't just try to get through "one more season."

Check with your manager for guidelines that will help you decide when signs should be replaced because they have bullet holes, chipped paint, missing or illegible letters, incorrect information, cracked boards, splintered mounting holes, or missing pieces. Consider the consequences of not repairing or replacing deficient signs. Take some photos to help portray the situation.

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Reclaiming Trails

Reclaiming abandoned trails requires as much attention and planning as constructing a new trail. If you're rerouting a section of trail, the new section needs to be well designed, fun, and better than the one you're closing. If your new trail doesn't provide a better experience than the old trail, visitors will keep using the old one!

The goal is to reduce the impact trails have on the landscape. Simple restoration may consist of blocking shortcuts and allowing the vegetation to recover. Complex restoration projects include obliterating the tread, recontouring, and planting native species. Careful monitoring and followup are needed to ensure that almost all evidence of the old trail is gone. Restoration projects range from simple and relatively inexpensive to complex and costly (figure 89).

Figure 89—A candidate trail for a turnpike or rerouting, followed by reclamation of the old trail.

For more detailed advice on restoration, see the "Wilderness and Backcountry Site Restoration Guide" (Therrell and others 2006).

Past practices of trail abandonment have left permanent scars on the land. You probably know of abandoned trails that had a few logs and rocks dragged into the tread and trenches. Decades later, those same trails are still visible, still eroding, still ugly, and sometimes, still being used!

Reclamation strategies include: closure, stabilization, recontouring, revegetation, and monitoring. Restoration needs to be carefully planned. The consequences of each strategy should be examined. Consult with a hydrologist, landscape architect, and soil and plant specialists when planning to reclaim an old trail.

Each abandoned trail section should be reclaimed. This is true whether an entire trail is abandoned or a segment with multiple trails is being narrowed to one tread. If the abandoned trail is not blocked to prevent further use, it may persist indefinitely. Closure is particularly important if stabilization and revegetation are to succeed. The abandoned tread should be blocked to all traffic, recontoured, and disguised (figure 90)

Figure 90—Sagebrush is being transplanted to help disguise this reclaimed trail.

to prevent users from being tempted to take it. This work should be completed for all segments visible from trails that remain open.

Stabilizing abandoned tread to prevent further erosion will promote natural revegetation in some instances. Trails break natural drainage patterns and collect and concentrate surface waterflows. Restoring the natural contour of the slope reestablishes the local drainage patterns and reduces the likelihood of erosion. Recontouring usually eliminates any temptation to use the old trail and assists revegetation. Pull fillslope material back into the cut and use additional material to rebuild the slope, if necessary.

Completely break up or scarify the compacted tread at least 4 inches deep. Doing so will allow native grasses, plants, and seed to take hold and grow. Fill in the visual or vertical opening of the corridor by planting shrubs, trees, and even deadfall (figure 91). Finally, sprinkle leaves and needles to complete the disguise.

Remove culverts and replace them with ditches.
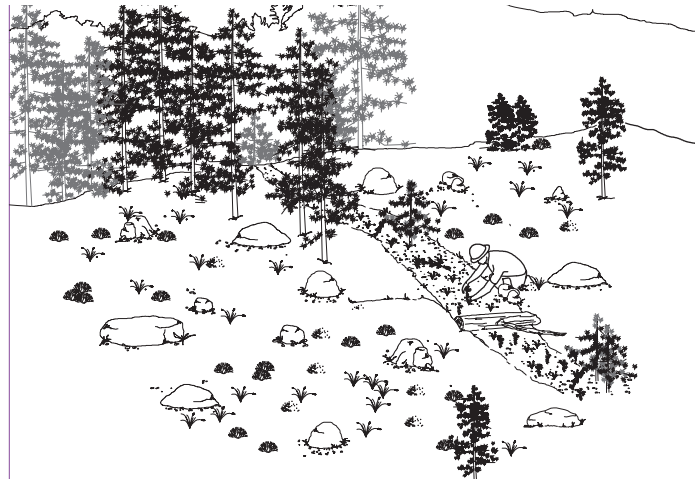
Figure 91—Abandoned trails need to be blocked off effectively, and with sensitivity. Plant native grasses and plants. Use shrubs or deadfall to fill the opening left by the abandoned trail.

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Check Dams

Check dams are used on sections of abandoned, trenched tread to stop erosion and hold material in place during site restoration. Check dams are intended to slow and hold surface water long enough for the water to deposit sediment it is carrying. Check dams should be used with drainage structures to reduce overall erosion from the abandoned tread (figure 92).

Check Dams

150 to 250 mm
(6 to 10 in) typical

Use 300-mm (12-in) -diameter logs
or 100- x 300-mm (4- x 12-in)
dimensional lumber.

125 mm
(6 in) min.

50- x 450-mm (2- x 18-in) stakes.
Use 16d ringshank or barbed nails.

16- x 600-mm (½- x 24-in) #4 rebar.
Drive flush with top of log.

SIDE VIEW

Embed logs,
rocks, or
dimensional
lumber at least
300 mm (12 in)
into undisturbed
bank.

TOP VIEW
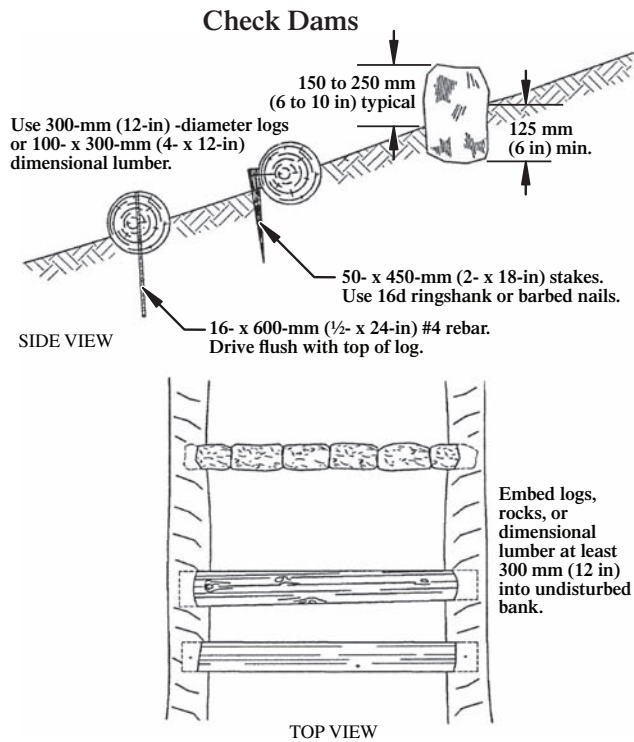
Figure 92—Check dams allow soil to rebuild on eroded trails.

Check dams are best used as holding structures for fill to help recontour the old tread. The material used in the dam should be seated in an excavated footing that extends into the sides of the gully. As material behind

the dam builds up, additional levels can be added to the dam with enough batter to keep the dam stable against the pressure of the fill. The top of the dam should be level or slightly higher than the excavated footing. For watertightness, the uphill face of the dam should be chinked and covered with tamped fill. These trenches take a long time to fill up. Most never do. If they do, add fill below the dam to finish the process.

Spacing between dams depends on the steepness of the old grade and the degree of restoration desired. If the check dams are intended only to slow down erosion on a 25-percent grade, relatively wide spacing is sufficient, every 20 meters (65 feet). If the intent is to fill in half of the old trench, the bottom of each dam should be level with the top of the next lower dam. On steeper grades, the dams need to be closer together (figure 93). If the intent is to approach complete recontouring of the

Figure 93—Over the years, this gully should fill in.

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trench, the dams should be closer still, especially on grades steeper than 25 percent. A point of diminishing returns is reached on grades steeper than 40 percent. Check dams would have to be built right on top of each other to retain soil at the full depth of the trench.

Revegetation

Revegetation can be accomplished passively or actively. Passive revegetation allows surrounding vegetation to colonize the abandoned trail. This process works when erosion has been stopped, precipitation is adequate, the tread has been scarified, and adjacent vegetation spreads and grows rapidly. Disturbed soil provides an opportunity for invasive plants to take hold. Active revegetation ranges from transplanting propagated native plants to importing genetically appropriate seed. Successful revegetation almost never happens in a single season. Plan carefully for best results.

There are no cookbook answers for returning abandoned trails to their natural condition. Each site should be evaluated for its potential to re-grow and heal. On sites that are moist and relatively flat, it may be possible to block off the trail and allow rehabilitation to proceed naturally. Dry, steep sites will take a lot of work.

Tools

Specialized trail tools can help make your trail work more enjoyable.

Remember:
- Your most important tool is your brain—use it.
- Always use proper personal protective equipment, such as hardhats, gloves, and safety glasses. Make sure a job hazard analysis has been approved and a safety plan is being followed.
- Select the right tool for the job. Carefully inspect each tool. Make sure the handles are sound, smooth, and straight, and that the heads are tight.
- Pace yourself. Take rest breaks, drink plenty of water, and keep your mind on your work. Crewmembers should trade off on work tasks occasionally for relief from repetitive stresses.
- Keep cutting tools sharp. A dull tool makes your work harder and more dangerous.
- Before you start, clear away any brush or limbs that might catch a swinging tool.
- Posture is important. Stand comfortably in balance. Adjust your stance and tool grip continually to prevent slipping and to avoid glancing blows. Be especially careful when working in wet, slippery conditions.
- Be thinking about the consequences of every move. If you are working with a rock or log, think ahead so you are not standing in the wrong place when it moves. Be ready to toss your tool aside and jump free. Avoid cutting toward any part of your body, and watch out for your coworkers. Use skill, not brute force.

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- When carrying, loading, or storing a cutting tool, cover the blade with a sheath to protect both the sharp edge and yourself. In vehicles, make sure tools are fastened down.
- Maintain at least 3 meters (10 feet) between workers as a safe operating distance when using individual chopping and cutting tools.
- Carry sharp tools at your downhill side. Grasp the handle at about the balance point with the sharpened blade forward and down. If you fall, throw the tool clear.
- At the work site, lay tools on the uphill side of the trail with the business end farthest uphill. Make sure the handles are far enough off the edge of the trail so they are not a tripping hazard. Never sink double-bit axes, McLeods, Pulaskis, mattocks, or similar tools into tree trunks, stumps, or the ground where the exposed portion of the tool will present a hazard.

Tools for Measuring

Clinometers—A clinometer, called a clino by trail workers, is a simple, yet useful, instrument for measuring grades. Most clinometers have two scales, one indicating percent of slope, the other showing degrees. Percent slope, the relationship between rise or drop over a horizontal distance, is the most commonly used measure. Percent readings are found on the right hand side of the scale. Don't confuse percent and degree readings. It is easy to do! Expressed as an equation:

Percent of Grade $= \dfrac{\text{Rise}}{\text{Run}} \times 100$ percent

A section of trail 30 meters (100 feet) long with 3 meters (10 feet) of difference in elevation would be a 10-percent grade. A 100-percent grade represents 45 degrees.

Traditionalists often prefer an Abney level to a clinometer. They are easier to see through and there are no measurements to read.

Global Positioning Systems (GPS)—Most trail surveyors are using GPS receivers for accurate trail location, inventory, and contract preparation. Real-time correction is no longer necessary and prices have fallen. GPS is becoming the norm for locating trails.

Tape Measures—Get a tape measure with metric units. Mark off commonly used measurements on your tool handles. Know the length of your feet, arms, fingers, and other rulers that are always handy on the trail. Calibrate the length of your pace over a known course so you can easily estimate longer distances.

Tools for Sawing

Bow Saws—These saws are useful for clearing small downfall and for limbing. They consist of a tubular steel frame that accepts replaceable blades. The blades can be removed by loosening a wing nut or releasing a throw clamp.
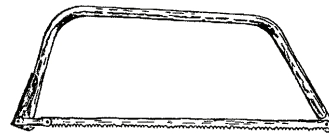
Bow saw

Chain Saws—A chain saw can make short work of your cutting tasks—but it is not for wilderness use. Specialized instruction and certification are required, so make sure you are certified before operating a chain saw.

Crosscut Saws—Symmetric crosscut saws, those designed for a sawyer at either end, follow two basic patterns. Felling crosscuts are light, flexible,

Felling crosscut

Bucking crosscut

and have concave backs that conform easily to the arc of the cut and the sawyer's arm. The narrowed distance between the teeth and back
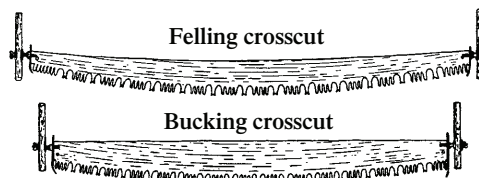
leaves room for sawyers to get wedges into the cut quickly. Bucking crosscuts have straight backs and are heavier and stiffer than felling saws. Bucking saws are recommended for most trail work because they are more versatile.

Bucking saws also are available as asymmetric saws, with a handle at one end that can be used by a single sawyer.

Cover the blades with sections of rubber-lined firehose slit lengthwise. Velcro fasteners make these guards easy to put on and take off. When carrying a saw, lay it flat across one shoulder with a guard covering the teeth. The teeth need to face away from the neck. Don't leave a wet guard on a saw.

A sharp crosscut saw is a pleasure to operate, but a dull or incorrectly filed saw is a source of endless frustration, leading to its reputation as a misery whip. Never sharpen a saw without a saw vise and the knowledge to use it. Field sharpening ruins crosscut saws.

Warren Miller's classic, the "Crosscut Saw Manual" (revised 2003), provides information on sharpening techniques. David E. Michael's "Saws That Sing: A Guide To Using Crosscut Saws" (2004) tells you everything else you will need to know. Both are available from the Federal Highway Administration's Recreational Trails Web site: *http://www.fhwa.dot.gov/environment/fspubs/.*

A saw's teeth are needle sharp. Wear gloves when sawing and keep your hands clear of the cut and the blade. Carry bow saws by your side with the blade pointed down. Cover the blade with plastic blade guards or small-diameter fire hose secured with Velcro fasteners. Always carry spare parts and plenty of replacement blades.

Pruning Saws—Pruning saws are useful for limbing, some brushing, and removing small downfall, especially where space is limited and cutting is difficult. Folding pruning saws are handy.
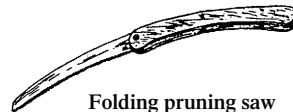
Folding pruning saw

Tools for Chopping

Axes—Axes are of two basic types: single or double bit. Double-bit axes have two symmetrically opposed cutting edges. One edge is maintained at razor sharpness. The other edge usually is somewhat duller, because it is used when chopping around rocks or dirt. Mark the duller edge with a spot of paint.

Double-bit ax

Single-bit ax
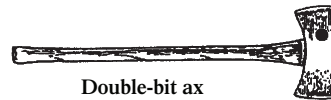
Before chopping with an ax, check for adequate clearance for your swing. Remove any underbrush and overhanging branches that might interfere. Be sure your footing is stable and secure. Chop only when you are clear of other workers.

Stand comfortably with your weight evenly distributed and both feet planted shoulder-width apart. Measure where to stand by holding the handle near the end and stretching your arms out toward the cut. You should be able to touch the blade to the cut.

Begin chopping by sliding your forward hand within 150 millimeters (6 inches) of the axhead. As you swing, your forward hand slides back down the handle to the other hand. Just after impact, give the handle a slight twist to pop severed wood out of the cut.

Proficiency with axes requires practice. Inexperienced users and dull axes can cause serious accidents. In general, the force of the swing is not as important as accurate placement. Always chop away from your body. Stand where a glancing blow will not strike you. If you must cut toward yourself, "choke up" on the handle with both hands and use short swings for more control.

"An Ax to Grind–A Practical Ax Manual" (Weisgerber and Vachowski 1999) is a good reference.

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Tools for Grubbing

Combination Tools—
The combination or
combi tool is basically
a military entrenching
tool on a long handle,
developed for firefighting. It serves as a light-duty shovel and scraper.

Combi tool

Fire Rakes (Council Tools)—The fire
rake is another fire tool widely used
for trail work, especially in the East.
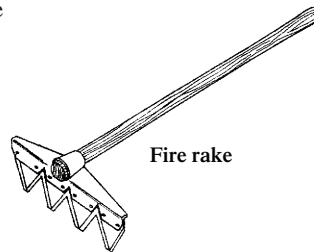
Fire rake

Hoes—Use an adze
hoe, grub hoe, or hazel
hoe to break up sod
clumps when con-
structing new trail or
when leveling an exist-
ing trail tread. These
hoes also are useful
in heavy duff. They
generally work better
than a Pulaski.
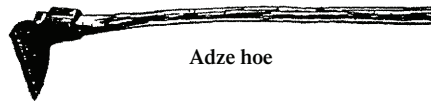
Adze hoe
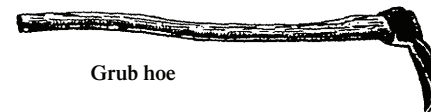
Grub hoe
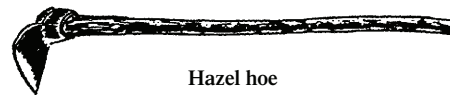
Hazel hoe

Mattocks—The pick mattock is often recommended as the standard tool for trail work. For many applications, it is much better than a Pulaski. It has a pointed tip for breaking rocks and a grubbing blade for working softer materials. The grubbing blade also may be used to cut roots or remove small stumps. With the edge of the tool, you can tamp dirt and loose rocks or smooth a new tread.

Pick mattock

Cutter mattock

A pick mattock can be used to pry rocks without fear of breaking a handle. Two people working with pick mattocks may not need to carry rock bars.
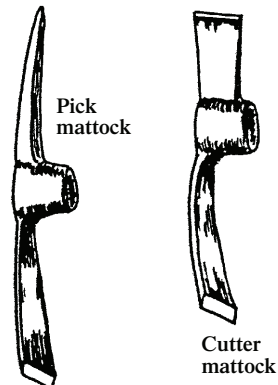
Maintain good cutting edges on mattocks. Sharpen grubbing blades to maintain a 35-degree edge bevel on the underside. Sharpen pick ends as you would a pick, and maintain factory bevels on cutter blades.

McLeods—The McLeod combines a heavy-duty rake with a large, sturdy hoe. McLeods work well for constructing trails

Mcleod tool

through light soils and vegetation or for reestablishing tread when material from the backslope sloughs onto the trail. A McLeod is essential for compacting tread and is helpful for checking outslope. If you hate leaving a bolt impression in your compacted tread, remove the bolt that secures the toolhead and weld the head to the mounting plate. McLeods are inefficient in rocky or unusually brushy areas.

Picks—Pick heads have a pointed tip that can break up hard rock by forcing a natural seam. They also have a chisel tip for breaking softer materials.

Pick

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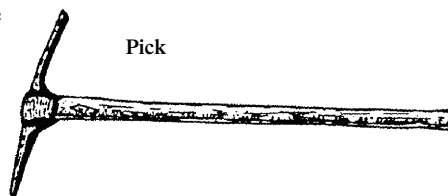
Work the pick as you would the hoe on a Pulaski with short, deliberate, downward strokes. Avoid raising the pick overhead while swinging. Always wear safety goggles while using a pick to protect yourself from flying rock chips.

Use a grinder or mill bastard file to sharpen the pointed tip to a 3-millimeter ($\frac{1}{8}$-inch) square. When sharpening the chisel tip, maintain the factory bevel.

Pulaskis—The Pulaski combines an ax and a grub hoe into a multipurpose firefighting tool. It isn't as good as a hoe or mattock for grubbing, nor is it as good as an ax for chopping. It is a popular trail tool, mostly because it is widely available and easier to carry than several single-purpose tools.
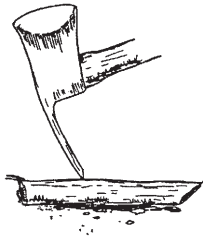
When using the hoe end of a Pulaski, stand bent at the waist with your back straight and parallel to the ground, knees flexed, and one foot slightly forward. Hold the handle with both hands so the head is at an angle to your body, and use short, smooth, shallow swings. Let the hoe hit the ground on its corner. Use the ax end to chop large roots after the dirt has been cleared by the hoe. Always wear safety goggles while grubbing to protect yourself from flying chips of rock and dirt.

Carry the Pulaski at your side. Grip the handle firmly near the head and point the ax end away from your body and down.

Sharpen the cutting edge of the Pulaski's ax as you would any other ax. When sharpening the Pulaski's hoe end, maintain the existing inside edge bevel. Never sharpen the top of the hoe.

Stump Grinders—If you have lots of stumps to remove, consider buying or renting a gasoline-powered stump grinder. These portable grinders are powered by a chain saw motor and have carbide teeth that can be sharpened or replaced. They grind through a stump in much less time and with a whole lot less frustration than would be needed to dig the stump out.

Stump grinder

Tools for Digging and Tamping

Digging and Tamping Bars—A digging and tamping bar is about the same length as a rockbar, but much lighter. It is designed with a chisel tip for loosening dirt or rocks and a flattened end for tamping. These bars are not prying tools.

Digging bar
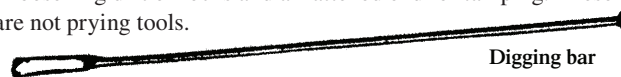
Shovels—Shovels are available in various blade shapes and handle lengths. The *common*, or *round-point*, shovel weighs between 2.3 and 2.7 kilograms (5 and 6 pounds). Its head measures about 200 by 300 millimeters (8 by 12 inches). If a shovel feels too heavy or large, choose a

Square

Round point

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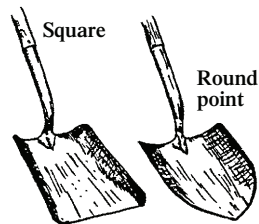
smaller version—remember, you have to lift everything the head holds. The *square* shovel is a flat-bottomed model intended for shoveling loose materials, not digging.

When scooping materials, bend your knees and lift with your legs, not your back. Push the shovel against your thigh, which serves as a fulcrum. This makes the handle an efficient lever and saves your energy and your back. Don't use the shovel to pry objects out of the trail—that's a job for a pick and a pry bar.

Tools for Brushing

Bank Blades and Brush Hooks—Bank blades and brush hooks are designed specifically for cutting through thickets of heavy brush or sap-

Bank blade

Brush hook

lings. Use them for clearing work that is too heavy for a scythe and not suited for an ax.
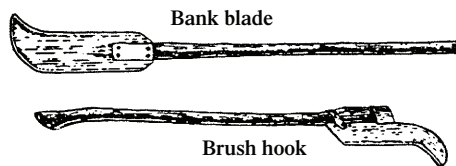
Lopping Shears and Pruning Shears—Lop-ping and pruning shears are similar in design and use. Lopping shears have long handles and may have gears to increase leverage for thicker stems. Pruning shears are small enough to fit in one hand and are designed to cut small stems and branches. Cutting edges vary, but generally one blade binds and cuts a stem against an anvil or beveled hook. We recommend the hook and blade shear for overhead cuts because the curved blades
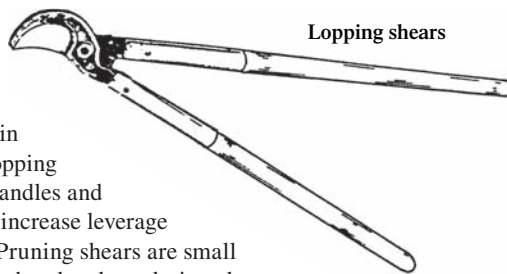
Lopping shears

transfer the weight of the shears to the limb. Lopping and pruning shears do a better job of making a nice clean cut than hand saws or axes.

Power Weed Cutters—Several manufacturers make "weed whackers," motorized weed cutters that use plastic line to cut weeds. Some have metal blades that substitute for the line. These can be a good option for mowing grass and weeds on trails. Follow the manufacturer's instructions for safe use and operation. Eye protection is especially important.

Swedish Brush (Sandvik) Axes—These clearing tools work well in brushy thickets or in rocky or confined areas.

Swedish brush ax

Weed Cutters (Grass Whips)—Weed cutters are used for cutting light growth like grasses and annual plants that grow along trails. They are lightweight and durable and usually are swung like a golf club.
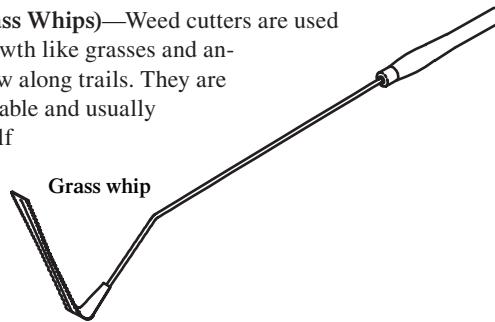
Grass whip

Tools for Pounding and Hammering

Hand-Drilling Hammers—Hand-drilling hammers are used to drill steel into rock or to drive wedges and feathers into cracks or drilled holes. There are two types of hand-drilling hammers—single jacks and double jacks. For more infor-

Single jack

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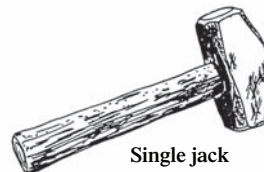
mation on hand drilling, read "Hand Drilling and Breaking Rock For Wilderness Trail Maintenance" (Mrkich and Oltman 1984).
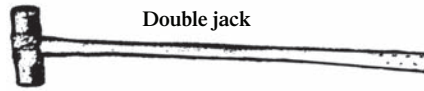
Double jack

Sledge Hammers—Sledge hammers have heads forged from heat-treated high carbon steel; they weigh from 3.6 to 9 kilograms (8 to 20 pounds).
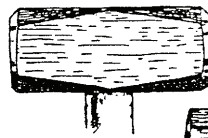
Nevada or long-pattern sledge

Driving sledges are used to set heavy timbers and drive heavy spikes or hardened nails. Stone sledges are used to break boulders or concrete. Because of differences in tempering, these tools are not interchangeable.

Double-face sledge
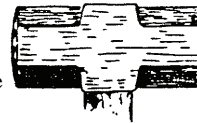
Stone sledge

Tools for Lifting and Hauling

Block and Tackle—A block and tackle is a set of pulley blocks and ropes used for hoisting or hauling. They come in different styles, sizes, and capacities.

Canvas Bags—Heavy-duty canvas bags sold to carry coal are great for dirt, small rocks, and mulch. They are more durable than similar-looking shopping bags.

Canvas coal bag

Motorized Carriers—If your budget and regulations allow, consider a motorized carrier. They come in various configurations and typically feature a dump body. A trailer pulled behind an all-terrain vehicle may be an alternative to a motorized carrier.

Motorized carrier

ATV trailer

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Packstock Bags and Panniers—Fabric bags or hard-sided panniers with drop bottoms work well when packstock are used to carry trail construction materials. A design available for fabric bags is included in "Gravel Bags for Packstock" (Vachowski 1995).

Packstock bag

Rockbars—Use a rockbar (also called pry bar) for lifting or skidding large, heavy objects. These bars are heavy duty. They have a chisel tip on one end. The other end can be rounded or pointed.

Rockbar

Place the tip of the chisel under the object to be moved. Wedge a log or rock between the bar and the ground to act as a fulcrum. Press the handle down with your weight over your palms. Never straddle the bar when prying. When the object raises as much as the bite allows, block it and use a larger fulcrum or shorter bite on the same fulcrum to raise the object farther.
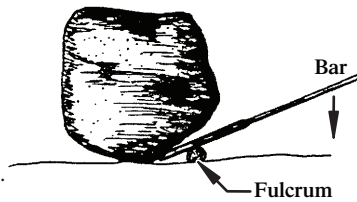
The rounded end of a rockbar is great for compacting material into rock cracks when armoring trail. You can use the pointed end to break large rocks by jabbing the point into a crack and twisting.

Tools for Peeling and Shaping

Bark Spuds (Peeling Spuds)—Use a bark spud to peel green logs. Have the log about hip high. Hold the tool firmly with both hands and push the dished blade lengthwise along the log under the bark. Always peel away from your body. Its three sharpened edges make this tool unusually hazardous to use and transport.

Bark spud

Drawknives—A draw-knife works best to peel dry logs. Position the log about waist high, and grasp both handles so the beveled

Drawknife

edge of the blade faces the log. Begin each stroke with arms extended and pull the tool toward you while keeping even pressure on the blade. Keep your fingers clear of the blade's corners.

Tools for Sharpening

Inspect all tools before use. Sharpening makes tools last longer. A small scratch that is ignored could lead to a serious crack or nick in the blade.

Use a file or grindstone to remove metal from a dull edge. If there are no visible nicks, a touchup with a whetstone will restore a keen cutting edge. In these instances, you need only restore the edge bevel. Whet-

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ting the edge removes very small bits of metal from the blade and causes the remaining metal to burr slightly on the cutting edge. This burr is called a feather, or wire edge. Remove this weak strip by honing the edge on the other side. The correctly honed edge is sharp, does not have a wire edge, and does not reflect light or show a sharpening line. Wear gloves when sharpening cutting edges.

Edge of bevel

Blade bevel

Blade of cutting tool
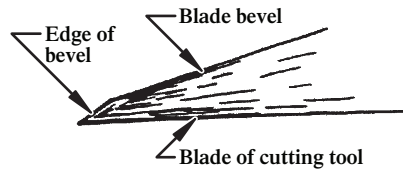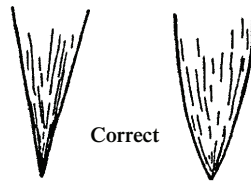
Blade Bevels

Correct

Wrong

Restoring the blade bevel requires coarser grinding tools to reshape worn cutting blades. Reshape blades with hand files, sandstone wheels, or electric grinders. Remove visible nicks by grinding the metal back on the blade. Remember that the correct blade bevel must be maintained. If the shape can't be maintained, have a blacksmith recondition the toolhead or discard it.

A hand-tool sharpening gauge that gives you all the correct angles can be ordered from the General Services Administration (NSC No. 5210–01–324–2776).

If a cutting edge is nicked by a rock, it may be work hardened. A file will skip over these spots and create an uneven edge. Use a whetstone or the edge of a bastard file to reduce the work-hardened area, then resume filing. Alternate using a whetstone and the file until the file cuts smoothly over the entire length of the edge.

Files—Files come in single or double, curved or rasp cuts. Single-cut files have one series of parallel teeth angled 60 to 80 degrees from the edge; they are used for finishing work. Double-cut files have two series of parallel teeth set at a 45-degree angle to each other; they are used

for restoring shape. Curved files are used for shaping soft metals. Rasp-cut files are used for wood.

Files are measured from the point to the heel, excluding the tang (the tip used to attach a handle). File coarseness is termed bastard, second cut, or smooth. The bastard will be the coarsest file available for files of the same length. A 254-millimeter (10-inch) mill bastard file is good for all-around tool sharpening. Before filing, fit the file with a handle and knuckle guard. Always wear gloves on both hands. Secure the tool so both hands are free for filing. Use the largest file you can. Remember that files are designed to cut in one direction only. Apply even pressure on the push stroke, then lift the file up and off the tool while returning for another pass.
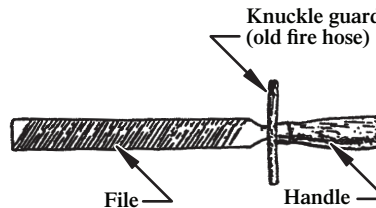
Store or transport files so they are not thrown together. Protect them from other tools as well. An old piece of fire hose sewn shut on one end makes a great holder for several files, a guard, and a handle.

Mechanized Trail Building Equipment

Grading Equipment—Several types of graders that can be pulled with ATVs work well for maintaining wider trails used by motorized traffic. MTDC has designed a rock rake to fit on an ATV for trail work.

An experienced operator can use small mechanized equipment to make wonderful singletrack trails. Such equipment also is great for constructing wider trails for motorized traffic and packstock.

A Web site showing a variety of small mechanized equipment and attachments for trail work can be found at: *http://www.fhwa.dot.gov/environment/equip/.*

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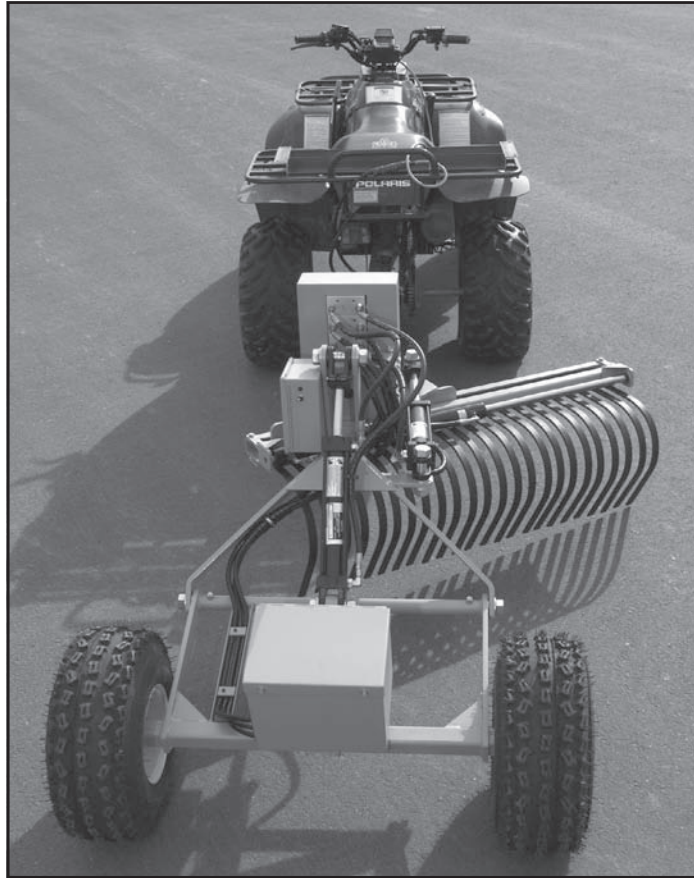
Rock rake designed by MTDC

Mini Excavators—Mini excavators can excavate tread and move material and rocks from place to place. They are even more popular with trail contractors than dozers, because dozers can only push material. Excavators can dig and move material. Mini excavators are available from many manufacturers.

Mini excavator

Trail Dozers—Trail-sized dozers are becoming more common for cutting singletrack trail. When an experienced operator follows a good design, the trails built by a dozer are impressive.

Sweco 480

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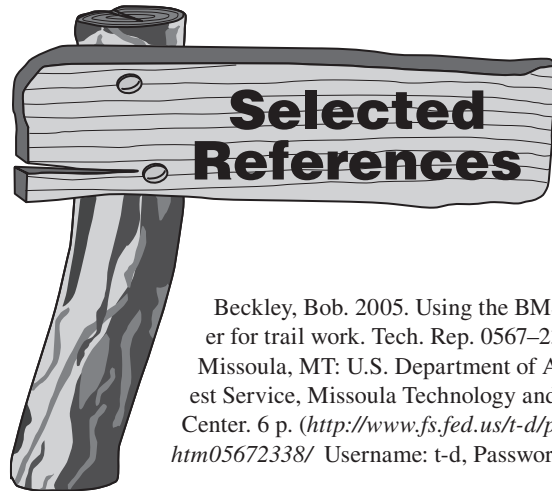
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Library Card

Metric Conversions

To convert from this unit	To this unit	Multiply by
inch	millimeter	25.4*
inch	centimeter	2.54*
foot	meter	0.3048*
yard	meter	0.9144*
mile	kilometer	1.6
millimeter	inch	0.039
centimeter	inch	0.394
centimeter	foot	0.0328
meter	foot	3.28
meter	yard	1.09
kilometer	mile	0.62
acre	hectare (square hectometer)	0.405
square kilometer	square mile	0.386*
hectare (square hectometer)	acre	2.47
ounce (avoirdupois)	gram	28.35
pound (avoirdupois)	kilogram	0.45
ton (2,000 pounds)	kilogram	907.18
ton (2,000 pounds)	megagram (metric ton)	0.9
gram	ounce (avoirdupois)	0.035
kilogram	pound (avoirdupois)	2.2
megagram	ton (2,000 pounds)	1.102
ounce (U.S. liquid)	milliliter	30
cup	milliliter	247
cup	liter	0.24
gallon	liter	3.8
quart	liter	0.95
pint	liter	0.47
milliliter	ounce (U.S. liquid)	0.034
liter	gallon	0.264
liter	quart	1.057
degrees Fahrenheit	degrees Celsius	(°F – 32) ÷ 1.8
degrees Celsius	degrees Fahrenheit	(°C x 1.8) + 32

*The conversion factors with asterisks are exact (the others give approximate conversions).

Metric Comparisons

- A millimeter, one-thousandth of a meter, is about the thickness of a dime.

- One inch is just $\frac{1}{64}$ inch longer than 25 millimeters (1 inch = 25.4 millimeters).

- 150 millimeters is the length of a dollar bill.

- One foot is about $\frac{3}{16}$ inch longer than 300 millimeters (12 inches = 304.8 millimeters).

- A meter is a little longer than a yard, about a yard plus the width of this notebook.

- A kilometer is about five-eighths of a mile.

1 kilometer
|<-------------------------------------->|

1 mile
|<--->|

Great Trinity Forest Management Plan

RECREATION

Wetland Trail Design and Construction (2007 Edition)

Wetland Trail Design and Construction

2007 EDITION
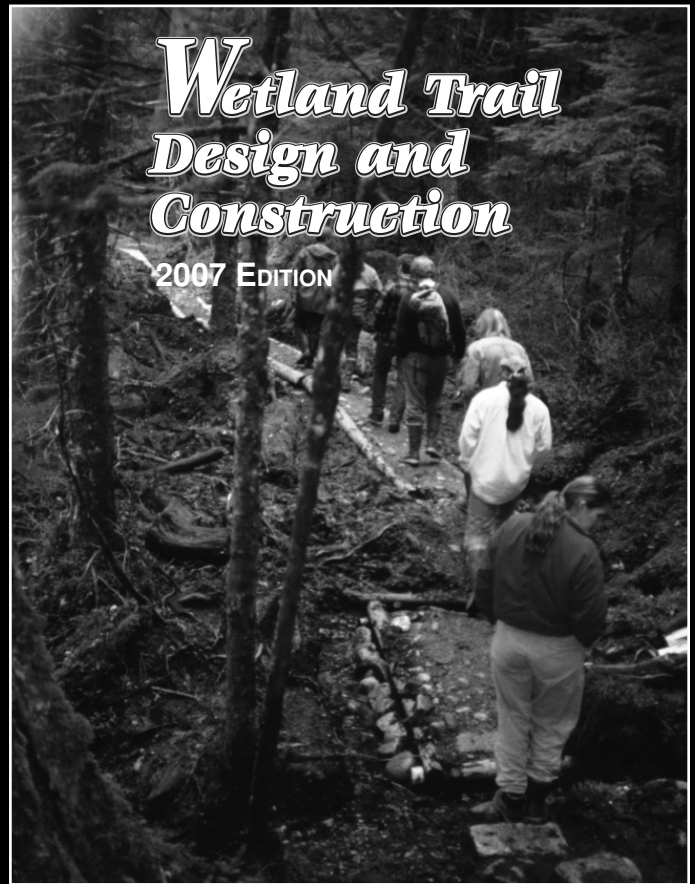
Robert T. Steinholtz
Bristlecone Trails, Lakewood, CO

Brian Vachowski
Project Leader

USDA Forest Service
Technology and Development Program
Missoula, MT

8E82A3—Trail Treatment for Wet Areas

January 2007

*A*cknowledgments

Any document concerning trail construction must recognize the men and women who do the field work—whether they are professionals or volunteers. Some of the most unforgettable and fun-loving people we have known have worked on trail crews.

None of the construction techniques in this document are new. Most have been used for decades. Fortunately, trail crews took the time to explain and demonstrate the construction techniques to us. The techniques described in this manual have occasionally been modified slightly to make it easier to work with contemporary materials.

*C*ontents

Contents

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Introduction

Most experienced trail crews try to avoid wetlands because of the construction and maintenance problems they pose. Little has been published on wetland trail construction, and materials that are available are often outmoded or are too regionally focused. By pulling this information together from our experiences, we hope to answer questions you didn't even know you had.

In this manual we have described the common techniques for building a wetland trail. We have also included information on some of the more unusual materials and tools.

Some of the techniques and tools we describe are suitable for wilderness situations where mechanized equipment cannot be used. Others are suitable for urban greenbelts where a wider range of techniques, material, and equipment can be used. Somewhere in between are the back-country sites where machines are permitted, but access and logistics are challenges. Although this book is written for wetland trails, the techniques described can also be used for correcting other poorly drained low areas in existing trails.

The manual is written for those who are untrained and inexperienced in wetland trail construction, but those with experience may learn a few things, too.

The 2007 edition incorporates minor changes to this report, first published in 2001 (0123–2833–MTDC). The changes primarily involve wood preservative treatments and construction details. The list of references has been updated.
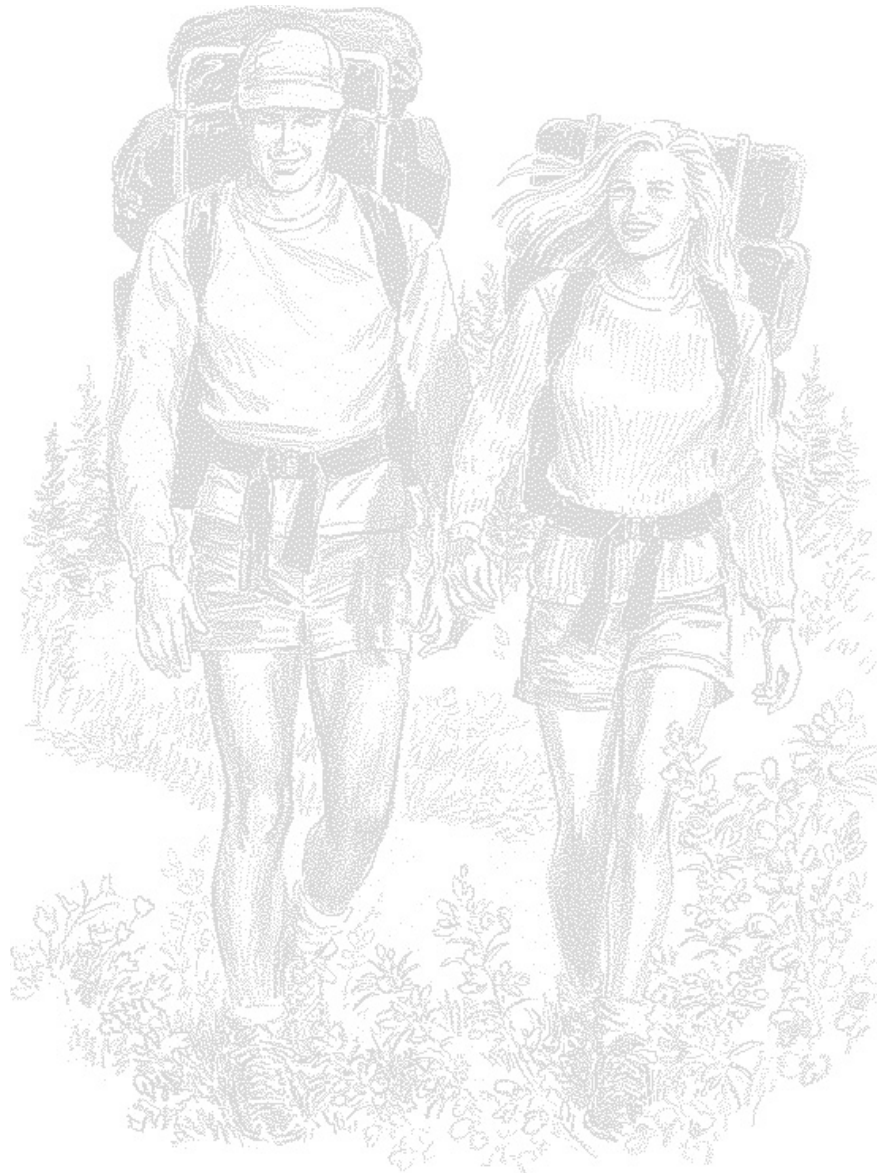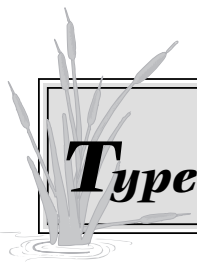
Types of Wetlands

Wetland managers and specialists recognize 30 or more different types of wetlands. From a trail construction viewpoint, there are only six types of wetlands, perhaps seven. The basic differences in construction techniques for wetland trails depend greatly on the geologic, hydrologic, and vegetative factors influencing the site and, to a degree, on the wildlife species that live there.

Local indicator plants can help identify whether a site may be a wetland. Test holes and rod soundings can help determine the capability of the soil to support a trail. By studying the soil, the wildlife, and the subsurface water at the site, you can select the appropriate trail layout and construction techniques.

Glaciated U-shaped valley

Figure 1—Glacial soils can be expected in U-shaped valleys typical of areas shaped by glaciers.

Wetlands Formed by Glacial Action

Generally, trails are easiest to construct in wetlands formed by glacial action. As a glacier melts, sand, gravel, boulders, and occasional blocks of ice are deposited in a narrow area in a mountain valley. The melting glacier creates a large creek or river that drains the valley. During spring runoff, adjacent wetlands may be underwater, but the ground will still be solid. Although you may be working in standing water, you will not sink in the soil. As the wetland dries out, the surface may be dry and solid. However, water will be just a few inches to a few feet below the surface. During the dry season, the level of the groundwater will normally drop, but it will fluctuate depending on upstream runoff.

Look for this site condition in northern areas that were glaciated during the Ice Age, or in U-shaped mountain valleys. Such valleys indicate previous glaciation (figure 1). To avoid being misled, dig a 4-foot-deep test hole to see whether characteristic sand and gravel are present.

Occasionally, small deep pockets of organic silt and clay are found within wetlands of glacial origin. When these occur near a river or creek, the soil mixture becomes saturated with groundwater and is extremely fluid. These pockets are rare, usually easily visible, and should be avoided. They can be extremely treacherous, especially if covered with a thin layer of ice or snow. One such pocket encountered on a trail project in the Rocky Mountains was 10 feet long, 8 feet wide, and more than 4 feet deep.

Wetlands With Organic Silt and Clay Soils

This type of wetland may be the most common. A test hole will indicate that the soil is not sand or gravel, but silt or clay—soils with fine particles. The silt and clay in most wetlands of this type are from organic materials such as leaves, bark, and wood. The terrain traps runoff and the soil particles hold this water, making the area soft underfoot.

Silt and Clay Soils With Some Water

Anyone building a trail through this type of wetland will find that footprints quickly fill with water. Hikers may sink up to their ankles in the unstable soil.

Silt and Clay Soils With Considerable Water

This type of wetland is similar to the one described above. A test hole will indicate that the soil consists of the same silt or clay material; however, it has considerably more water mixed with it. Work is difficult when you immediately sink to your knees or even to your waist.

2

Your wetland construction checklist should include:
- *Lace-up boots, hip boots, or even waders that are suitable for sloshing in water*
- *A dry change of clothes*
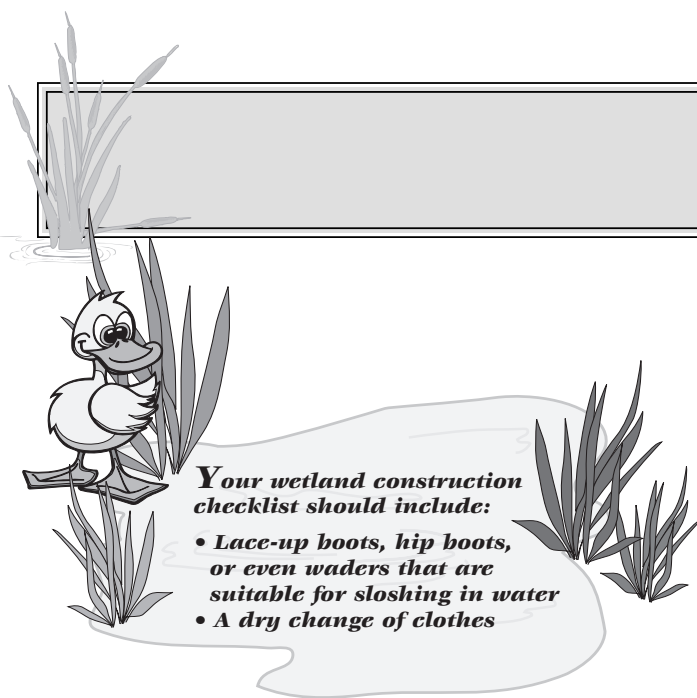
A test hole should be as deep as possible. Due to the excessively wet soil, the sides of the hole will continually slough off. It may be impossible to dig deeper than 12 to 18 inches. In that case, rod soundings can help determine subsurface conditions.

Rod soundings are not too difficult to perform or to interpret. A 6- to 8-foot-long steel rod is driven into the ground with a sledge hammer. If the rod hits something solid, it will stop, or slow considerably. The rod may have reached a strata of rock or firm soil that will support construction, or it may have struck a root or an isolated boulder, a misleading indication of overall conditions. Take additional soundings nearby to determine the overall conditions.

An inexpensive and easily portable rod can be made from 2-foot lengths of galvanized, $\frac{1}{2}$-inch diameter pipe. Screw a cap onto one end of one pipe section and screw a coupling onto the other end. Continue with 2-foot sections until at least 6 feet of pipe is assembled. Screw a T connection onto the upper end of the rod so that a $\frac{1}{2}$-inch-diameter steel bar can be passed through the T for leverage in case the rod gets stuck in the ground. Tap the T with a hammer (figure 2).

Figure 2—This sounding rod is inexpensive and easy to carry.

The rod can be made as long as necessary. Usually 6 or 8 feet of rod is enough to determine whether a soil problem exists.

River Deposits and Deltas

Soil deposited along rivers and in their deltas may include inorganic clay and an extremely high percentage of water. Walking in this type of wetland is almost impossible. This type of wetland is found along the Missouri River and in the Mississippi River delta, and should be expected along other large rivers.

Floating Wetlands—Trembling Earth or Quaking Bog

Another type of wetland is the result of water-tolerant sedge and sphagnum moss invading lakes. Basically, these wetlands are areas of land floating on water or water-saturated peat. Over the years leaves, needles, twigs, and seeds are carried into a wetland or lake by wind and runoff, eventually forming a layer of organic soil. In areas where the soil and water are extremely acidic, the high volume and acidity of the water keeps organic matter from rotting. As this soil layer builds, the seeds of less water-tolerant plants will begin to grow. After many years a miniature forest of slow-growing, stunted trees will be found on the site. Expect plants such as sedges, sphagnum moss, pitcher plant, cranberry, blueberry, and Labrador tea. Tree species that will tolerate this site condition are alders, balsam fir, black spruce, tamarack, willows, and baldcypress.

This soil will support little foot traffic. Often the ground will compress with weight and quake slightly underfoot. At the extreme, the ground will undulate as it would if someone was walking on a mattress. In the Okefenokee Swamp, this type of wetland is referred to as "trembling earth." In the Adirondack Mountains and Canada, a similar site is called a "quaking bog." A test hole may show a thin layer of organic soil, perhaps 1 foot thick. Below it will be a layer of sphagnum moss and peat. Rod soundings in these layers will meet little resistance. When the rod is hit with a 4-pound sledge hammer, people standing 2 to 5 feet away may feel the shock through the ground.
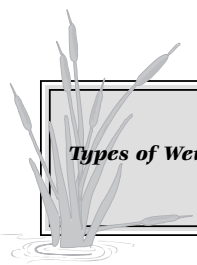
Wetlands on Mountains
Carrs

In mountainous areas, wet trail problems sometimes show up only after the trail has experienced heavy use. The terrain may slope, perhaps by as much as 10 to 20 percent. Problems become evident only when trail traffic wears through a thin layer of soil and exposes a wet, fluid soil that may be 1 to 3 feet thick. Trail crews often refer to these sites as carrs.

If test holes and rod soundings had been taken before construction, they would have revealed this thin layer of soil on top of fluid soil. The fluid layer may be so wet that it would have been impossible to dig a test hole without the hole's side walls continually caving in. Once the fluid layer is reached, the weight of the rod can cause it to sink 1 to 2 feet without being hit by a hammer. Leaning on the rod might cause it to sink 2 to 3 feet. The rod should be hammered until firm soil is reached or the rod has penetrated 8 feet of soil.

Carrs can often be identified by indicator plants. River birch, shrubby willows, and alders growing on what appears to be solid ground should alert a trail designer to the potential problem (figure 3) and the need for soil testing.
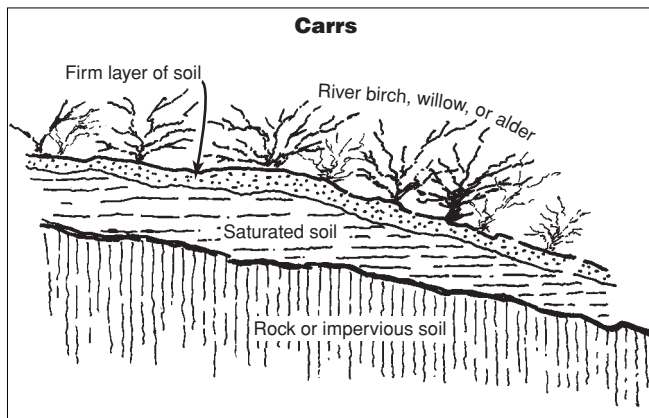
Figure 3—Carrs are characterized by a captive layer of saturated soil just under the surface that is sandwiched between two impervious layers.

Seepage

Some mountain wetlands are caused by subsurface water that seeps to the surface from a perched water table. A perched water table occurs where dense rock or an impervious soil layer is within inches to a few feet below the ground. Precipitation that would normally percolate deep into the ground is trapped near the surface and follows the slope of the

impervious material downhill. This condition is common during the spring in high mountainous areas. In the dry season, the surface of the ground may be dry, but water will be only a short distance below. A trail designed and built in the dry season may be unsuitable during the wet season (figure 4).
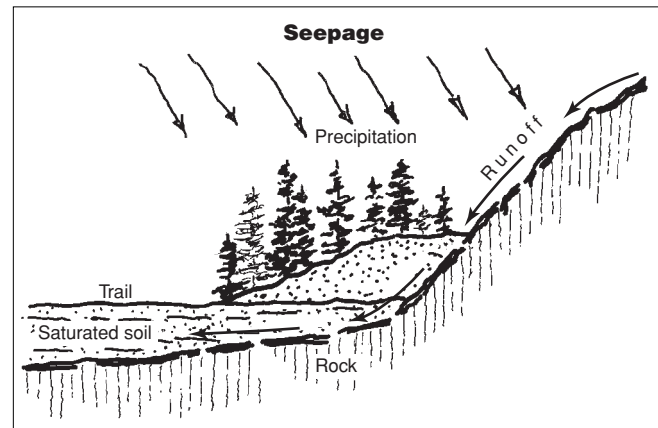
Figure 4—Seepage is sometimes caused by precipitation held in perched water tables.

Another more obvious condition occurs near limestone cliffs. Limestone covers millions of square miles of the Earth's surface, and some limestones are extremely porous. Water will percolate deeply through certain types of limestone. Other types of limestone may be highly fractured, permitting water to penetrate. Water will seep out of the exposed faces (figure 5). This condition also occurs in sandstone formations.
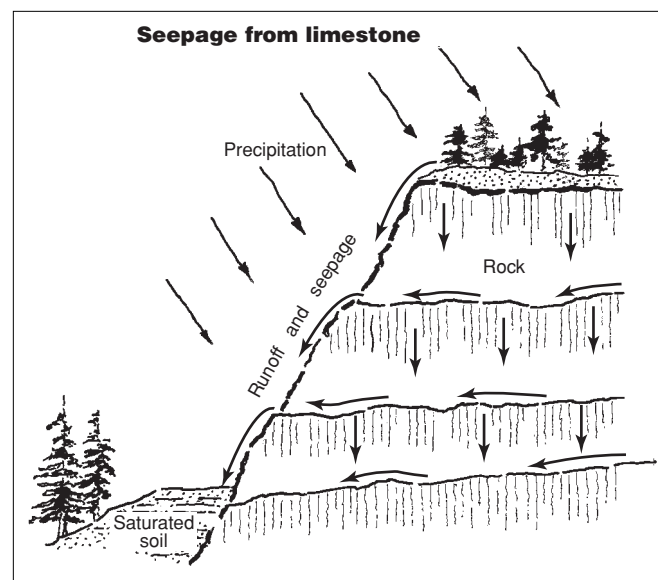
Figure 5—Limestone formations are very porous. Water will percolate through the limestone and seep out of exposed faces and cutslopes.

4
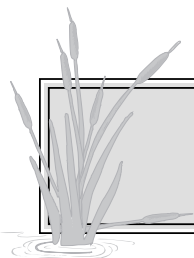
Spruce Bogs

The spruce bog is a forest type found in the northern United States and throughout Canada and Alaska. The forest often consists of pure stands of black spruce, a slow-growing tree that survives in dense shade where the water table is high. Walking through a mature stand of these trees is a unique experience. The trees may be 6 to 12 inches in diameter, 25 to 40 feet tall, 15 to 40 feet apart, and 200 years old. Because they can withstand shade, the trees are often densely branched to the ground.

In spruce bogs, roots spread on the surface, presenting a problem for trail construction. The roots may be 15 to 20 feet long and as big around as the tree. Large tree roots on one side of the trail spread out and cross into the root system of trees on the opposite side of the trail. Cutting the roots for normal trail construction would leave roots on either side of the trail and unbalance the trees' support. Hikers may trip over the roots if they are left in place. The surface soil is organic and breaks down quickly into ruts and mudholes. Hikers detour around these spots, creating a braided trail with two, three, or four alternative routes.

Muskeg

Muskeg refers to an area covered with sphagnum mosses and tufts of sedges. Muskeg is very common in Southeast Alaska, where all relatively open peat bogs with sphagnum mosses or sedges are called muskeg. The following information about muskeg is from the *Alaska Region Trails Construction and Maintenance Guide* (USDA Forest Service 1991).

Soils in Southeast Alaska maintain a thick, living, organic surface mat, a high percentage of iron oxides, and are often saturated with water. The soil structure breaks down readily under stress or disturbance.

Once the protective mantle and root layer are destroyed, the soil readily turns into water-muck. In some disturbed muskeg soils, there seems to be no limit to how far a person could sink. A site can go from solid footing to knee-deep muck after the trail crew makes just a few trips back and forth.

The volume of traffic these highly organic soils can support is directly related to the network of roots that exist in the soil. This network of roots strengthens the soil just as reinforcing bars strengthen concrete.

Wetlands With Wildlife That Bite Back

The last type of wetland has more to do with hydrology, climate, and wildlife than geology. Sites in the southeastern United States and tropical regions support species of wildlife that look upon man as prey. Building a normal wetland trail in these areas may be hazardous to the crew building the trail and to hikers unfamiliar with the potential dangers posed by local wildlife.

Alligators are often found in wetlands in the southern United States. Normally, alligators are not a problem to adult humans, but they may take an interest in a visitor's dog or small child. Little can be done to permanently keep them off the trail. Alligators may find a way through sturdy barrier fences that are improperly maintained, but may have a harder time finding their way off the fenced trail.

A loop trail should be considered in such areas. The loop trail provides the visitor with a route for hightailing it back to the trailhead, no matter where the alligator is encountered.

If alligators are the primary attraction for an interpretive trail, consider constructing an overlook. An overlook separates visitors from alligators and is an alternative to building a trail into the alligators' territory. In open areas, an overlook may be an effective way to see alligators. In areas with trees or dense brush, an overlook may not be worth the effort or expense. Guided boat trips might be another option for heavily-used locations.

Wetland trails in northern regions have their own potential wildlife challenges. Moose have a fondness for wetlands. Although usually docile, moose can be dangerous during some seasons. In the spring a cow moose is protective of her young. In the fall rutting season, a bull moose can be cantankerous and unpredictable. Moose have been known to attack people with no provocation and to follow wetland trails, including those with a wooden surface. Wetland trails in these areas might be designed with few abrupt curves and sight distances of at least 75 to 100 feet.
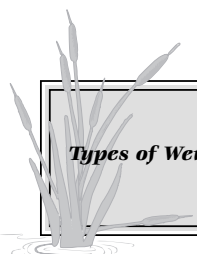
In the fall bull moose will demolish typical interpretive signs. One way to reduce sign damage is to use a vertical format for signs and place each sign on a single wide post (figure 6).

Wetlands with beaver, or where there is a possibility of beaver activity, pose different potential problems. Beavers are a natural draw for interpretive trails, but they might chew through wooden piles used to support the wooden deck of a trail. More importantly, they may change the water level of a wetland. A dam built upstream may reduce the flow of water into the wetland and reduce visitor enjoyment. A dam built downstream may raise the water level above the trail. Beavers may also plug culverts, weirs, and overflow structures. The level of the trail should be set higher to allow for higher water. A wetland trail that has been submerged because of beaver activity will require maintenance or reconstruction.
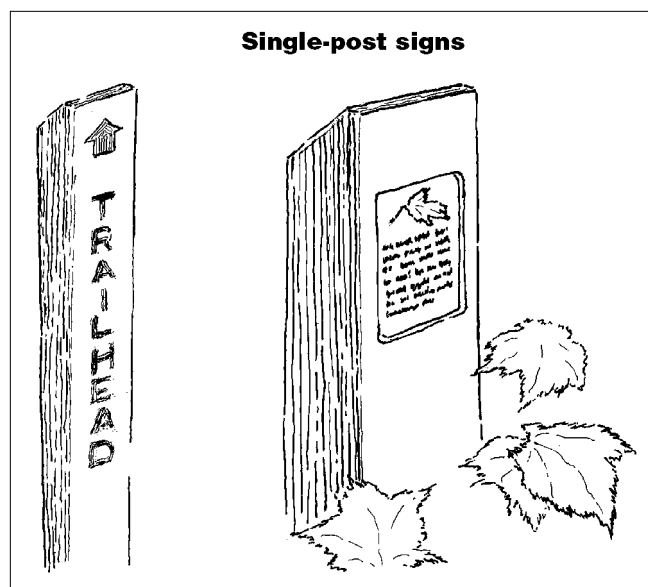
Single-post signs

Figure 6—Installing signs that are designed to fit a single post helps prevent damage from moose.

6
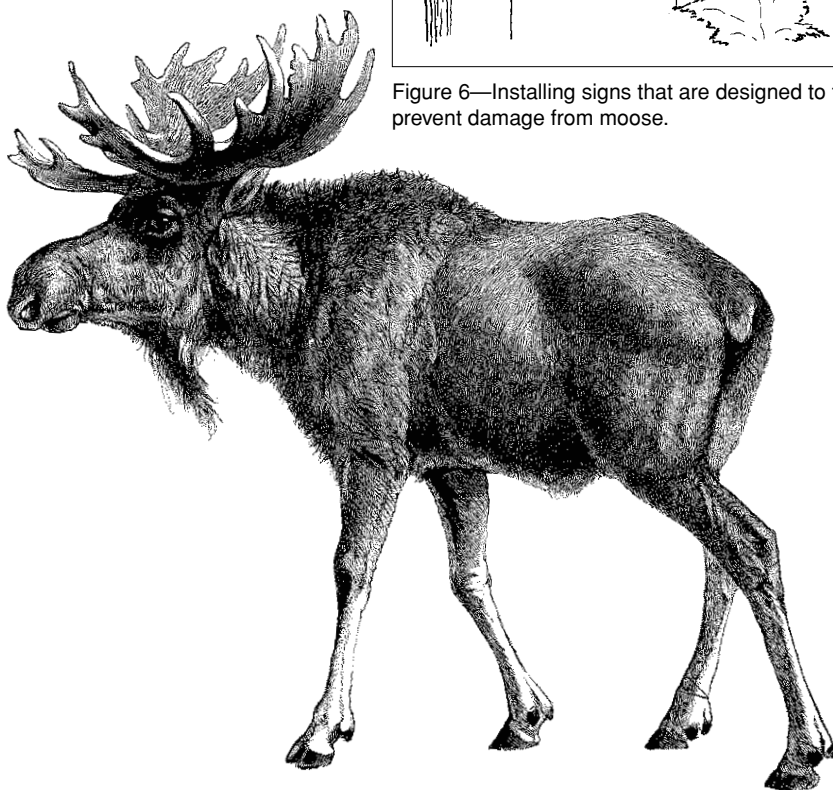
Environmental and Accessibility Compliance

National Environmental Policy Act and Other Federal Laws

Laws, regulations, and management practices affect trail construction activities. Congress passed the National Environmental Policy Act (NEPA) in 1969. The purpose of this act is to ensure that Federal agencies consider the potential adverse effects their activities may have on the environment. The preservation of natural resources is the primary intent of this act, although the act covers cultural resources as well. The National Historic Preservation Act (NHPA) covers cultural resources. The Endangered Species Act (ESA) protects rare, threatened, and endangered plants and animals.

Trail construction on Federal lands, or lands where Federal funds are involved, must conform to these and other laws. Proposed trail routes should be walked by specialists knowledgeable about rare and endangered species of plants and animals. To avoid disturbing important cultural sites, archeologists and historians should be invited to participate. At some locations, cave specialists or fossil specialists will also be important. Trail planning needs to be coordinated with the land management agency that has jurisdiction over the trail.

Each U.S. Department of Agriculture, Forest Service jurisdiction must complete a formal environmental analysis before trail construction or major reconstruction. The process may be simple or complex, depending on the nature of the project and its affected environment. Checking with the District NEPA coordinator is a good first step. Other agencies will have similar review processes. Early in the planning stage, determine the regulations that govern development in the area being considered for construction. Where many agencies have jurisdiction, the agency with the most stringent regulations usually governs.

When Federal funds are not involved, professional ethics on the part of trail personnel suggests voluntary compliance with the intent of the NEPA and NHPA regulations.

The U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers governs construction in navigable waterways and wetland areas of the United States. The agency's primary concern in wetland areas is to limit the volume of fill and avoid filling that would interfere with normal runoff entering the wetland. For a wetland trail the procedure generally involves a letter to the local district headquarters, perhaps a site visit by a Corps representative, and the issuance of a Corps 402 or 404 permit. Generally, complying with Corps requirements also results in construction that needs minimal maintenance.

State and Local Agencies

Many States have enacted regulations controlling wetland development, including trails. More States can be expected to do the same. Some counties and municipalities have their own wetland regulations. More and more trail projects cross agency and property boundaries, so Federal project managers need to be aware of other laws and regulations that might apply.

Occasionally, large areas have been established with uniform regulations applying to many towns and counties. The Adirondack Park Agency is a good example. This agency's regulations apply to 6 million acres of New York State's Adirondack Mountains. Included are all or parts of 12 counties and more than 100 towns and villages. Roughly 45 percent of the land is owned by the State; the rest is privately owned.

Accessible Trails

Trails need to be accessible to people with differing physical abilities. All trails do not have to be accessible to all people, but accessibility is to be considered for new trail construction and major reconstruction. It is a legal requirement to do so.

In May 2006, the Forest Service Outdoor Recreation Accessibility Guidelines (FSORAG) and Forest Service Trail Accessibility Guidelines (FSTAG) became official direction for the USDA Forest Service on National Forest System lands. These detailed guidelines are based on the draft accessibility guidelines for outdoor developed areas created by the Architectural and Transportation Barriers Compliance Board.

To help field practitioners understand the FSORAG and FSTAG, the Forest Service produced the *Accessibility Guidebook for Outdoor Recreation and Trails* (Zeller and others 2006). This new guidebook is easy to use and is full of photos, illustrations, design tips, hotlinks, and valuable sidebars. Readers will have an easier time integrating accessibility into the outdoor recreation environment. The guidebook is available at:
  http://www.fs.fed.us/recreation/programs/accessibility/.

*F*ield *Work*

Turned Around

A legendary Maine guide, so the story goes, insisted that he had never been lost, but he admitted to having been "turned around real good once—for 3 days."

A wetland on an overcast day can easily provide an opportunity to get "turned around real good." Wetland terrain is often featureless. There are no hills, ridges, or rock outcrops, and no obvious slopes. Vegetation is often uniform. If the vegetation is dense and at least 6 feet high, everything looks the same. The problem worsens with fog, rain, or falling snow. Maps and even aerial photographs are useless. There may be no real danger of getting lost. However, it is frustrating and time consuming to lay out a route in the wrong direction or to learn that you are not where you thought you were.

In this situation, a compass is essential. Start using the compass **before** entering the wetland and **before** getting turned around. Bring vinyl flagging ribbon and a good sighting compass to the wetland on the first day. Hand-held global positioning systems (GPS) are another way you can keep track of your location (figure 7).

Figure 7—Knowing how to use a compass or GPS unit will help you locate the trail.

Sometimes the terrain and vegetation are so uniform you have to mark the general area that the trail will traverse. Using the compass and the vinyl ribbon, flag a straight line route on one particular compass bearing or azimuth. Tie the ribbon at shoulder to eye level. When standing at one ribbon, you should be able to see the next one (figure 8).

Flagging ribbons
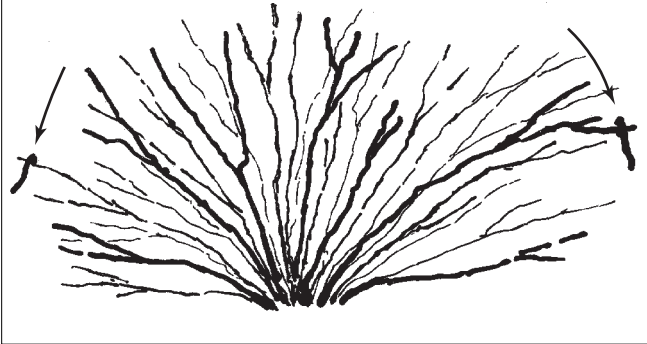
Figure 8—Dense, spreading shrubby plants such as willow and alder may require two flagging ribbons, one on each side of the plant.

Flag the outer perimeters of the general area wherever they are not obvious. Use different-colored ribbons as needed to help you find your vehicle at the end of the day. Not that *you* are likely to get turned around, of course.

Trail Layout
Reconnaissance

Reconnaissance (recon) involves walking over the area the trail will traverse and finding the places where the trail must go and the places you would like it to go. For example, there may be only one location where the trail can enter the wetland with minimal construction. This becomes a construction control point. There may be just one or two places where it is feasible to cross a small stream. These become construction control points. One of these points will probably be incorporated in the final route.

What about a location that provides a distant view? This becomes an esthetic control point. A small island in the wetland supports a variety of plant life that is of interpretive value. The island becomes another control point. A view of a sewer plant on the other side of the wetland is something to avoid. That location becomes a negative control point.

Preliminary Route (P-Line)

The trail must be laid out on the ground. The objective is to tie the control points together in a reasonable route, somewhat like connecting the dots, but on a much larger scale. This is normally done with vinyl flagging ribbon.
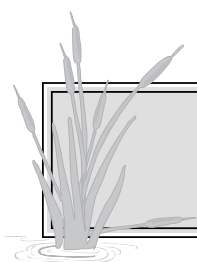
Few people use striped ribbon, so consider using it to mark the preliminary route. Carry at least two different combinations of colors (red and white stripes and orange and black stripes or other combinations) (figure 9).
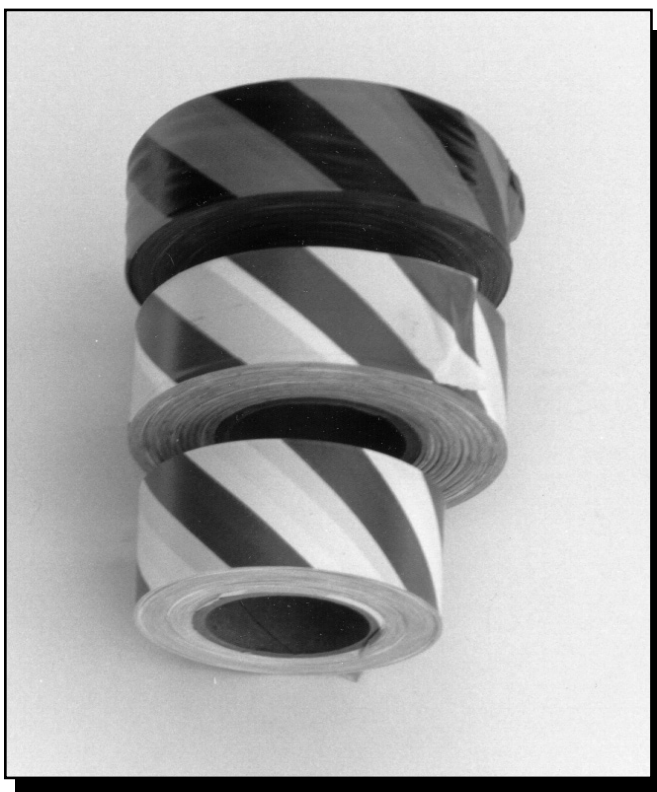
Figure 9—Vinyl flagging ribbon comes in many colors. Striped ribbon is good for marking the preliminary route.

If a portion of the route has to be changed, use the second color of ribbon. Do not tear down the ribbon for the first route that appears to be undesirable; it may prove to be better than the alternative route. Tie the new color of ribbon next to the piece of the first color where you want to depart from the first route. The outcome will be a preliminary route or P-line.

Coordination

The layout of an interpretive wetland trail should be a collaborative effort between people experienced in trail construction and those who will be responsible for the interpretation of the completed trail. All parties need to be brought in at the planning and layout stage. The interpretive staff is in the best position to identify interpretive points.

On an interpretive trail, the interpretive points will be among the control points. Routing any trail through all possible control points would result in a long, zigzag trail that would be expensive to build and would look ridiculous. Usually there must be a compromise between alignment, the length of the trail, construction cost, maintenance problems, and the number of esthetic and interpretive control points along the route. One 600-foot length of trail was built near a beaver dam for its interpretive value. Soon, that length of trail was under almost 2 feet of water and had to be rerouted. That location turned out to be a poor compromise.

After agreement on the P-line, the various compliance specialists should be contacted and, if necessary, brought in to walk the route. These may include specialists from your own agency, perhaps others from the U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service, and cultural resource specialists such as historians and archeologists.

Blue Line

It helps to go back over the P-line and refine it with an eye toward reducing construction problems, views of the trail by other trail users, and views of constructed structures from the trail. Refine the alignment to avoid sharp turns and long straight sections.

Blue ribbon is often a good choice for this more precise line. Blue has proven to be the most visible color in areas of dense vegetation. Spending time flagging the blue line will make the final layout work easier and faster. In some agencies, specific colors of ribbon denote specific purposes. Be sure your blue flagged line isn't going to be confused with a logging unit boundary, for example. Sometimes, because of vandalism and removal of the ribbon, the proposed route should not be too obvious. Solid green or black-and-yellow striped ribbon are usually the most difficult to see against vegetation and less likely to be removed. Sometimes cattle and wildlife chew on the ends of the ribbon. You may be able to locate the flag line by looking for the remaining knots of ribbon.

Final Layout

The designer and one or two assistants measure the route and keep notes (appendix A) on distances and locations and on the lengths of items that will be needed during construction. This information is extremely important for preparing accurate cost estimates, ordering materials, tools and equipment, and determining the size of the construction crew.

Distances are usually recorded by station, an engineering measuring system used for roads, railroads, and utility lines. Traditionally, in this system 100 feet is written as 1+00; 1,254 feet is 12+54. The distances are measured with either a 100-foot or 50-foot measuring tape and are "slope measured" (measured along the slope). Wire flags are marked with the station distance and stuck in the ground at the approximate location that has been measured. Using metric measurements, 100 meters is written as 1+00; 1,254 meters as 12+54.

The trail grade (the slope of the trail route) is measured on the ground between stations and between obvious changes in slope. At most sites a clinometer or Abney hand level is sufficiently accurate for this work. Precision is not as critical for a trail as it is for a road.

Measure the slope as a percentage of grade (the vertical rise or fall in feet per 100 feet of horizontal distance, or meters per 100 meters of horizontal distance) and record it in the notes. Where the route rises, it is shown as a positive or plus grade. Where the route drops, it is a negative or minus grade. Appendix B has slope conversion information.

A crew of three is more efficient than a crew of two for doing final layout. A crew of three is almost essential in areas of dense vegetation.

The field notes can be kept on Rite-in-the-Rain waterproof paper and stored in a 4- by 6-inch ring binder (figure 10). A blank form that you can copy is included in appendix A.

The form shown (figure 11) is 4¼- by 5½-inches or a half sheet of paper. After the workday, remove the notes from the ring binder and leave them in the office or at camp. Normal surveyor's notebooks are awkward for trail field notes—they keep trying to close up and they are difficult to copy.
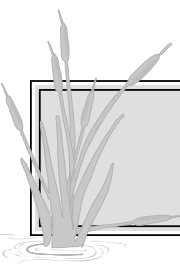
The field notes should include important basic information: location, project, date, weather, first and last names of the crewmembers, job assignments, color of the flagging ribbons, and the location of the 0+00 station referenced to fixed objects on the ground. Clear and consistent handwriting and language skills are important. Standard abbreviations should be used and the abbreviations must be explained to others on the crew. Provide a legend for unusual abbreviations. Sketches and maps are also valuable sources of information. Eventually, the field notes will get to the office where someone else may have to interpret them.

What a waste of time it would be to go through all this work and end up with notes that are unusable. Paper is inexpensive compared to the time required to gather this information. Do not write notes too close to each other. When you make an error, put a single line through the mistake. Do not try to write over or erase it. Go to the next line and write in the correct information.

It is critically important to note the colors of ribbon that you used. Trail construction workers will need to know the color of ribbon they will be looking for. Six months after the field layout, even the workers who laid out the trail will not remember what colors were used.

Figure 10—This field notebook is a tried and true technology that works.

Drawings, Specifications, and Cost Estimates

Regardless of who builds the trail, the field notes must be converted to drawings and specifications that can be used in the office for estimating costs and ordering materials, and in the field for construction.

10

Station & distance	Tread width	Sideslope (percent)	Gradient (percent)	Notes
				Pingree Park—Accessible
				wetland trail.
				9/10/97—Sunny, warm.
				Bob Pilk, Terri Urbanowski,
				Bob Steinholtz. Red
				ribbon/red flags.
				0+00-35' east of flag
				pole/north curb.
0+00				
	4'	25	5	
0+50				
	4'	30	5	
0+75				Enter willow brush
	4'	30	5	Heavy brush clearing
1+00				
		35	5	
1+76				Intersection with wetland
		10	4	loop—rt (south route)
				end willow brush clearing.
1+81				Begin bog bridge/piles
		0	4	
2+04				End piles, begin B.B. on
		0	-2	sleepers

Figure 11—Sample field notes are legible and have the information needed to locate the trail and plan for materials.

Station & distance	Tread width	Sideslope (percent)	Gradient (percent)	Notes
2+38				End B.B./begin turnpike.
		0	+2	
2+74				End turnpike/begin B.B. on
		0	+2	sleepers—medium willow
				brush clearing.
3+06				
		±10	0	Hummocky/begin B.B. with
				cribbing, some cribbing
				one side only.
3+58				Timber culvert: 8' span by
	4'	0	0	4' height
3+66				
		0	0	
3+86				River on rt. Suggest 20 lf
		10	-1	of Geoweb in turnpike.
4+19				End turnpike. Begin trail
				on
	4'	0	+2	solid ground.
4+97				Sta. 4+97 = 1+76

Figure 11—(continued).

12

The drawings should include the approximate layout of the route, indicating landmarks and major items of construction. A second drawing at a larger scale should indicate by station or distance where these items begin and end. These distances are subject to field adjustment. Several large-scale drawings may be needed to show the whole trail route.

Drawings with construction details will also be needed for cost estimates and construction. These large-scale drawings show the construction materials, their dimensions, how they are put together, and how they are attached.

A specification defining the quality of the materials and craftsmanship must also be written. For a simple project, this information can be included on the drawings. The specification is also needed by the cost estimator, the individual ordering the materials, the crew chief, and the project inspector.

Preparing drawings and a specification may sound like a lot of work, but preparation reduces the questions of the construction crew and the time spent by the designer in the field during construction. Such work also reduces the possibility that the wrong materials could be delivered to the worksite. Written drawings and specifications are essential for contracts. Forest Service employees should follow the format of *Standard Specifications for Construction and Maintenance of Trails* (USDA Forest Service 1996) and *Standard Drawings for Construction and Maintenance of Trails* (USDA Forest Service 1996).

If the work is to be done in-house with an experienced crew, sometimes the procedures can be simplified. It is still a good idea to have drawings and written specifications, because they can prevent misunderstandings.

*W*etland *Trail Structures*

At least eight types of trail structures are commonly built in wetlands. Some of these are built with no foundation. Others have sleepers (sills), cribbing, or piles as foundations. Most of these structures are built of wood.

The oldest methods for building a wetland trail were corduroy and turnpike, which require no foundation. Turnpike may require constructing timber culverts, which involves building two small timber walls. The walls must rest on a buried timber sill. Planks span the space between the walls.

The various types of puncheon, gadbury, and the simplest form of bog bridge construction may be built on a foundation of sleepers, or on log or timber cribbing. Cribbing is more difficult to construct and is used occasionally where the terrain is hummocky (having small mounds of vegetation interspersed with depressions that hold water).

Bog bridges and boardwalks are often supported on pile foundations. Three types of pile foundations have been used for bog bridges and boardwalks: end-bearing piles, friction piles, and helical piles. Piles are the most labor-intensive foundation. Helical piles and some friction piles require specialized machinery for installation.

Floating trails are another, less common, technique. Where they are used, you need some form of anchorage.

In this manual we describe the structures more or less in historical order. The oldest are early in the list, and the newest or most difficult to construct appear toward the end. The older structures can be built without machines, although machines make the work go faster. The newer structures are easier to build if machinery is available.

Sustainable Design

Sustainable design essentially asks the trail designer or builder:

➥ Can we use the proposed construction technique and expect the materials and the various processes to be available years from now if we need to replace part of the trail?

➥ When the item is no longer usable, can any of the materials be recycled?

➥ Can recycled materials be used in the construction?

➥ Are recycled materials appropriate for the proposed use?

These criteria should be considered by all agencies, especially conservation agencies.

Corduroy

Corduroy was originally used to provide access through wetlands to areas being logged or mined. Essentially, the technique involved laying a bridge on the ground where the soil would not support a road. Two log stringers or beams were placed on the ground about 8 feet apart. Small-diameter logs or half logs were placed on the stringers, spanning them. The logs became the tread or surface of the road. They were spiked or pinned to the stringers (figure 12).

A variation of corduroy construction was to place the tread logs directly on the ground. No stringers were used, and the logs were not pinned or spiked to the ground or each other. Some excavation was required to ensure the tread logs were level. The tread logs eventually heaved up or sank, creating severe cross slopes in the tread.

Corduroy construction was often used in areas with deep shade and considerable rainfall. The combination of sloping, wet tread resulted in a slippery, hazardous surface. The stringers and tread logs soon rotted. With no support, the cross slope on the tread logs became worse and more hazardous.

When corduroy was laid directly on the ground, it interfered with the normal flow of runoff. Runoff was blocked in some areas and concentrated elsewhere. Erosion and relocation of minor streams resulted. No plants grew underneath the corduroy, further damaging the wetland resource. Many trees needed to be cut to provide the logs for the corduroy. In many cases, these impacts would be unacceptable today. The useful life of corduroy today is only 7 to 10 years. Corduroy is rarely replaced because suitable trees are even farther from where they are needed for the reconstruction job.

Corduroy did not represent sustainable design and required considerable maintenance. Corduroy is rarely used today. We do not recommend it.
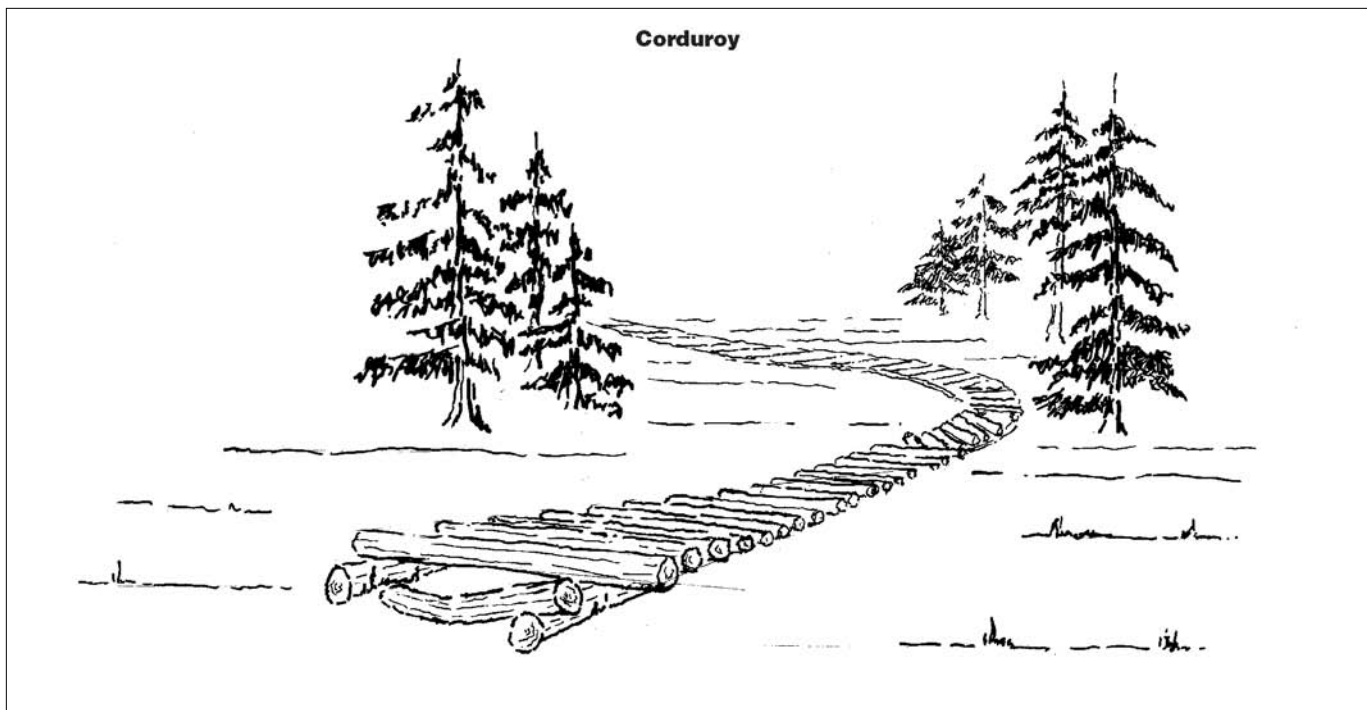
Figure 12—Corduroy requires a lot of native material, rots quickly to an unsafe condition, and is no longer recommended for new construction.

Turnpikes

Turnpikes are used to elevate the trail above wet ground. The technique uses fill material from parallel side ditches and other areas to build the trail base higher than the surrounding water table. Turnpike construction is used to provide a stable trail base in areas with a high water table and fair- to well-drained soils (figure 13).

A turnpike should be used primarily in flat areas of wet or boggy ground with a 0- to 20-percent sideslope. The most important consideration is to lower the water level below the trail base and to carry the water under and away from the trail at frequent intervals. Turnpikes require some degree of drainage. When the ground is so wet that grading work cannot be accomplished and drainage is not possible, use puncheon or some other technique. A turnpike is easier and cheaper to build than puncheon and may last longer. A causeway is another alternative where groundwater saturation is not a problem and a hardened tread is needed.
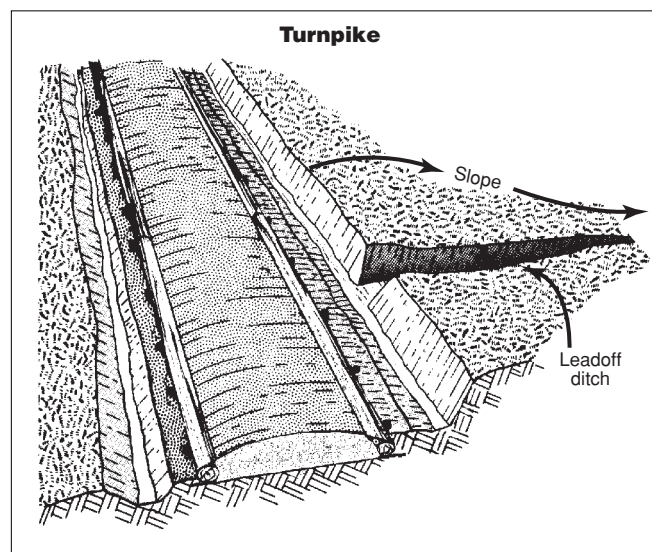
Figure 13—Trail turnpikes usually cost less than other techniques for crossing seasonally wet areas. Occasional culverts are needed for cross drainage under the turnpike.

Begin the turnpike by clearing a site wide enough for the trail tread and a ditch and retainer log or rocks on either side of the trail tread. Rocks, stumps, and roots that would protrude above the turnpike tread or rip geotextiles should be removed or at least cut flush below the final base grade.

Ditch both sides of the trail to lower the water table. Install geotextile or other geosynthetic materials and retainer rocks or logs. Geotextile and geogrid should go under any retainer rocks or logs (figure 14). Lay the geotextile over the ground surface with no excavation, then apply high-quality fill. An alternative method, one that not only provides separation between good fill and clay, but also keeps a layer of soil drier than the muck beneath, is called encapsulation (the sausage technique). Excavate 10 to 12 inches of muck from the middle of the turnpike. Lay a roll of geotextile the length of the turnpike, wide enough to fold back over the top with a 1-foot overlap (figure 15). Place 6 inches of crushed stone, gravel, or broken stone on top of the single layer of geotextile, then fold the geotextile back over the top and continue to fill with tread material.

Rocks or logs can be used for retainers. Rocks last longer. If you use logs, they should be at least 6 inches in diameter, peeled, and preferably treated or naturally decay-resistant. Lay retainer logs in a continuous row along each edge of the trail tread.

Anchor the logs with stakes or, better yet, with large rocks along the outside. The fill and trail surface keep the retainer logs from rolling to the inside.

The practices described above work best on turnpikes in mountain bogs or other areas that are not subject to periodic river flooding. In flood-prone wetlands, different techniques work better. One turnpike was flooded to a depth of 6 to 8 feet on two occasions in 1 month. Stones up to 1 cubic foot in an adjacent area of riprap were lost in the flood. The edges of that turnpike were logs pinned to the ground with diagonally driven driftpins that helped to keep the logs from floating up and away. The logs were still in place after the flood, but the fill material between the logs had been swept away. Geotextile fabric that had been installed between the fill and the ground was still in place. In retrospect, if geocell or geogrid had been placed on the geotextile fabric and stapled, nailed, or placed underneath the logs, most of the fill material would probably have remained in place (figure 16).

Wood used in turnpike construction should be either a naturally decay-resistant species or treated poles. Pinned as described, the logs or poles should survive some floods.
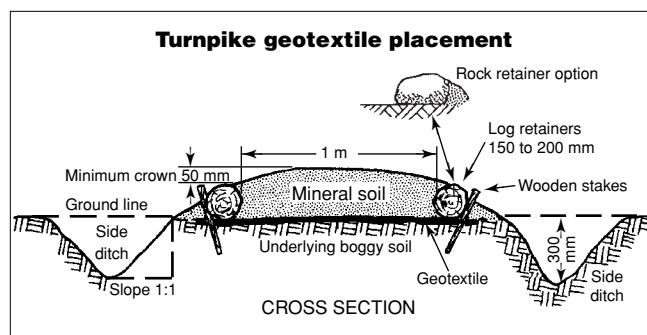
Figure 14—Place the geotextile under the retainer logs or rocks before staking it.
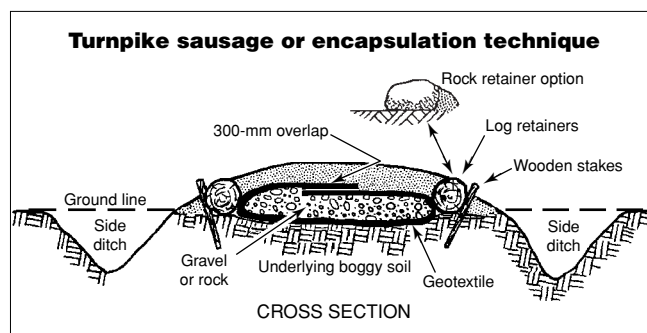
Figure 15—Sausage or encapsulation method.
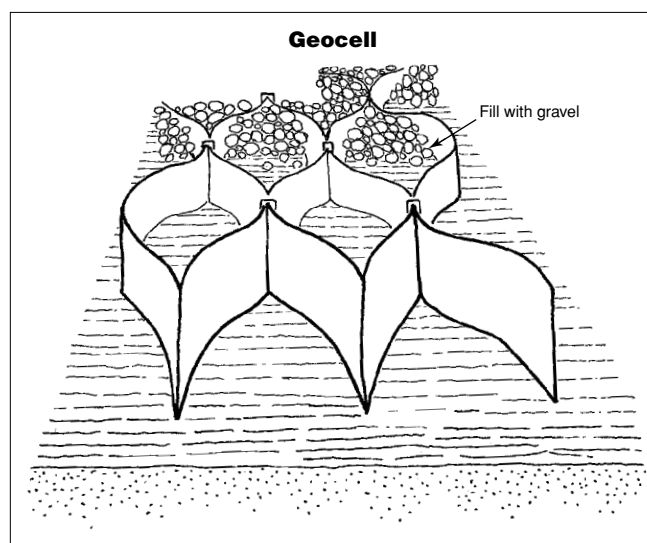
Figure 16—Geocell may help keep fill in place in areas prone to flooding.
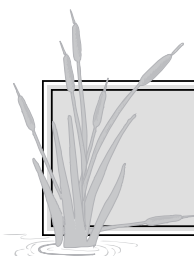
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Firm mineral soil, coarse-grained soils or granular material, or small, well-graded angular rock are needed for fill. Often, gravel or other well-drained material must be hauled in to surface the trail tread. If good soil is excavated from the ditch, it can be used as fill. Fill should not include organic material and should have minimal silt and clay components. Fill the trail until the crown of the trail tread is 2 inches above the retainer or outsloped a minimum of 2 percent. It doesn't hurt to overfill initially, because the fill will settle (figure 17). Compacting the fill—wet it first—with a vibratory plate compactor will help reduce settling.

Figure 17—A new turnpike will need additional fill as it settles, especially during the first year. This turnpike has a timber culvert.

Fill material imported from outside sources may contain seeds of invasive weeds. Instead, it is standard procedure to dig a borrow pit near the site. The pit and routes to it should be carefully located to avoid resource damage and a construction scar that will be seen for many years. The borrow pit should be dug into a slope so that the floor of the pit can slope out and carry runoff water out of the pit. After the trail has been completed, grade back the sides of the pit and revegetate the disturbed area with native plant material.

Keep water from flowing onto the turnpike by constructing a dip, waterbar, or a drainage structure at each end of the turnpike where necessary. Keep the approaches as straight as possible or widen any curves coming onto a turnpike to minimize the chance that packstock or motorbike users will cut the corners and end up in the ditches.

Turnpike maintenance, especially recrowning, is particularly important the year after construction; the soil settles the most during the first year.

Causeways

A more environmentally friendly relative of the turnpike is the causeway, essentially a turnpike without side ditches (figure 18). Causeways filled with broken rock have been successfully used throughout the Sierra Nevada and elsewhere to create an elevated, hardened tread across seasonally wet alpine meadows. Often, multiple parallel paths are restored and replaced with a single causeway. Causeways create less environmental impact than turnpikes because they do not require ditches that lower the water table. In highly saturated soils the causeway could sink into the ground, a problem that geotextiles can help prevent.
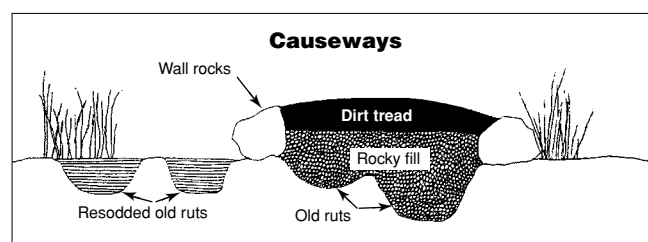
Figure 18—Causeways create an elevated, hardened tread across seasonally wet areas. Geotextiles may be added to help prevent the trail from sinking into the ground.

Improving Drainage
Dips or Ditches

Turnpikes and causeways interrupt the flow of water along and across the trail. You need to take measures to ensure that water flows away from turnpikes instead of saturating them. The tools to ensure that water flows away form turnpikes include: dips (or ditches), open drains, French drains or underdrains, and culverts.

Generally, dips are at least 12 inches deep, have flat bottoms, and sideslope ratios of 1:1. In many cases, the dip can be extended beyond the wet area to capture water that might flow onto the trail.

The simplest way to get water across a trail is to cut a trench across it. These open-top cross drains, or dips, can be reinforced with rocks or treated timbers to prevent cave-ins. These structures are not usually a good alternative because people and packstock stumble on them. One way to reduce this risk is to make the dip wide enough (at least 2 feet) so that packstock will step into the drain rather than over it (figure 19).

An open drain can be filled with gravel. Such a drain is called a French drain. Start with larger pieces of rock and gravel at the bottom, topping the drain off with smaller aggregate (figure 20). French drains are often used to drain a seep or spring underneath a trail bed. A perforated or slotted pipe in the bottom of the drain reduces the amount of fill material needed and drains the area more effectively.

Culverts

Culverts provide better and safer drainage across turnpikes than open drainage gaps or ditches.

Historically, culverts were built as small bridges, using stone or logs. Stone culverts require large stones and a skilled mason. Finding large stones is difficult. Today, dry stone masonry is almost a lost art. Well-built stone culverts can be extremely durable. Some stone culverts that are at least 100 years old are still in use.
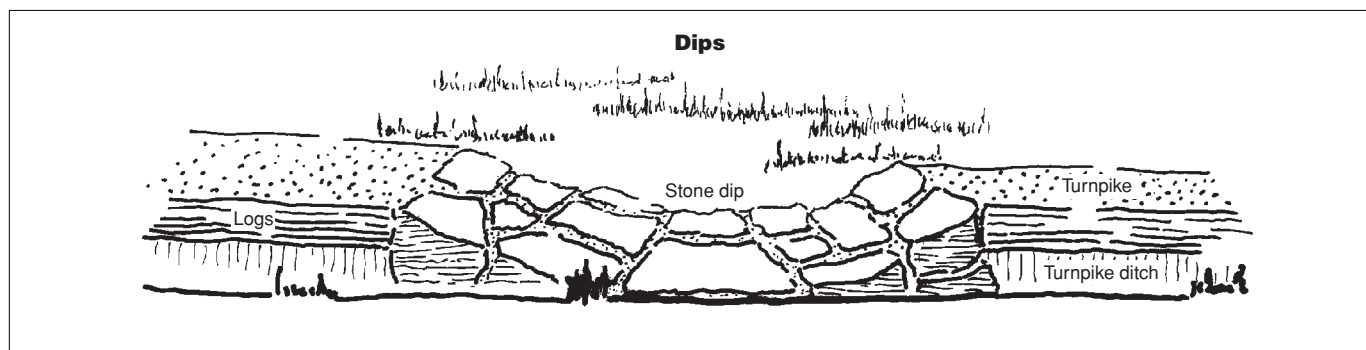
Figure 19—Dips and ditches are a simple and effective way to drain wet areas. The slope angle and depth vary with soil and water conditions. Stones help reinforce the dip. Geotextile may be installed under the stone dip to prevent fine materials from washing out.
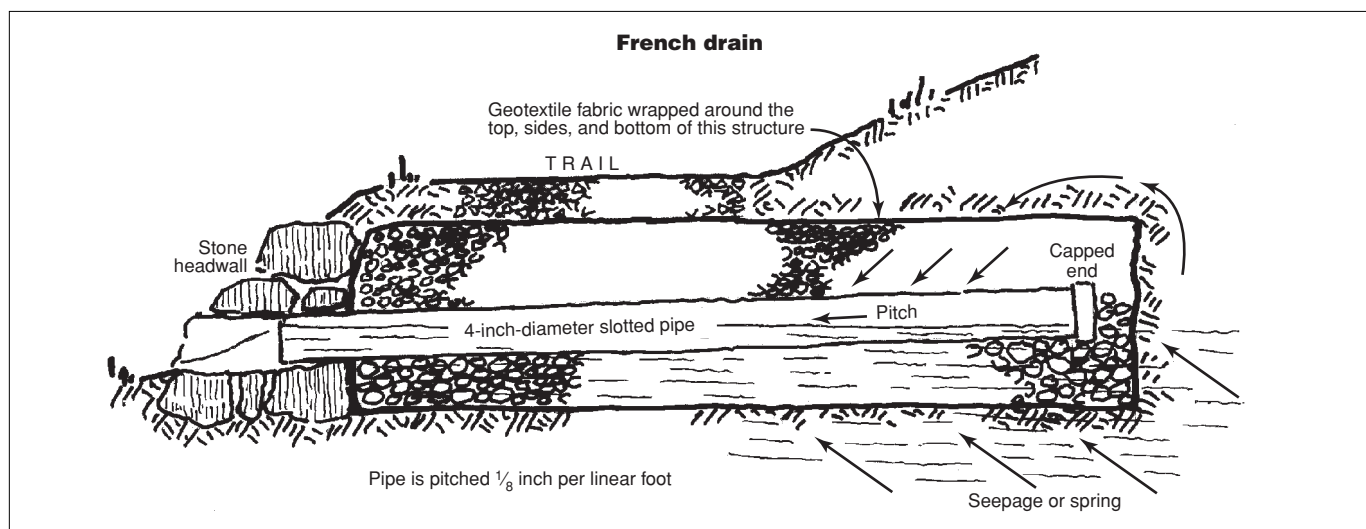
Figure 20—Wrapping French drains with geotextile helps prevent clogging. French drains or underdrains are used to drain springs and seeps that have a low flow.

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Log culverts were used where stone (and stone masons) were not as readily available as logs. Construction crews may also have been more familiar with log construction. Log and timber culverts require less skill to build than stone culverts, but need maintenance. Expect to replace log culverts in 20 to 40 years, although they can last much longer.

Building a timber culvert is simple. We typically use 6 by 6 and 4 by 6 timbers, cutting them to any length suitable for the site and trail condition. Although old railroad culverts sloped the invert of their culverts, it may be difficult to do so in a wetland. In fact, it may be wise to build the invert level. This way the rising water from a creek or river can easily flow through the culvert as the water rises and recedes during a flood.

To build a timber culvert, two timber sleepers are placed in a shallow trench on each side of the trail, parallel to the trail centerline. The sleepers are pinned to the ground with at least two driftpins (figure 21). A timber wall is constructed on each side of the invert, resting on both sleepers. These walls can be as high or low as is suitable for the site condition. Notched 4 by 6 timbers are placed on the top of the walls to become the trail tread. The 4 by 6 timbers are spiked or pinned to the walls. Depending on materials available, the invert may be lined with stone or with planks resting on the sleepers. The invert should be flush with the bottom of the creek or wetland to allow aquatic organisms to move freely.

Normally, timber walls require deadmen going back perpendicular from the face of the wall into the earth behind the wall. The deadmen help keep the wall from collapsing. Because the walls for a timber culvert are only 6 to 8 feet long, installing deadmen is impractical. However, some bracing is needed to keep the walls from collapsing. For timber culverts with walls retaining 12 to 24 inches of earth, 4 by 6 timbers can be used for each side of the tread surface. The bottom of each 4 by 6 can be notched 1 inch deep at each end to fit over the two timber walls, forming a brace to support the walls. The area between these two 4 by 6s can be filled with 3-inch-wide planks (figure 22). Timber walls retaining more than 24 inches of earth should have notched 4 by 6s the full width of the tread surface.

Most lumberyards carry 4 by 6s only in 8-foot lengths. For efficient use of the wood, the 4 by 6s should be used to span distances of 8 feet, 4 feet, or 2 feet, 8 inches. The 2-foot, 8-inch length would provide a 20-inch-wide open area and is the minimum width recommended for timber culverts. The minimum clear height of the culvert should be 7 inches. Rough sawn 2-inch-wide lumber is adequate for the entire tread surface of the 2-foot, 8-inch culvert (figure 23).

The trail tread can be the surface of the top timbers of the culvert, or a curb can be added on each side and the space between the curbs can be filled with earth. The height and width of a timber culvert can be adjusted to fit site conditions and the expected volume of water. The spacing and number of culverts can also be adjusted to reduce the concentration of runoff and potential erosion problems. Timber culverts have an advantage over round pipe because the top timbers can be quite low and still provide the cross-sectional area of a large round pipe. Round pipe also concentrates runoff, while timber culverts spread the same volume of water over a wider area. Timber culverts work well with turnpike construction. Round pipe requires taller structures, a disadvantage.
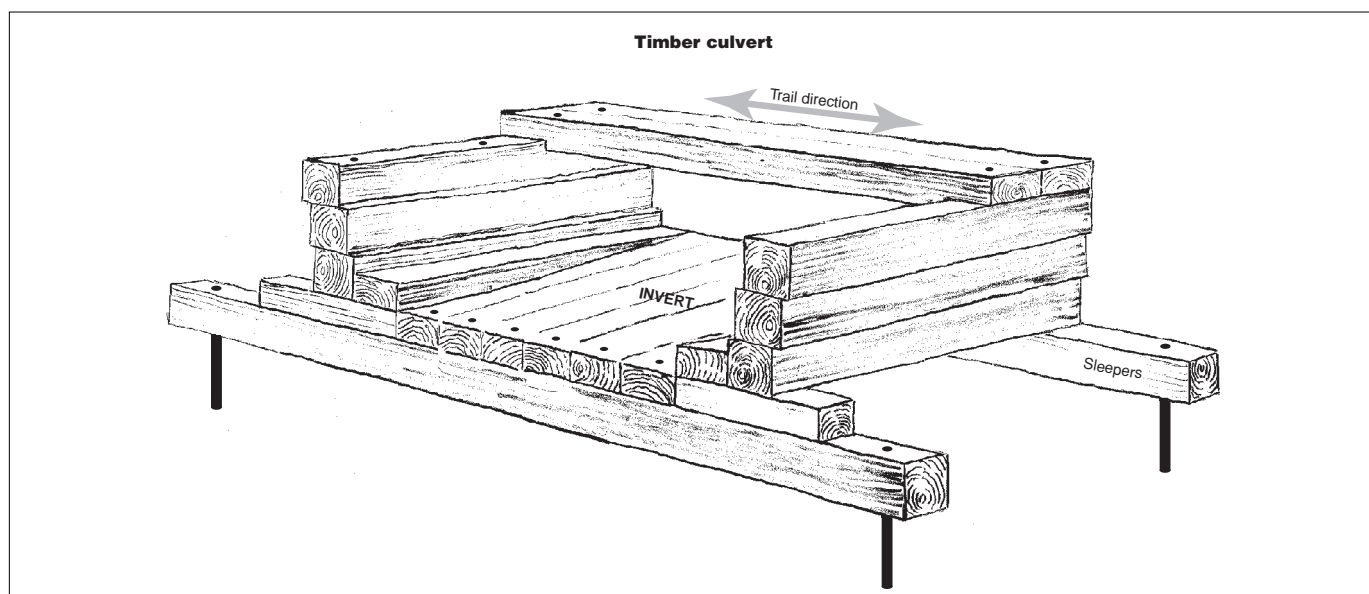
Figure 21—Timber culvert. The invert (bottom of the culvert) is often built level in wetlands because it is less likely to wash away in floods.

Deck planks over timber culvert

Unnotched 3 by 6 interior deck planks

Notched 4 by 6 end deck planks
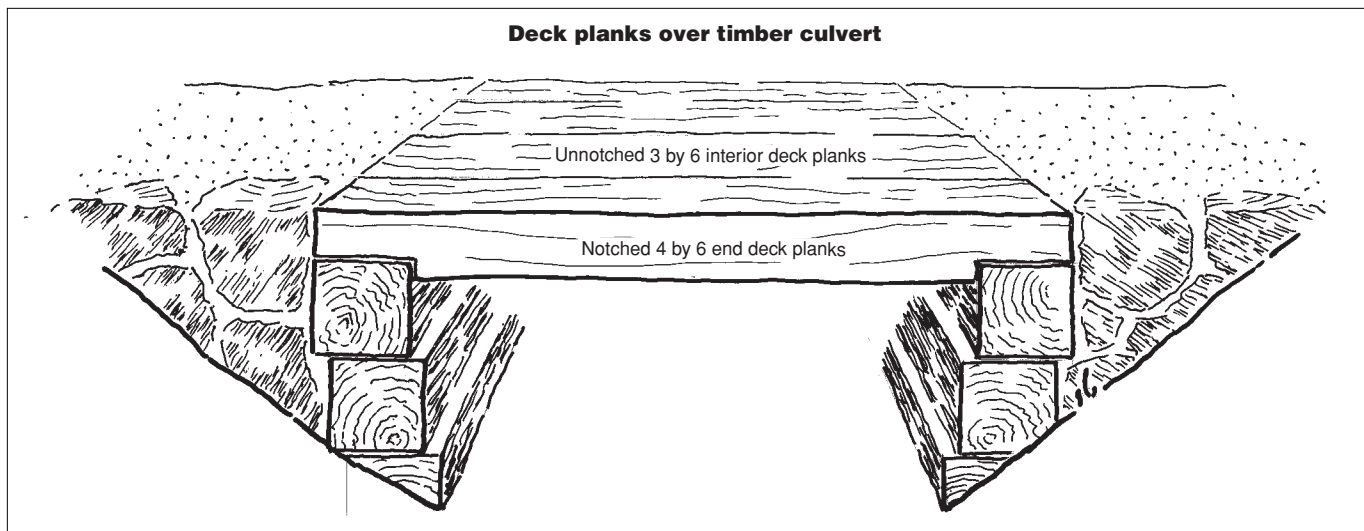
Figure 22—Notching the deck planks on both ends of the culvert (two planks with notches are adequate for a wall up to 24 inches high) helps to brace the walls.

Wood culvert component sizes

32"

6"

20"

5"
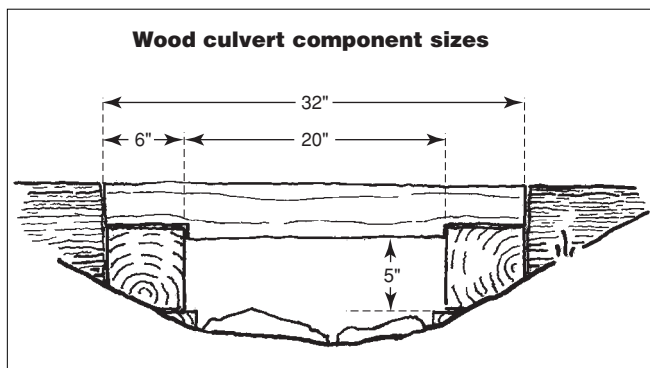
Figure 23—Minimum size recommendations for a wooden culvert designed to use standard timber sizes efficiently. Often larger culverts may be needed. This culvert has no constructed invert.

Pipe is not a traditional or visually compatible material for some backcountry trail culverts. Also, it is difficult to clean a small-diameter pipe with a shovel. A typical shovel blade is 9 inches wide and requires many passes to clean out a 12-inch-diameter pipe. You can do the job more easily with the smaller-diameter combi (combination tool). Make the rectangular opening of a timber culvert 20 inches wide and it will be much easier to clean than a round pipe. Pipes as small as 2 inches in diameter have been used to carry surface runoff beneath turnpike (appendix C compares round and rectangular culverts). Such pipes plug up within weeks and are impossible to clean. They should never have been installed.

Corrugated plastic culverts are sturdy, lightweight, and easy to cut. Although the culverts are not natural, the colors usually blend in with their surroundings better than steel. High-density polyethylene (HDPE) plastic culverts have become quite popular for trail work. However, some trail designers feel corrugated plastic culverts look out of place and they may not meet Recreational Opportunity Spectrum guidelines in remote sites. The ends can be framed by rock so they look natural, and plastic does not decay.

Timbers or logs used in culvert construction should be naturally decay-resistant or treated wood to help meet sustainability criteria. Treated wood should meet best management practices for aquatic environments.

Another culvert design that can be effective is an open-bottom culvert, essentially half of a round culvert. Open-bottom culverts need to be adequately supported under both edges.

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Structures Requiring Foundations

Corduroy, turnpikes, causeways, and improved drainage are all constructed directly on the ground and do not require a foundation. The remaining techniques—puncheon, bog bridges, gadbury, and boardwalks—all require some sort of constructed foundation to raise the structure off the ground.

The type of foundation needed varies with the structure being constructed, materials available, and the site-specific soil and water conditions. More than one type of foundation may be appropriate for each structure, so we will discuss foundations first. These foundations include sleepers, cribbing, end-bearing piles, friction piles, and helical piles.

Sleepers (Sills)

The simplest foundation is to rest the tread plank or stringers on sleepers, also called sills, or mud sills. A log of a naturally decay-resistant wood or a large-diameter treated pole or post is used for the sleepers. Sleepers are used to support puncheon, gadbury, and bog bridge construction. The notching for each type of structure is different and will be discussed later in this chapter.

A sleeper (figure 24) is placed in a shallow trench at a right angle to the trail centerline. A second sleeper is placed in another trench parallel with the first sleeper. The distance between the two sleepers is the span. The span is determined with the help of someone with carpentry or structural engineering experience.

Pinning the sleepers to the ground with 24- to 30-inch driftpins is extra work, but it may reduce future maintenance in wetlands subject to flooding. Pinning is most important near streams or rivers where high water velocities may occur during flooding. Pinning may also reduce maintenance in areas of frequent slack-water flooding. The outer driftpins should be driven in holes drilled at opposing angles. Driftpins installed at these angles will resist flotation and uplift from frost and will also deter vandalism. If rebar is used for pinning, the hole can be $\frac{1}{16}$-inch smaller diameter than the rebar. Otherwise, the hole should be the diameter of the pin.
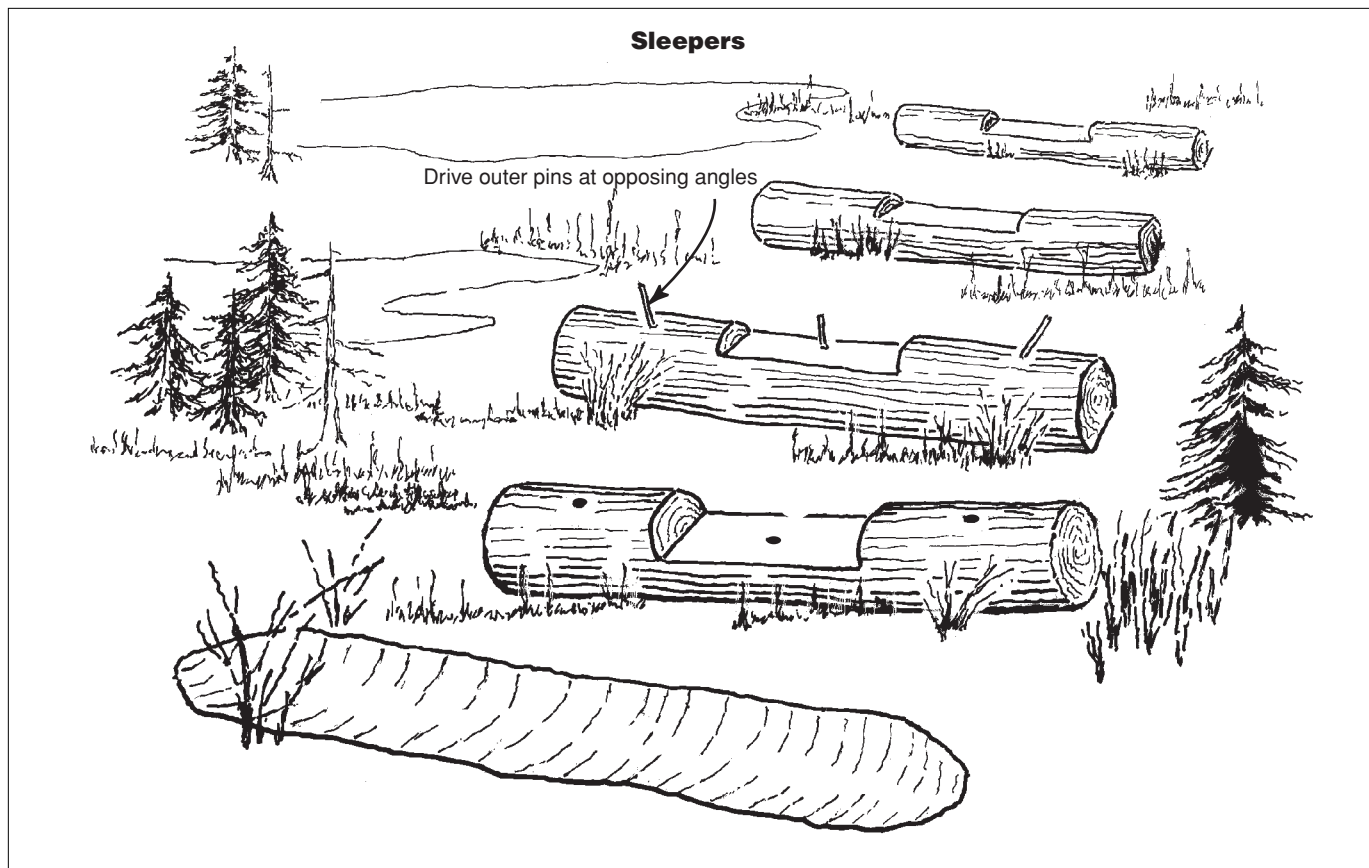
Figure 24—Place sleepers in a shallow trench and pin them at opposing angles so they won't float away during seasonal flooding.
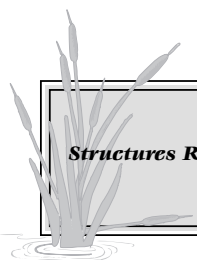
Timbers are sometimes used instead of logs for sleepers. Timbers are easier to work with because they do not require notching. However, timbers do not have the same rustic quality as logs. Precast concrete parking bumpers and other precast concrete units have been used for sleepers, but they are far from rustic. Concrete bumpers weighing 150 pounds per cubic foot are difficult to bring to the site. In most wetland soils, they will eventually sink into the ground.

Sometimes the base for the sleeper can be strengthened by excavating deeper, wider, and longer; laying down geotextile; adding several inches of gravel on top of the geotextile; and folding the geotextile back over the top of the gravel to encapsulate it. Lay the sleeper on top of this foundation.

Cribbing

In hummocky terrain or when crossing a wide, low area, log or timber cribbing can be used to support a trail. Usually logs are used to construct cribbing (figure 25). Dig two parallel
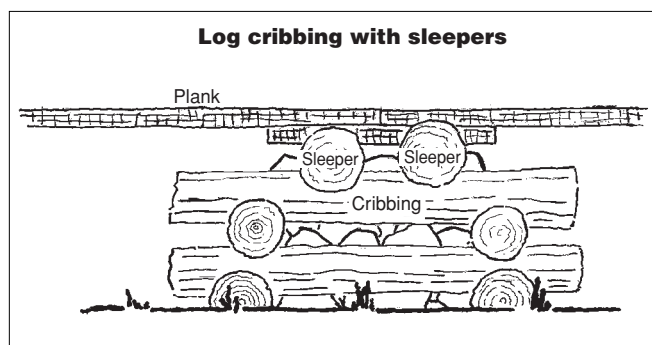
Figure 25—Log cribbing with two sleepers.

shallow trenches a few feet apart. Place a sleeper in each trench and diagonally pin it to the ground with three 30-inch driftpins. Drive the outer two pins at opposing angles. Depending on the width of the completed trail, the first layer (or course) may be 3- to 5-foot-long logs. A second course of two more logs is placed on the first course of logs, near their ends. Each course of logs is placed at right angles to the course below and spiked or pinned to it. The cribbing is built up until the proper height is reached. Lay the top course perpendicular to the centerline of the trail. Stringers or plank can either be nailed to each of the top logs or timbers, or a single, large-diameter log can be notched and pinned to the top logs (similar to the sleepers described earlier).

If you use logs, saddle notches may be used in the bottom of all but the sleepers. This will result in a solid wall of logs. A simpler technique is to use a square notch at the ends of each log that contacts another. This technique will leave a 3- to 6-inch gap between the logs (figure 26).
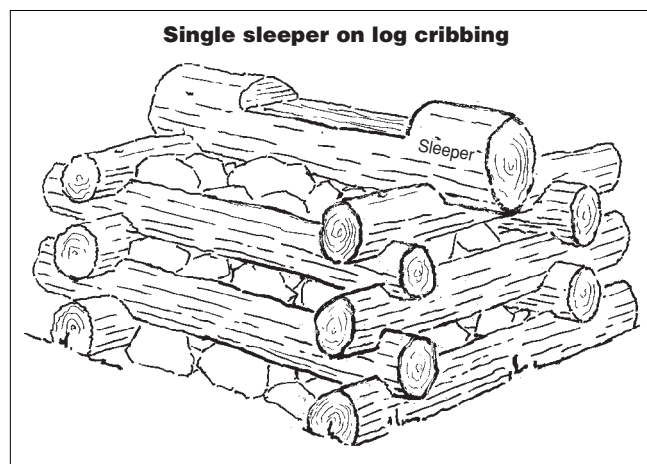
Figure 26—Log cribbing with a single sleeper. Do not notch logs that contact the ground.

Drive spikes or 12-inch-long driftpins into predrilled holes at the corners of the cribbing to hold it together. Avoid stacking the joints on top of each other. The joints must be offset or the driftpins from each course will hit the driftpins in the logs of the course below.

Timbers are easier to use than logs because they do not have to be notched. For greater stability and to prevent the cribbing from being washed away in floods, you can fill the open space in the core of the cribbing with stone.

Wire gabion baskets filled with rock also can be used for crib structures. Sleepers are placed on top.

Wooden Piles

Piles are another foundation technique. Three types of piles have been used for wetland trails. Structural engineers refer to these piles as end-bearing piles, friction piles, and helical piles (figure 27). Geotechnical engineers use a hand-operated relative density probe to help determine soil conditions. The probe is driven into the ground with a fixed force, allowing resistance to be calculated.

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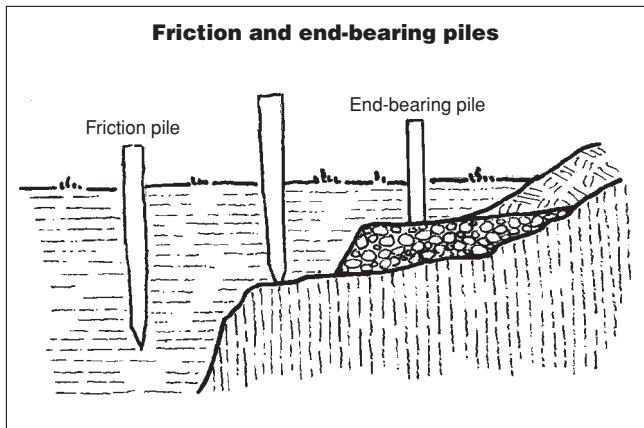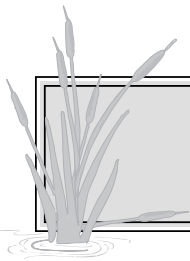
Figure 27—Friction and end-bearing piles. The pile in the middle began as a friction pile but became an end-bearing pile because it met solid resistance before fetching up.

End-Bearing Piles

End-bearing piles are used at locations where firm earth or solid rock is found 2 to 10 feet below the ground. Although the soil at these sites may support sleepers, piles can be used to support the tread at abrupt changes in grade when the tread must be 1 to 5 feet above the ground or water. Piles can also support handrails.

To place an end-bearing pile, excavate a hole a little wider than the pile to a point below the frostline. If you encounter solid rock in the bottom of the hole before reaching the frostline, the pile can rest on the rock. Power augers help make digging easier and faster. In wilderness areas or where only a few holes are needed, a posthole digger, manually operated auger, or shovel will do the job.

Place the pile upright and plumb in the hole. Place the excavated earth (or imported coarse sand or gravel) in the hole in 6- to 8-inch layers, equally on all sides of the pile, and compact it by tamping. A tamping bar is the best tool for compacting earth (figure 28).
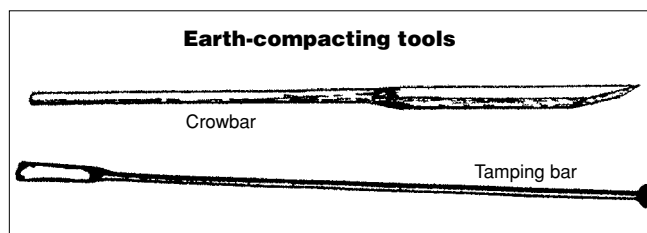
Figure 28—A crowbar (rock bar) and a tamping bar. The tamping bar is lighter than the crowbar and is best suited for loosening soil in holes and for tamping around posts.

End-bearing piles can be made from naturally decay-resistant or pressure-treated wood, steel, or concrete cast in sono-tubes (disposable cylindrical forms). Wood is typically used because it is readily available and easier to use than steel or concrete. Connections to a wood pile are also much easier to make, and the tools needed for the job are lighter and more readily available. Timbers are the first choice for end-bearing piles because their flat, squared sides are easier to connect to than the round surface of logs. Usually, rough-sawn, pressure-treated 6 by 6s are adequate for this work (figure 29).
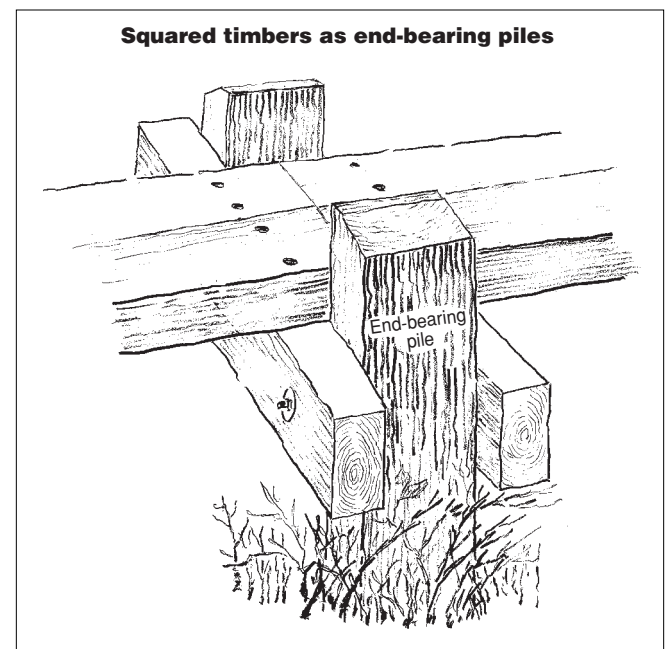
Figure 29—Using squared timbers for end-bearing piles makes connections easier than when round piles are used. Cut the tops at an angle so they will shed water.

Friction Piles

Friction piles are normally used when the ground is wet and sloppy—areas where you need logs or some kind of a deck to stand on while you work. Friction piles for trail work are usually at least 12 feet long and 10 to 12 inches in diameter. Friction piles are considerably heavier, more awkward to transport, and more difficult to install than end-bearing piles.

A friction pile should be a naturally decay-resistant log or a pressure-treated log or pole. Cut a point on the narrow end and dig a shallow hole where the pile is to go. The pile must be driven with the wide butt end up and the narrow end down. The pile should stand as plumb as possible.

For backcountry wetland trail construction, friction piles are driven by hand. Pile driving is done with a "hammer"—a 2½- foot piece of 12-inch-diameter steel pipe (figure 30). A cap is welded at the top and two ½-inch-diameter holes are cut in the cap to let air out. Two steel handles of ½-inch-diameter reinforcing bars are welded to the sides of the pipe. At one area where friction pile construction was common, two of these hammers were used to drive the piles by hand. One hammer weighed 90 pounds and the other 135 pounds. Using these tools builds strong bodies. Usually two persons work together when operating these manual pile drivers.

The theory of the friction pile is that the surface of the pile develops friction against the sloppy soil. The deeper the pile is driven, the more friction develops, until finally the pile "fetch-es up" and can be driven only fractions of an inch with each blow of the hammer. When that point is reached, pile driving stops, normally at depths of 6 to 10 feet. Sometimes firm soil or rock will be reached before the pile fetches up. At this point the driving stops and the pile becomes an end-bearing pile.

If the trail is being built progressively, 12- to 16-foot piles can be driven by a small, lightweight machine with a pile driver attachment. Building a wetland trail strong enough to support the pile driver may be worthwhile in coastal areas that are subject to hurricanes, northeasters, or typhoons. If the wetland trail can support the machine, it will probably withstand some severe storms. If longer piles are needed, a much heavier pile driver can be brought to some sites on a barge.
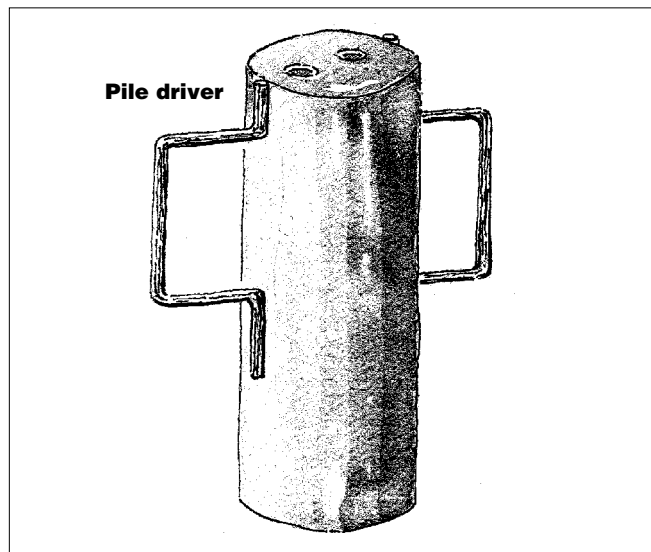
Figure 30—A pile driver (hammer) can weigh 135 pounds or more.

Bent Construction

Whether wood end-bearing or friction piles are used, once a pile is in place, the construction is similar. A second pile is placed on the opposite side of the trail centerline so that each is the same distance from the centerline. When both piles are in place, they are connected by one or two ledgers. The combination of ledgers and piles is called a bent.

On a one-ledger bent, the top of each wood pile is cut flat and level with the opposite pile. A 3 by 6 or 3 by 8 timber is placed flat on the top of both piles so that it extends a few inches beyond each of them. This timber, or ledger, is spiked to the top of each pile (figure 31).

When two ledgers are used, one is bolted to the front and one to the back of each pile, spanning the space between the piles. Drill a hole through each pile parallel with the trail centerline. These holes (and ledgers) should be level with each other. A 3- by 6-inch ledger is held in place on one side of the pile, and the hole in the pile is extended through the ledger. This is repeated until each ledger can be bolted to each pile. The ledgers should be level and level with each other.
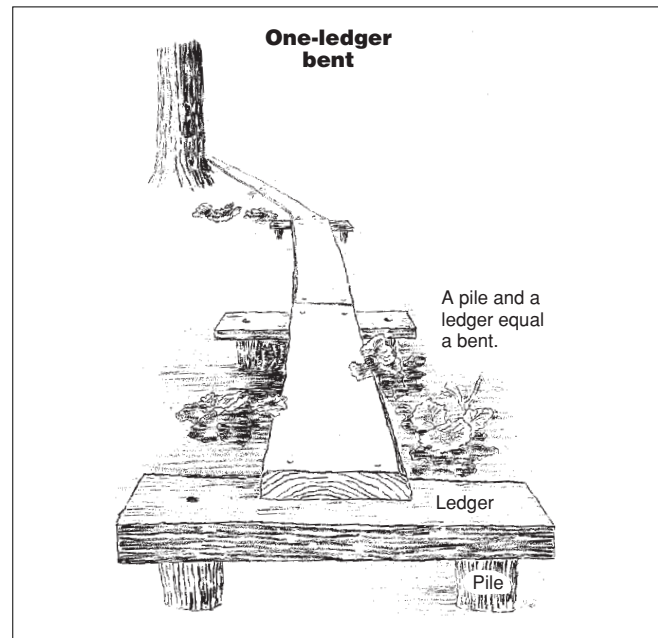
Figure 31—A bent with one ledger. Spike the ledger to the top of each pile. The pile and ledger are collectively called a bent.

Another method for the same type of installation is to determine the proper height of the ledgers and clamp the pair of ledgers to each pile of the bent. Drill a hole through the ledger, the pile, and the opposite ledger, all at once. This is faster, but requires two large clamps that can open at least 1 foot (figure 32).

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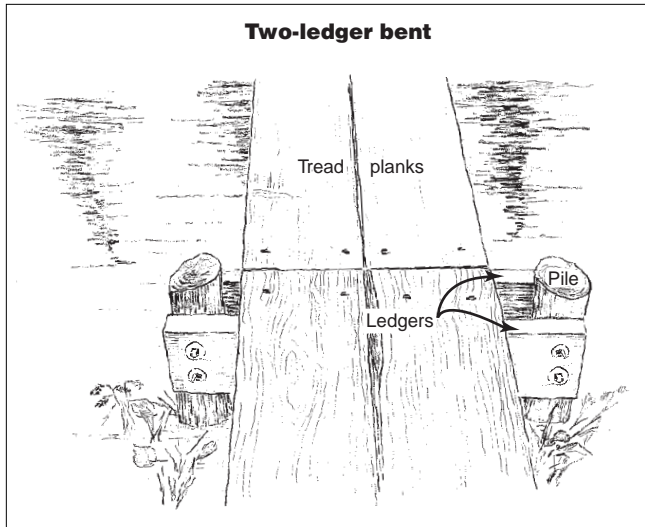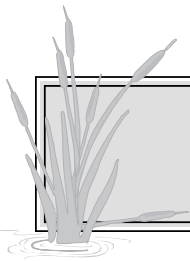
Two-ledger bent

Figure 32—A bent with two ledgers. Trim the tops of the piles at an angle so they will shed water. The bolts go through the pile and both ledgers.

After installing a pair of bents, pressure-treated 3- by 12-inch tread planks are nailed to the ledger or ledgers as described for the bog bridge on sleepers. If the planks are more than 2 feet above the ground or water, the tread should be at least two planks wide for trails that do not have to meet accessibility standards. Collect and dispose of treated wood trimmings and sawdust.

Where the deck will be more than 3 feet above the ground, diagonal bracing is needed to connect the piles of a bent. A single diagonal brace is adequate if the deck is just 3 to 4$\frac{1}{2}$ feet above the ground (figure 33). If the deck is higher than 4$\frac{1}{2}$ feet, two diagonal braces are necessary. These braces should be installed as a cross brace, forming an X between the piles. Diagonal braces are normally wood (figure 34). The angle of the braces should be between 30 to 60 degrees to the horizontal to provide enough support. Angles of 30, 45, or 60 degrees, or a 3-4-5 triangle, make the mathematics of carpentry easier in the field.

Occasionally, the ground is well below the surface of the tread. If the tread is 4 feet or more above the ground and the space between the bents is 6 feet or more, diagonal bracing may be needed to connect consecutive bents. Bracing between bents is done with wood members from the right pile of one bent to the right pile of the next, and the left pile of the bent to the left pile of the next (figure 35). Keep in mind that braces impede waterflow and can contribute to debris and ice jams.

Diagonal brace

Figure 33—A single diagonal brace is adequate if the deck is no more than 4$\frac{1}{2}$ feet above the ground. Alternate braces on successive bents.

Double brace

Figure 34—Use a cross brace if the deck is higher than 4$\frac{1}{2}$ feet above the ground. Extra-long braces can be bolted together using a spacer block to increase rigidity.
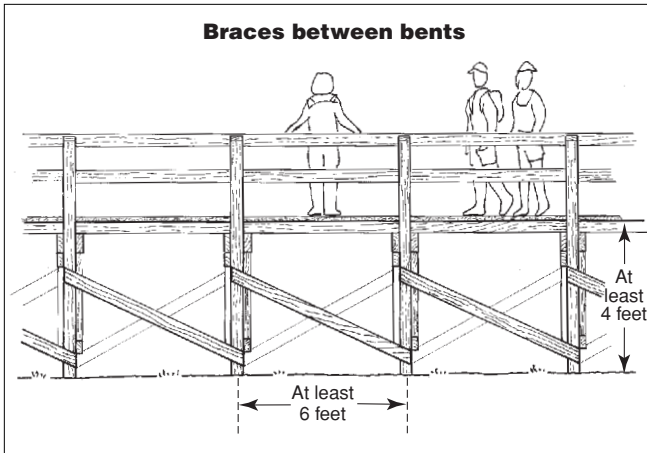
Figure 35—Bracing between bents is sometimes necessary.
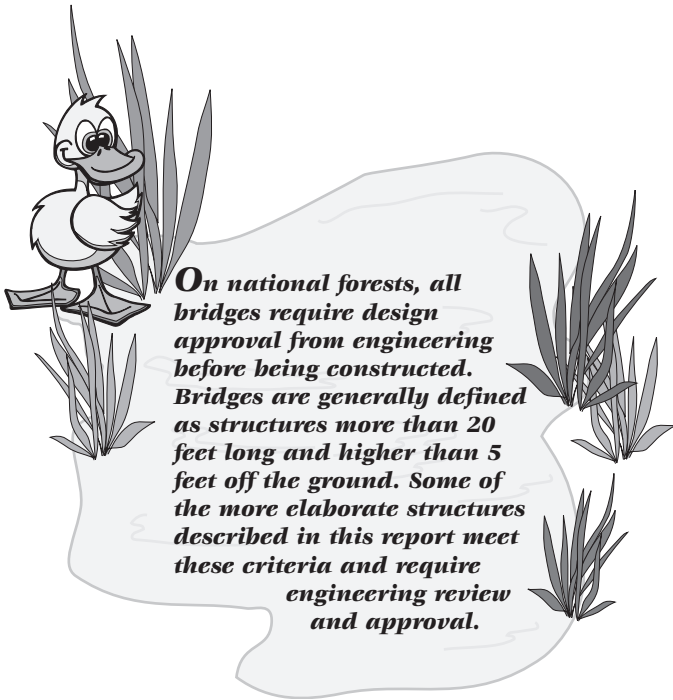
At least
4 feet

At least
6 feet

Braces between bents

Helical pile

Figure 36—Helical piles are an alternative to friction piles.

On national forests, all bridges require design approval from engineering before being constructed. Bridges are generally defined as structures more than 20 feet long and higher than 5 feet off the ground. Some of the more elaborate structures described in this report meet these criteria and require engineering review and approval.

anchor was modified to be used as a helical pile. Although technically incorrect, the term screw anchor is still used (figure 36).

Helical piles are now used to support anything from utility poles to large buildings built on poor wetland soils. They require special equipment and techniques to install. Many certified contractors are located throughout the country to allow for competitive bidding. Sometimes certified contractors will train volunteers to do the work. ***Helical piles are an excellent alternative to friction piles. They weigh less, are easier to install with portable equipment, and result in less ground disturbance. Their overall cost may be much less than friction piles*** (figure 37).

A helical pile includes a helical lead section and a beam saddle. The lead section is solid high-strength steel $3\frac{1}{2}$, 5, or 7 feet long, pointed at the bottom. One, two, or three solid steel helices 8, 10, or 12 inches in diameter and spaced $2\frac{1}{2}$ to 3 feet apart, are welded around a solid steel shaft. The diameter and number of helices depend on the loads to be carried and the soil conditions at the site. The helices are attached to the steel shaft with one edge of the slit lower than the other, creating a leading edge and a trailing edge. All the elements of a helical pile are hot-dipped galvanized. Bolt holes are provided at the end of each lead section for bolting another helical section to the lead section (figure 38).

Helical Piles (Screw Piles)

Helical piles, or screw piles, are more accurate terms for a recent adaptation of an old construction technique using screw anchors. Screw anchors were originally used in poor soils, often with cable guy lines. The design of the screw
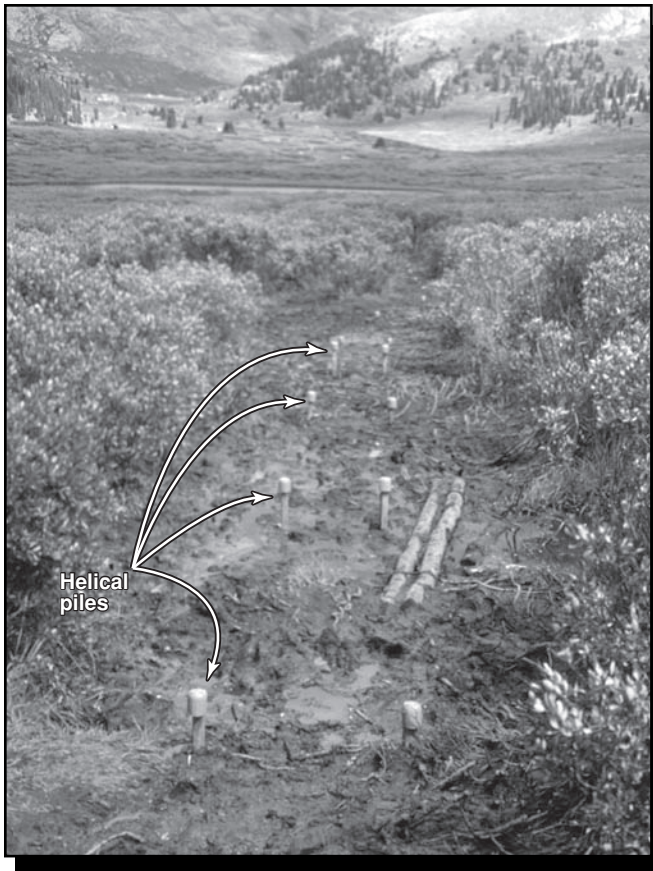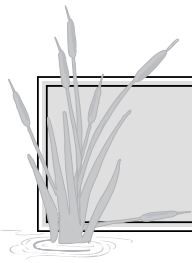
Figure 37—Helical piles installed in Colorado. The saddles are not yet attached. The ends are covered with temporary plastic caps for safety.

Figure 38—A helical pile was used for this boardwalk. Stringers are attached directly to the beam saddle, helping to keep the boardwalk close to the ground.

A 12-inch-long, L-shaped beam saddle fits into the end of the steel shaft of the helical pile where the sections are bolted together. The beam saddle consists of a steel angle welded to a pipe sleeve. Two bolt holes in the vertical leg of the steel angle are opposite two bolt holes in a steel side lockplate (figure 39). The side lockplate is held in place by two bolts through the steel angle, through a wooden ledger or stringer, and through the side lockplate. The beam bracket can be adjusted up to $3\frac{1}{2}$ inches by tightening the nuts on the bolt. A custom saddle is often used to accommodate larger wood or steel ledgers.
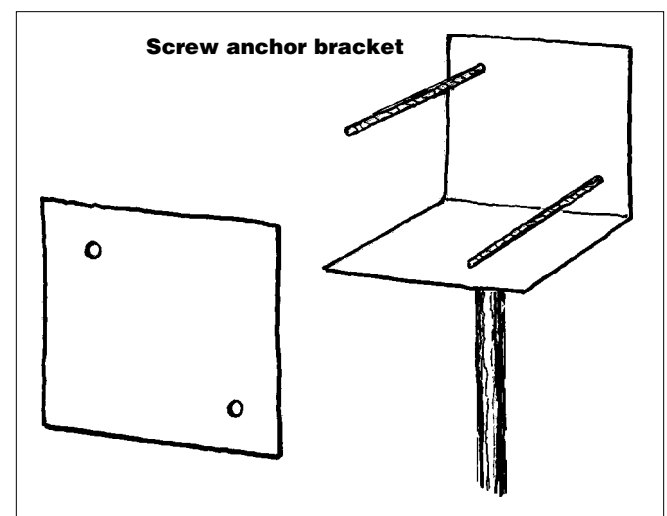
Figure 39—Screw anchor bracket for helical piles.

In poor soils, longer helical piles are sometimes used to achieve the needed load-bearing capacity. To reach that capacity, the pile is augered into the ground until a predetermined torque (the force needed to twist the lead section into the ground) is reached. Extensions can be bolted on to the lead section and augered into the ground until the correct torque is reached.

Helical Pile Assembly

Helical pile assemblies for wetland trails usually consist of two helical piles opposite each other, one on each side of the bog bridge or boardwalk, or they may be located under the boardwalk. The two piles may be tied together with a ledger or a pair of ledgers placed on edge, resting on the beam saddle of each pile. The ledgers are usually solid wood—3 by 6, 8, 10, or 12 inch, or two or three pieces of 2 by 4s or 2 by 6s nailed together. Ledgers may also be glulaminated. The ledgers are bolted to each beam saddle (figure 40).
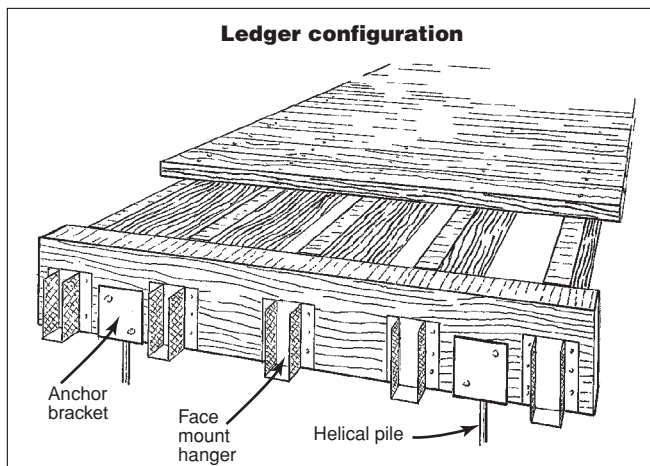
Figure 40—Typical ledger configuration of a helical pile assembly.

If the deck is 3 to 4½ feet above the ground, a diagonal brace is needed between the piles. If the deck is more than 4½ feet above the ground, two diagonal braces are needed, installed as cross braces. Diagonal braces may be additional helical piles (figure 41) or steel angles with diagonal cable attached to them. If bents are 6 feet apart or more, diagonal bracing between bents may also be needed. Consecutive bents may be braced diagonally from the left helical pile of one bent to the right helical pile of the next bent. The procedure is repeated to connect the bents' two remaining helical piles.
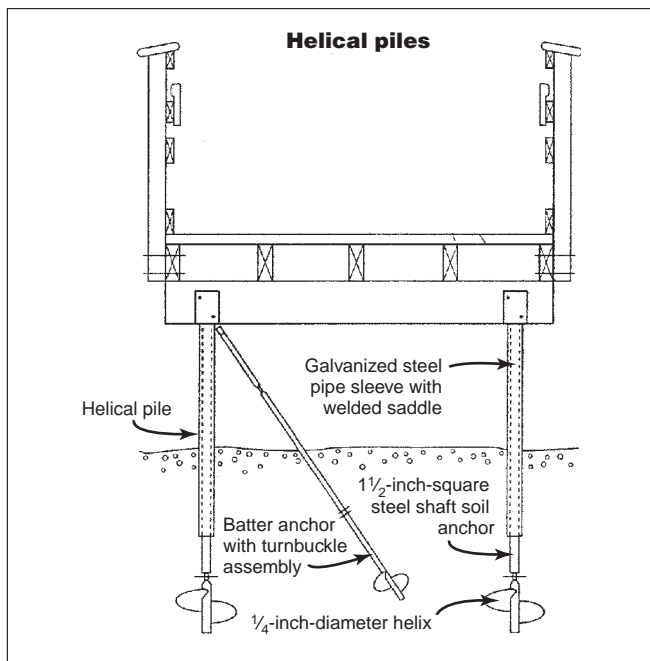
Figure 41—Typical helical pile assembly.

Special Site Considerations

A trail in a spruce bog requires adapting wetland construction techniques to the site. The most applicable technique is the bog bridge on bents. However, unlike construction in most wetlands, the location of each pile will have to be adjusted in the field to avoid roots.

Although the upper layer of soil is organic, the underlying soil may not be. Dig test holes along the proposed route to determine whether end-bearing piles, friction piles, or a combination of both is the best technique.

The spacing between piers will vary, as will the angle of the bents to the trail centerline. Some of the tread planks will be shorter than normal, and others will be longer. Starting with tread planks that are twice the normal length will permit cutting short pieces to fit one location, leaving longer pieces for use elsewhere (figure 42).
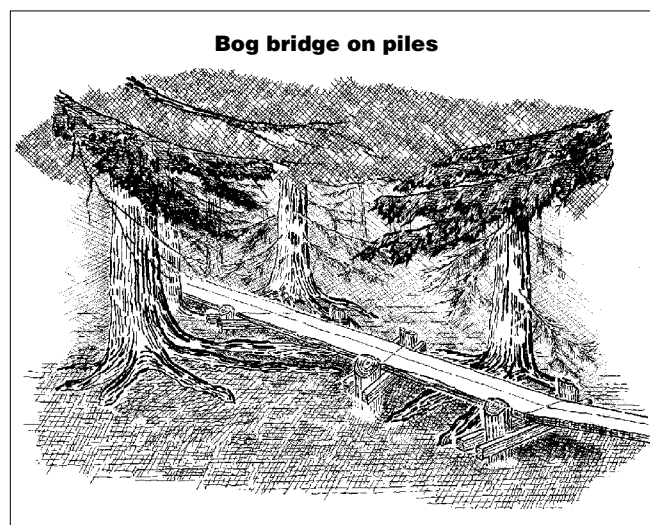
Figure 42—A bog bridge on a pile foundation. Protecting tree roots in a spruce bog requires careful placement of sleepers and piles.

Although this technique is described for northern spruce bogs, it may also have application in cypress swamps in the Southeastern United States and elsewhere.

If beaver are a problem, wrap piles with hardware cloth and staple it into place. The hardware cloth discourages beavers from chewing through the piles, timbers, or logs used in construction (figure 43).

Old beaver ponds present something of a problem in bog bridge construction, especially in mountainous areas. The
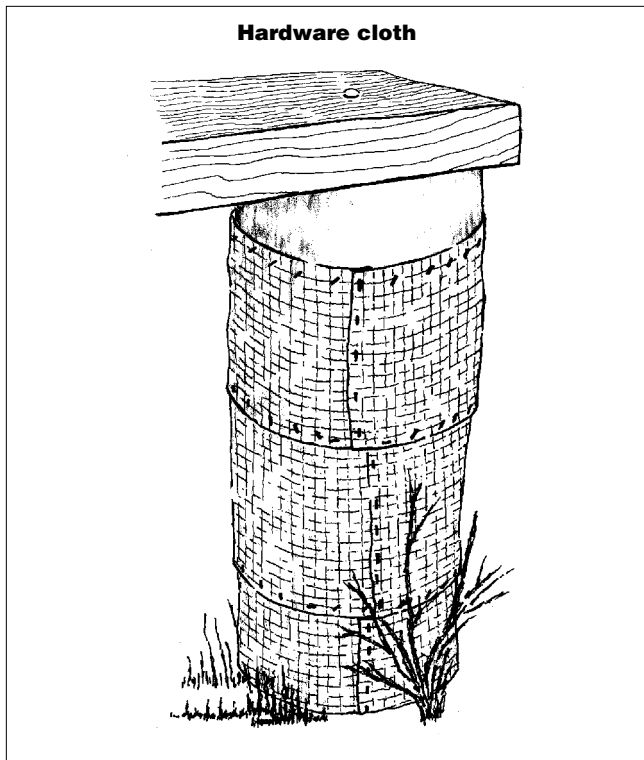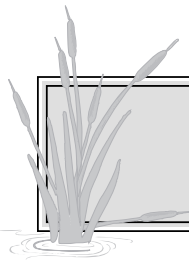
Hardware cloth

Figure 43—Hardware cloth stapled around piles helps discourage beavers.

original soil may have been of glacial origin and capable of supporting end-bearing piles. However, beaver dams trap silt, which drops to the bottom of their ponds. While end-bearing piles may work well in some locations in such ponds, friction piles are needed elsewhere. When concrete end-bearing piles were used at one pond, some settled 1 to 2 feet in 5 years. After 10 years, all concrete end-bearing piles had to be replaced with log friction piles (figure 44).

Puncheon

Puncheon are essentially short-span footbridges or a series of connected short-span footbridges. The term puncheon means different things to different people. Puncheon on the Appalachian Trail is not the same as puncheon built in the Cascades, Rocky Mountains, or Sierras. Puncheon built in easily accessible areas may not be the same as that built in the backcountry. Puncheon can be used where the soil is wet but does not contain enough water to seriously hamper trail work. The one thing common to all puncheon construction is the use of sleepers.

Figure 44—Know your soil conditions. Concrete end-bearing piles settled 1 to 2 feet here and had to be replaced with these log friction piles.

Type 1 Puncheon

On the Appalachian Trail, 3- to 6-foot-long logs are commonly used for the sleepers. The sleepers are notched to receive one or two tread logs and then placed in a shallow trench. The tread logs are hewn, split, or sawn, roughly in half, to provide a level plane for the walking surface or tread. The tread logs are spiked or pinned in the notch of the sleepers (figure 45).
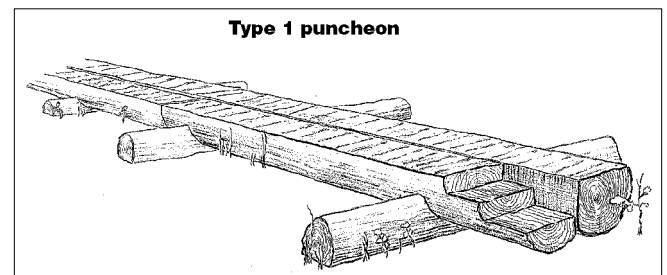
Type 1 puncheon

Figure 45—The rustic type 1 puncheon has sleepers and tread logs.

If the area to be crossed is longer than the logs available for the tread, the puncheon can be built as a series of connecting sections. Hiking any distance on single-tread-log puncheon can be unnerving because the hiker is looking down to avoid stepping off the tread. This is especially true if there is quite a drop from the tread to the ground or water below. Two tread logs placed side by side on longer sleepers will help. For two-tread-log construction, the inside face of each log should be hewn or sawn to butt closely to the adjacent log. A narrow gap between the two logs will help drain water, snow, and ice from the tread. This will reduce the chances of a slippery tread and retard decay.

Two or three small spacers can be nailed to the inside face of one of the logs to control the width of this gap. The spacers can be short, straight lengths of 2- to 4-inch-diameter branches or wood scraps, hewn flat on opposite sides to provide a piece of wood about 1 inch thick.

Type 2 Puncheon

In the Western States, puncheon uses log sleepers placed in a manner similar to that used on the Appalachian Trail. The sleepers are a few feet longer, however, and the space between them is spanned by two or three log stringers, or beams, spaced 1 to 3 feet apart (figure 46). The tread is made from 6- to 12-inch-diameter split logs, 4 to 6 feet long, or split planks. The split face becomes the tread. The bottom of the tread half-log is notched to rest on the stringer log, and the tread is spiked in place. If three stringers are used, do not spike the tread logs to the center stringer. The top of the three stringers will probably not be at the same height. Use a long carpenter's or mason's level to quickly determine the height of each stringer in relation to the others. Ideally the tread should be level from one side to the other. Handtools normally used in the field for construction make it difficult to get the tread perfectly level. Adjusting the depth of each notch, as needed, will allow for variations in stringer height. Shims under the decking also help to level the structure from side to side.

Half logs can be placed with their split sides facing up as a tread. Smaller half logs are placed split side facing down resting on the stringer and butted tightly against the tread log. These logs serve as brace logs, preventing the tread logs from wobbling. Succeeding tread log are butted snugly against the brace logs (figure 47).

If large logs are available, tread plank can be sawn from the logs, producing a number of pieces of plank of varying widths from one log. An Alaskan sawmill can be used at the site to produce planks with a uniform thickness. With this plank, there should be little—if any—need to notch or shim the stringers.

Excessive cross slope will make the surface very slippery. The meaning of excessive will vary, depending on the climate expected when the trail is being used. In a dry climate, the cross slope should not exceed $\frac{1}{2}$ inch per foot of tread width; in a wet climate, or where snow, ice, or frost can be expected, the cross slope should be no more than $\frac{1}{8}$ to $\frac{1}{4}$ inch per foot of tread width. If the trail leading to the puncheon is wet, no matter what the season, hikers will track mud onto the tread, making it slippery throughout the year.

Type 2 puncheon
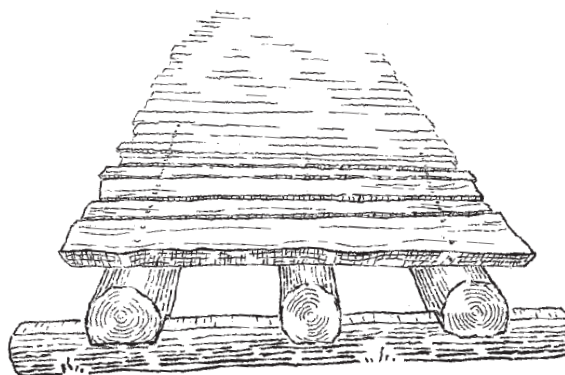
Figure 46—Type 2 puncheon has sleepers, stringers, and decking.

Rustic tread

Unnotched stringer

Sleeper

Sleeper may be notched
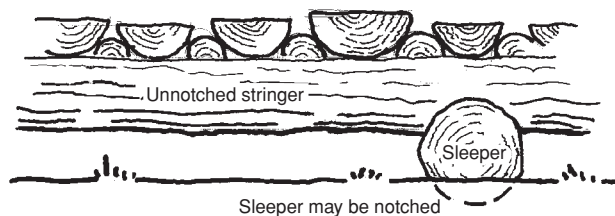
Figure 47—Rustic tread or decking made from half logs (logs cut in half lengthwise).

Type 3 Puncheon

Type 3 puncheon also uses sleepers to support the structure, but the material is sawn timber or lumber, which should be treated with wood preservative (figure 48). This construction is popular at more accessible sites where materials are easier to transport. The longevity of treated wood and the environmental consequences and labor of cutting trees onsite make the use of sawn, treated timbers increasingly popular at remote sites as well. Helicopters, packstock, all-terrain vehicles, and workers carry in the materials.

The sleepers can be either 6- by 6- or 8- by 8-inch-square timbers placed as previously described. Two or three stringers rest on the sleepers and may be toenailed to the sleepers and bolted or nailed to the stringer in the next span. The stringers may also be attached to the sleepers with steel angles and extended (cantilevered) a short distance beyond the sleepers.

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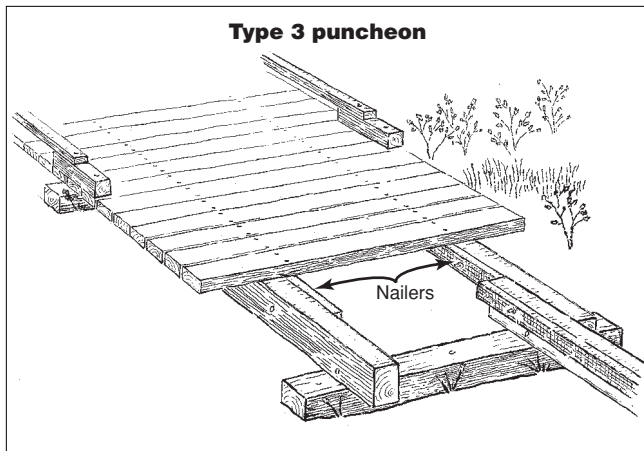
Figure 48—Type 3 puncheon is constructed from preservative-treated timbers. The nailer bolted to the inside of each stringer helps prevent decay by concentrating screw holes and associated decay in the easily replaced nailers instead of the stringers.

The size of the stringers is determined by the maximum weight they can be expected to support, which may be the snow load in snow country. For foot trails, usually the size of the stringers is calculated to support a live load of 85 pounds per square foot, the maximum weight expected for trail users standing on one section of trail. Heavier, wider puncheon is needed for horse and mule traffic.

On foot trails, the tread is often 2 by 6, 2 by 8, or 2 by 10 lumber nailed to the stringers. When three stringers are used, do not nail to the center stringer. The nails work their way out and pose a tripping hazard. The stringers are the most expensive and most difficult items to bring to the site. Do everything you can to extend their useful life; usually this means keeping them dry.

The tread will need replacement more frequently than any other portion of this type of puncheon. In some areas the wood tread will require replacement every 7 to 10 years. After three or four replacements of the tread, the top of the stringers will show signs of decay and wear. Water from runoff and condensation will follow the nails down into the wood, and repeated nailing in the same vicinity will soften the wood. To avoid this, a nailing board (nailer) of 2 by 4s or 2 by 6s can be nailed to the top or side of the stringer. A better solution is to bolt rough-sawn 2 by 4s or 3 by 4s to the side of the stringer with carriage or machine bolts. The bolts can be 2½ to 4 feet apart. The tread is nailed to the nailer instead of the stringer. Eventually, the nailer will require replacement, but the nailer is much easier to replace than the stringers. Esthetically, it is better to attach the nailers to the inside face of the stringers.

Puncheon Summary

The type 1 and 2 puncheon do not represent sustainable design. They damage the resource if onsite trees are cut to provide construction materials. Offsite timber materials may be from more sustainable commercial sources. The type 3 puncheon meets the criteria for sustainable design because the material used is more easily renewed. Although the tread may require replacement in 7 to 10 years, the heavy stringers have a much longer life expectancy.

All three types of puncheon are raised high enough above the ground to provide little interference with the movement of floodwater. The tread width of types 2 and 3 puncheon may affect the growth of plants under the tread.

Type 3 puncheon is the most likely of the three to meet accessibility guidelines.

Gadbury

Gadbury (figure 49), a structure similar to puncheon, was developed in the Pacific Northwest. Gadbury uses two half logs, as described for puncheon, and longer notched sleepers. The notch cut for gadbury must be about twice as wide as the notch cut for puncheon. The two half logs are placed on each side of the center of the notch with the flat surface up. Two full logs are placed in the notch on the outside of each of the half logs.

An experienced crew can construct gadbury without using spikes or steel driftpins. Such construction requires considerable skill and experience with woodworking tools. Lacking this experience, the pieces can be spiked or pinned together. Earth may be placed on the half logs and held in place by the full, outside logs.

Gadbury uses more wood than puncheon. From a standpoint of sustainable design, gadbury is less suitable than other techniques.
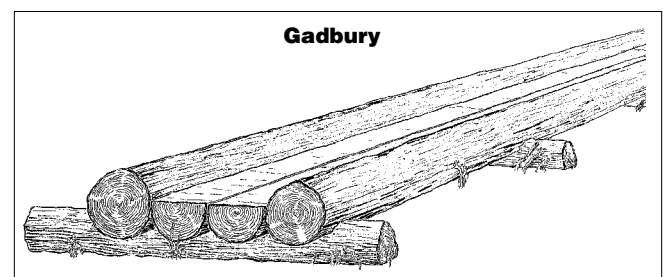
Figure 49—Gadbury is another rustic structure similar to puncheon. Use peeled logs for gadbury.

Bog Bridge

A bog bridge is a form of puncheon. Normally, bog bridges have a single- or double-plank tread surface resting directly on mud sleepers (figure 50), cribbing, or piles. A puncheon, by contrast, will usually have stringers resting on the mud sleepers, with tread decking nailed perpendicular to the stringers.

To add to the confusion over terminology, in coastal Alaska, bog bridges are called boardwalks, or step-and-run boardwalks if spacers are used to create steps (figure 51). In other places, the term bog bridge is synonymous with puncheon. In parts of the Rocky Mountains and Sierras, bog bridge equates to turnpike, a structure we described as a raised walkway of stone and fill material. We define bog bridges as a series of connected, short-span bridges close to the ground.

The tread of a bog bridge is usually treated, rough-sawn 3- by 12-inch plank that is 6 to 9 feet long. The plank parallels the centerline of the trail and rests on closely spaced, lightweight foundations. This means that the tread of the bog bridge can be closer to the ground, perhaps only 6 to 12 inches above it, providing 3 to 9 inches of clear space below the tread. There is little to block the flow of water (in either direction) below the plank, and little to resist the force of floodwater going over it. In the backcountry, bog bridges are normally one 12-inch plank wide. A plank this narrow does little to interfere with plant growth underneath. The span of each of these small bridges will vary with the type of wood used for the plank, the thickness of the plank, and the anticipated weight on the plank. In areas of heavy, wet snow, the snow may be the heaviest weight on the bridge. Snow load may be as much as 300 pounds per square foot in such areas.

Figure 50—A simple bog bridge with sleepers. This common structure is also called a single-plank boardwalk in coastal Alaska.
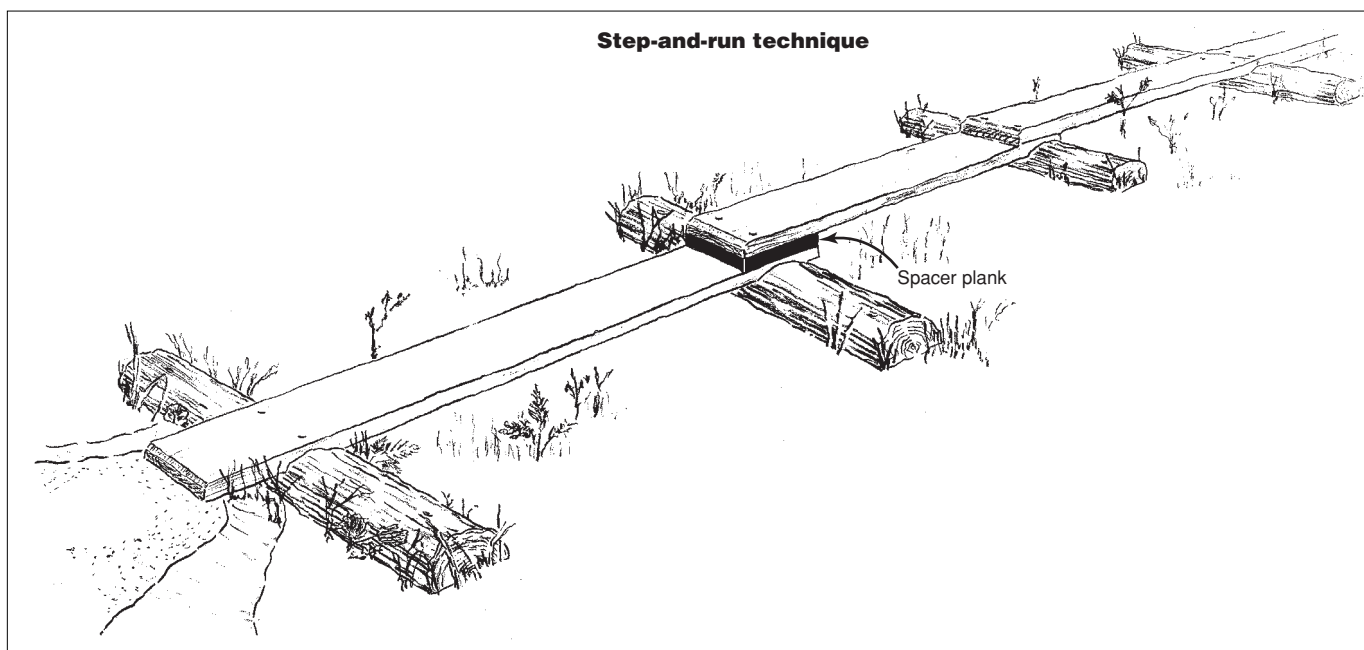
Figure 51—The step-and-run technique is a way of keeping planks level as elevation changes. Level planks help reduce slipping in wet climates.
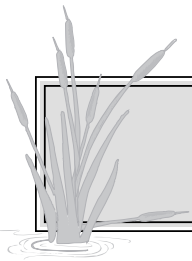
Bog Bridge on Sleepers

In its simplest form, the plank of the bog bridge rests on sleepers. A sleeper is placed in a shallow trench at right angles to the trail centerline. A second sleeper is prepared and placed in another trench 6 to 9 feet away. This distance is the span, which is determined from older installations or with the help of someone with carpentry or structural engineering experience. Place the plank flat in the notches of the sleepers, with one cut end centered in line with the centerline of the log. Mark the plank where it meets the centerline of the next sleeper and saw it to the proper length. The plank is nailed to the sleepers at each end with two 50- or 60-penny (appendix D), ring-shank nails driven through previously drilled pilot holes. This process continues across the wetland.

Bog Bridge on Cribbing

Occasionally, log or timber cribbing can be used to support the plank of a bog bridge. Plank can either be nailed to each of the top logs or timbers, or one large-diameter log can be notched and pinned to the top logs (similar to the sleepers described earlier). If the bog bridge is more than 2 feet high, the plank should be two planks wide for safety.

Bog Bridge on Piles

Another technique for building bog bridges is to rest the plank on pile foundations. The three types of suitable piles are end-bearing piles, friction piles, and helical piles.

After installing a pair of bents or piers, pressure-treated 3- by 12-inch planks are nailed to the ledger or ledgers as described for the bog bridge on sleepers. The ledgers do not have to be notched. When piles are used, the plank may be more than 2 feet above the ground or water. In such cases, the tread should be two planks wide.

Bog Bridge Summary

Whether a bog bridge is built on sleepers, cribbing, or wood piles, it lends itself to backcountry construction. The materials are wood, steel washers, bolts, nuts, and nails. The pieces of wood are relatively small and can be carried by hand. Bog bridges as described here do not meet Forest Service accessibility guidelines, but are suitable where departures from these guidelines are allowed.

Boardwalk

For the purpose of this book, a boardwalk is a structure that uses widely spaced bents or piers as a foundation. Stringers, parallel with the centerline of the boardwalk, rest on the ledgers of the bents or piers. The stringers support the deck, which is usually 2 by 6 or 2 by 8 lumber laid perpendicular to the centerline and nailed or screwed to the stringers, or to nailers bolted to the stringers. Boardwalks usually have a curb or handrail along their edges (figure 52).

Basically, a boardwalk is a series of connected bridges, each with a span as long as is practical, perhaps 8 to 40 feet. At most wetland sites, longer stringers are not practical because they are difficult to transport. Also, building adequate foundations for the long spans often requires large pieces of specialized equipment that cannot negotiate unstable soil.

Figure 52—A typical boardwalk. Boardwalks are expensive and somewhat complicated, so seek the help of engineers and landscape designers during planning.

Stringers

At least two stringers or beams rest on the ledgers and span the space between consecutive bents or piers. As the space between bents or piers increases, a third stringer, or heftier stringers, must be used. Three stringers are always better than two. There's safety in redundancy.

Long, thick stringers are more expensive than smaller ones. However, they permit the bents or piers to be farther apart. Studies of soil conditions and problems of construction access to the site will indicate the costs for stringers compared to bents or piers. Bring in some engineering help to figure out

the most economical spacing of bents or piers. Large stringers should be bolted to steel angles that have been bolted to the ledgers. Nailers should be used to attach the deck, as described for type 3 puncheon (figure 53).
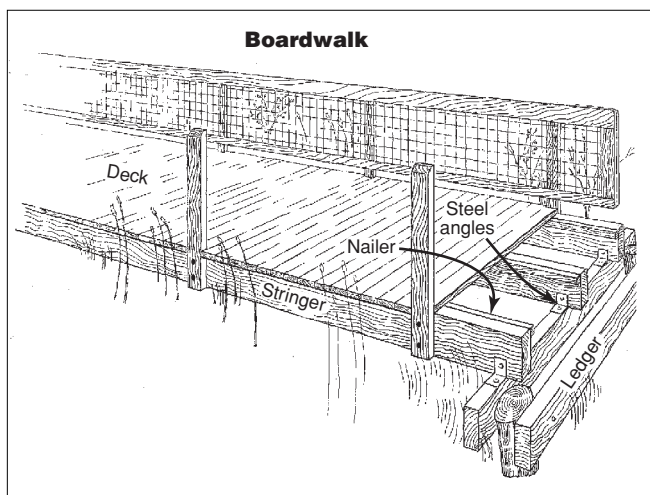
Figure 53—Details of boardwalk construction. Large stringers and ledgers connected with steel angles and nailers help increase the life of the stringers.

Ideally, the bottom of the stringers of a boardwalk should be above high-water levels, but this is often impractical. To reduce maintenance, the design of the boardwalk should avoid interference with the flow of floodwater and floating debris. To check for evidence of flooding, look for clusters of dead, broken branches stuck in shrubbery or the crowns of trees. Bark on the upstream side of trees may be scraped or stripped off. The height of anticipated floodwater may seriously affect the design of a proposed handrail. Joists can be toenailed to the ledgers, or steel top flange hangers may be nailed to the ledgers to support the joists (figure 54). Top flange hangers reduce the distance between the deck and the ground below, perhaps eliminating the need for a pedestrian railing.

Pressure-treated wood that is now available is highly corrosive to untreated metal hardware. Hot-dipped galvanized treatment is recommended for all fasteners and hardware.
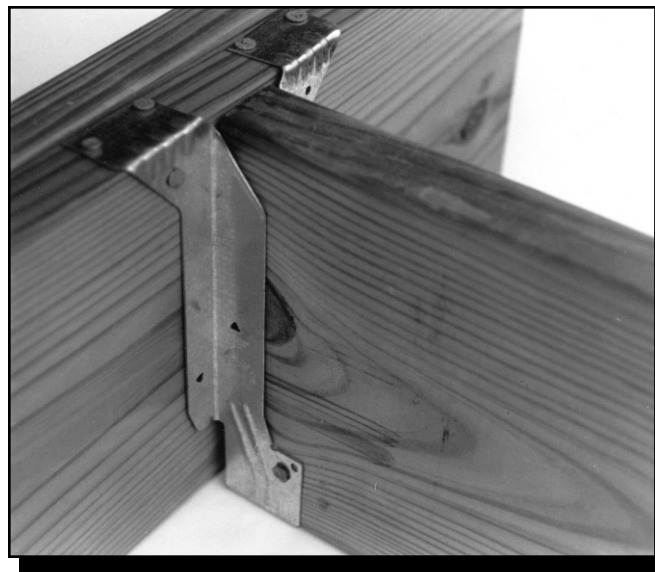
Figure 54—Supporting joists with top flange hangers helps keep a boardwalk closer to the ground.

Boardwalk Summary

Often boardwalks, as described here, are found around visitor centers, heavily used interpretive trails, or at other high-use sites. The sophisticated construction and materials needed for a boardwalk are less appropriate in the backcountry where the trail user expects simpler, more rustic construction and more challenging facilities.

During floods, the posts and rails can catch debris and form a dam. In most situations it is better to build as little as possible that will have to resist the force of high-velocity floodwaters. A decision on how much or how little to build should be based on the type and age of the visitors who will use the finished facility—schoolchildren, senior citizens, day hikers, or backpackers. Professional geotechnical and structural engineers and landscape architects are needed for effective design of these big-budget structures.

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F*inishing Details*

Although constructing the basic structure right is most important, often the mark of craftsmanship is most evident in the finishing details. Most of the following discussion applies to boardwalks. However, some finishing work can be used with other construction techniques.

Decks

Plank used for a deck often contains heartwood and sapwood. If the plank is placed with the heartwood face up, alternating moisture and drying—and the effects of freezing and thawing—will cause knots and some of the annual rings in the wood to lift. To reduce tripping hazards and future maintenance, deck plank should be placed "green side up" (the heart face down and the bark face up) (figure 55).
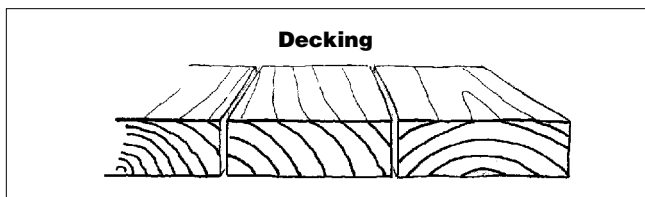
Decking

Figure 55—Place decking with the growth rings facing down to help prevent cupping. Cupping causes the wood to decay faster and creates a tripping hazard.

Posts

A pedestrian railing system may be needed along the edge of a deck to prevent visitors from falling off. Various building and highway codes call these railing systems "handrails," "guardrails," or "railings." If you are planning to install a pedestrian railing, the details of the installation of the posts need to be thought out before placing the deck. Railing posts need to be sturdy. They are a potential liability. Flimsy railings installed as an afterthought are the ones most likely to fail. Usually, it is the connectors, not the railing, that fail.

The deck, posts, and handrail are all closely related in their construction. As a minimum, 4 by 6 timbers should be used to support handrails. Actually 4 by 4s that are surfaced on all four sides are only 3½ by 3½ inches. They make a flimsy post. The deck should extend beyond the stringers to the back of the post, or at least 4 inches. If this is not done, people standing on the deck and leaning on the railing will have their feet sticking out beyond the deck (figure 56). In

Handrail post construction

Handrail post

Minimum 4 inches
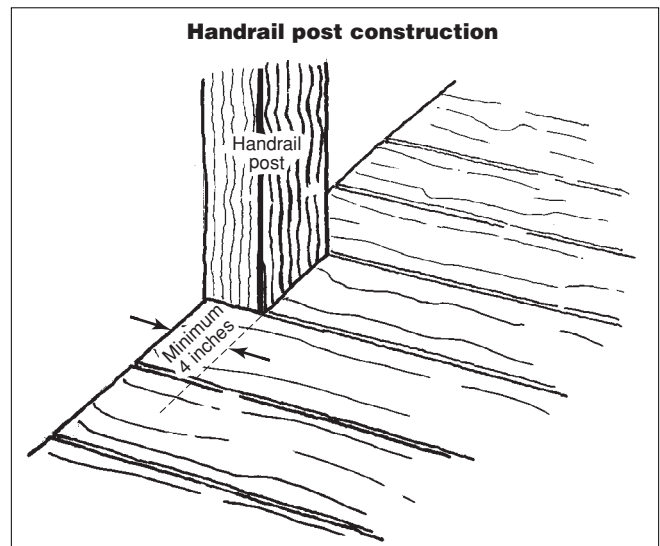
Figure 56—When the handrail post is attached to the stringer below the deck, the decking should extend at least 4 inches beyond the stringer.

addition, the decking helps keep water off the stringers, reducing decay.

There are two ways to install railing posts. The most common requires the deck to be in place. The posts are toenailed to a deck plank. By itself, this is a weak connection and requires an angle brace for support. Therefore the plank supporting the post must extend beyond the edge of the rest of the deck. If the plank is too short, the angle brace will be too close to vertical to provide much support (figure 57).

Handrail post attached to long deck board
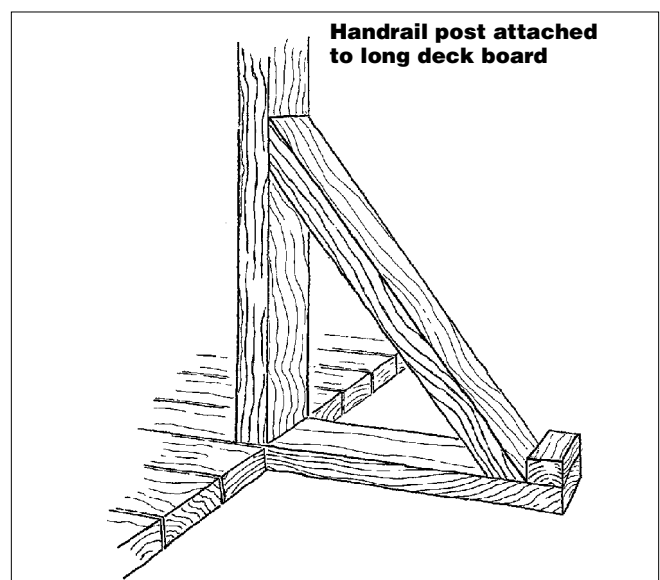
Figure 57—Attaching the handrail post directly to the decking requires long deck pieces to support an angle brace.

The second method is to attach the posts to the outside of the stringers. It is much easier to bolt the post in place before attaching the adjacent deck plank. To provide solid support, 12 inches of post should contact the stringer. The posts can be accurately cut and drilled in a shop and brought to the site. To avoid the awkward and time-consuming work of notching the planks, the width of the post should match the width of the deck planking (figure 58).

Handrail post attached to stringer
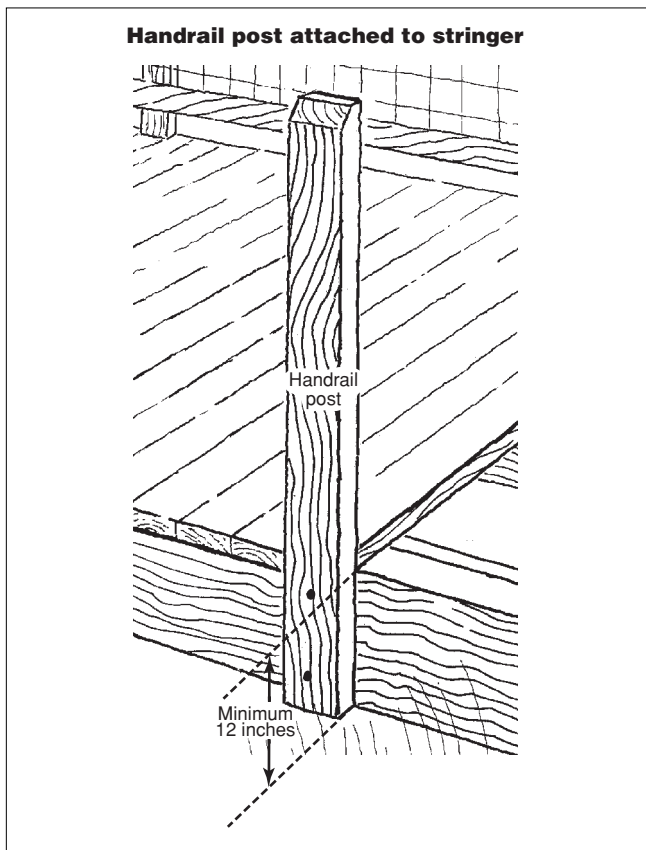
Figure 58—To provide proper support, at least 12 inches of the post needs to be in contact with the stringer.

The top of each post or pile should be cut at an angle to shed water and to help prevent decay. To avoid a sharp corner at the top of the post, a narrow 1-inch area closest to the handrail should be cut level, and the sloping portion should be pitched away from the boardwalk (figure 59). For esthetic and safety reasons, the posts should not extend above the top of the handrail (figure 60).
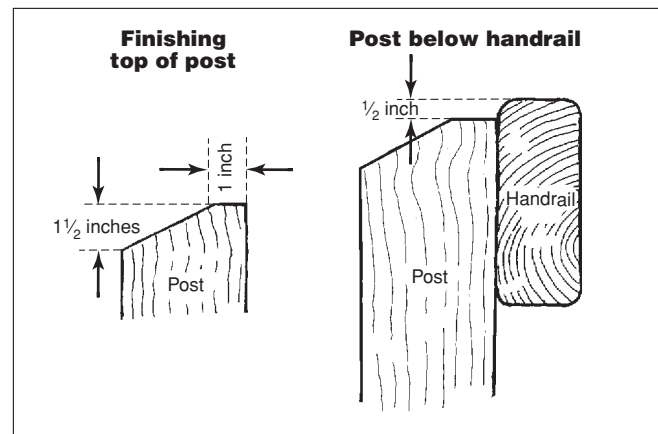
Figures 59 and 60—Cut the top of the post at an angle, but leave 1-inch flat on the inside edge. The post should not extend above the top of the handrail.

Inadequate railing systems have high potential for failing and injuring visitors. We recommend engineering review of railings and their connections.
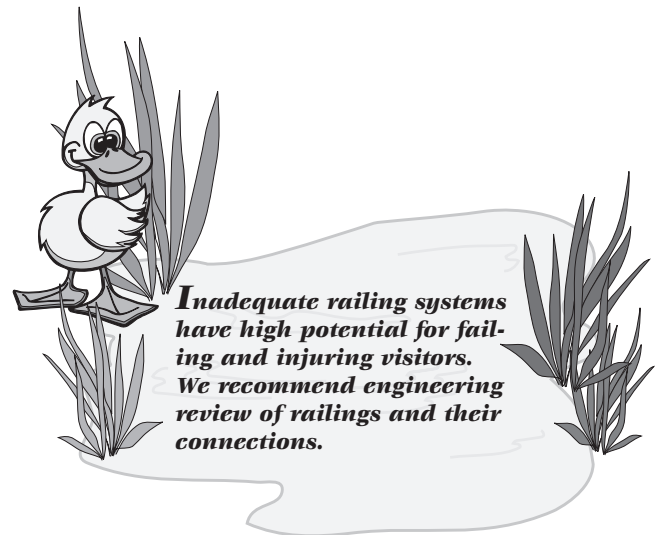
Pedestrian Railing Types

Safety must be the first consideration in selecting a railing system. Safety requirements are primarily determined by the relative accessibility of the trail. Railing types must fit the appropriate Recreational Opportunity Spectrum class. Railings are of three basic types:

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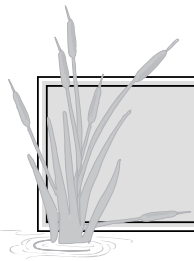
➥ Railings attached to buildings (visitor centers, for example), must meet building code requirements such as those listed in the International Building Code (IBC). This code requires a railing at least 42 inches high that a 4-inch sphere will not pass through.

➥ Handrails on bridges need to meet the American Association of State Highway and Transportation Officials (AASHTO) Standard Specifications for Highway Bridges. Although most of the structures described in this book are not bridges, we offer these specifications for information. AASHTO requires 42-inch-high guardrails on all pedestrian highway bridges. Bridges on fully accessible trails usually need this type of railing. This code requires handrail at least 42 inches high for pedestrian traffic and at least 54 inches high for bicycle or equestrian traffic. A 6-inch sphere must not pass through the railing in the bottom 27 inches, and an 8-inch sphere must not pass through the area above 27 inches.

➥ Handrails for more remote trail bridges must be at least 42 inches high for pedestrian traffic and at least 54 inches high for bicycle or equestrian traffic. These handrail systems must also have at least one intermediate rail so that vertical distances between rails do not exceed 15 inches. Three-fourths of all Forest Service trail bridges fall in this category.

Not all wetland trail structures need railings. If the trail itself has more hazardous drops than the trail bridge would have without a handrail, a handrail is probably not required. Other considerations, such as convenience, may justify installing a handrail. Although IBC requirements and AASHTO specifications do not govern trail construction, they can serve as guidelines. As a general rule, any fully accessible trail with a drop of 3 feet or more, or a more remote trail with a drop of 8 feet or more, should have a pedestrian railing system. All accessible trails require a curb. A wheelchair handrail is required for any accessible trail bridge on a grade of 5 percent or steeper. Document your decisions with a design warrant retained in your files.

Railing Installation

Install the railings after the posts and deck are complete. Most railings consist of a top and bottom rail, usually 2 by 6s, although 3 by 6s make a better splice and a stronger rail. The stronger rail permits posts to be spaced more widely than if 2 by 6s were used for rails. The rail can also be cut and drilled in a shop where the splices can be cut accurately and more efficiently.

Often there is no clear direction regarding splicing the railings if the span exceeds 16 feet, the longest lumber that is readily available. It is difficult to butt splice a railing to the surface

of a post that is less than 6 inches wide without an awkward splice or a maintenance problem (figure 61).

Walking on the top rail is a potential problem. Round logs or poles have been used to discourage visitors from walking on them, as well as 4 by 4s and 6 by 6s laid diagonally with one corner up. Another technique is to cut the tops of all posts at an angle and place a 2 by 6, or 2 by 8, on the cut surface. This helps to shed water and prevent decay.

Rail splices
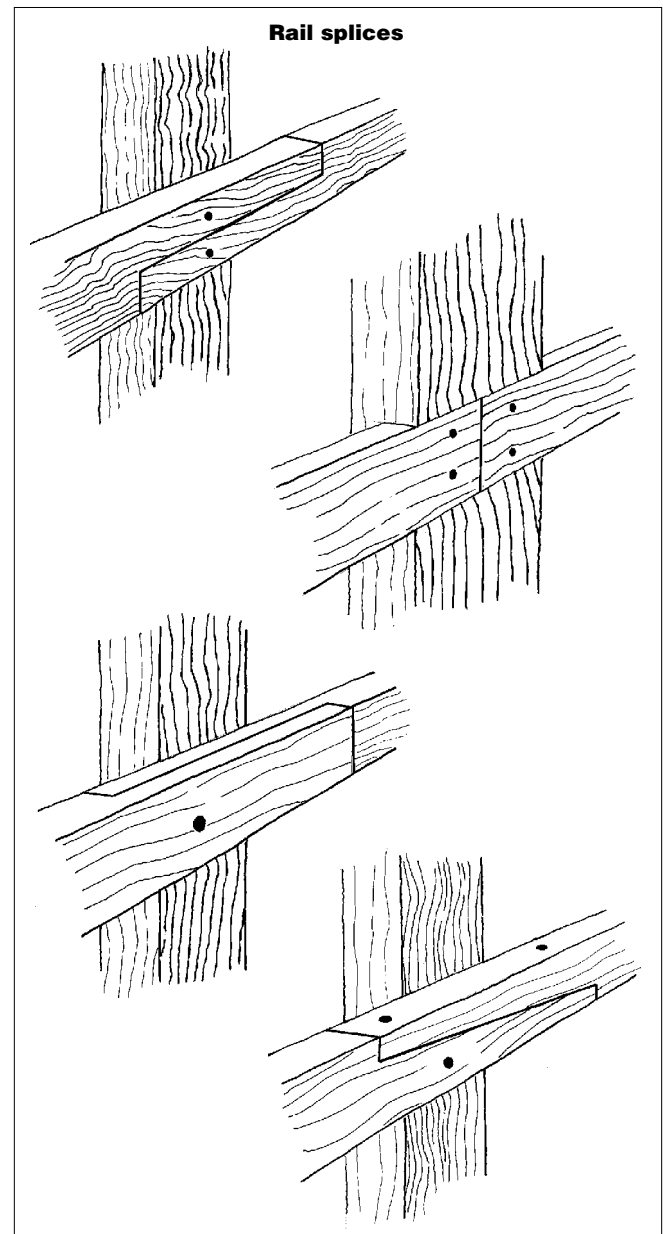
Figure 61—Four methods of splicing rails. It is best to cut the rails in the shop. Use carriage bolts with the round end on the inside of the railing to prevent users from snagging themselves.

The edges of all rails should be "edges eased." Edges eased is a trade term indicating that the corners along the edges of the piece of wood are rounded. To reduce splinters, the radius of the handrail edge should be ½ inch or more.

Installing a handrail on a curved bog bridge or angled boardwalk can be a challenge. One way to do this is to use steel angles. Measure the distance between posts and cut the rail to that length. Nail or screw the angles at the ends and to the outside of a 2- by 4-inch or 2- by 6-inch rail. The angles will have to be bent slightly to conform to the different alignment of the posts. Hold the rail in place and nail or screw the angle to the side of the post with the inside face of the board flush with the inside face of the post. Measure the distance between the centerline of the two posts and cut a 2 by 6 to that length. Round the ends slightly and bolt the 2 by 6 to the 2 by 4. The result will be a stronger rail than a single piece of material. This technique may also be used for straight sections of railing to avoid nailing or screwing into the face of the post (figure 62).

Figure 63—Wire rope is used here as part of the railing system.
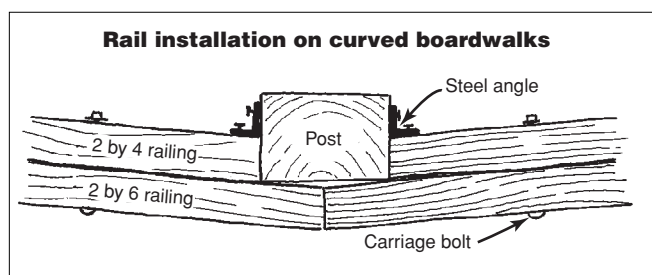
Figure 62—One method of installing rails on curving boardwalks using steel angles bent to accommodate the curvature of the structure.

For rails on curved trails, short wedge-shaped pieces of lumber can be used as shims between the posts and the rails. The wedges should be oak or cedar. Wedges are difficult to cut in the field. You could notch posts to the correct angle to accept the rails, but this is also difficult.

Cable or wire rope can be used as a railing system in some specialized applications (figure 63). Often the posts are close, 4 to 6 feet, and the cable is strung through holes drilled in the posts or through screw eyes. A single piece of cable may be strung through all the holes in the upper part of the posts, down the last post to the next lower hole and continuing this process back to the beginning through the lower holes, reducing the need for many splices. Use cable tensioners as needed.

Curbs (Bull Rails)

Curb and bull rail are two names for the same thing. If the drop from a boardwalk is about 36 inches or less, a curb is usually installed. A curb is required for accessible trails. Curbs help to delineate the trail tread (figure 64).
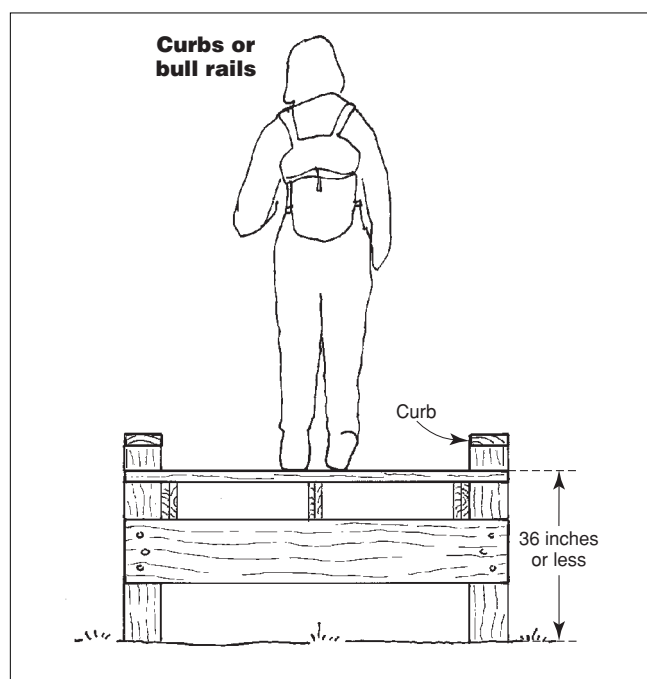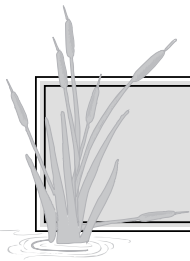
Figure 64—Typically, curbs (bull rails) are used when the deck is no more than 36 inches off the ground.

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Curbs placed directly on the surface of a wood deck can cause the deck planking to decay. Leaves, needles, and dirt accumulate against the curb, absorb water, and cause additional decay. During the winter, ice and snow will build up on the deck, causing a hazardous condition.

To keep the deck from decaying, place the curbs on blocks. A finished block of 2 by 4 lumber is only 1½ inches thick. Leaves and dirt can still build up against the curb and under it. With just 1½ inches of space between the curb and the deck, it is difficult to get a shovel under the curb, making this area almost impossible to clean. A better solution is to use two blocks of 2 by 4 lumber, one on top of the other, or one block of 4 by 4 lumber (figure 65) to eliminate the opening under the curb. Litter will not be trapped, and melting ice and snow will run off more quickly. These openings underneath the curbs sometimes are called scuppers, an old nautical term.

Bulkheads (Backwalls, End Dams, Faceplates)

Bulkheads must be installed where wood construction meets the earth trail at each end of a puncheon, bog bridge, or boardwalk. They function as retaining walls to support the earth. They also protect the end grain of the stringers from decay and insect damage (figure 66). Bulkheads should always be treated timber.

Install the top of the bulkhead level with the top of the stringers, covering the gap with a piece of deck plank. This is the best way to keep moisture away from the stringer.

Extend the backwall 1 to 2 feet on each side of the structure to keep wet soil away from the sides of the stringers.

Figure 65—Having at least 4 inches of clearance under the curb is best.
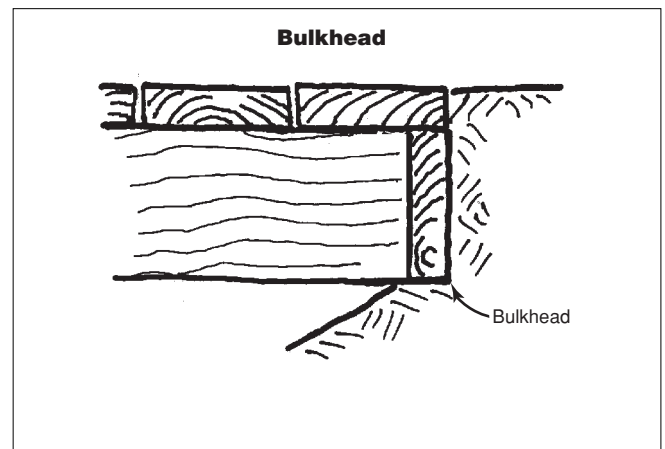
Figure 66—Bulkheads serve as retaining walls to support the earth, and they protect the stringers from decay and insect damage.

*F*loating Trails

Trails that float on the surface of the water are quite rare. They are covered briefly here. For more detailed information, refer to *Floating Trail Bridges and Docks* (Neese and others 2002).

Most floating trails are engineered structures, like docks, that float on watertight drums, polystyrene-filled corrugated plastic pipe, or other specialized floating systems. Rely on your engineering and landscape architectural staff to help you design a functional, attractive system.

A floating trail needs solid anchors at each end. Depending on the length of the floating trail and the expected water condition, the anchors may be timber deadmen (buried anchors), helical piles, concrete deadmen, or long wooden piles. Two cables, connected to these anchors and the opposite ends of each float, hold the floats in place. The trail must be straight between anchor points. Bends in the route require intermediate anchor points for the cables. If there is any current, an additional cable brace should be attached to the floats toward the middle of the span to hold them in place against the current. This cable brace must also be anchored on both ends. You may need to install cable braces on both sides of the floating trail to hold it in place (figure 67).

A floating trail tends to bob around, creating an unsteady tread surface. Such trails may not be suitable for all users. During periods of rough water, the floating trail may have to be closed. Sometimes, outriggers extending to the sides of the deck can provide additional floatation and stability.
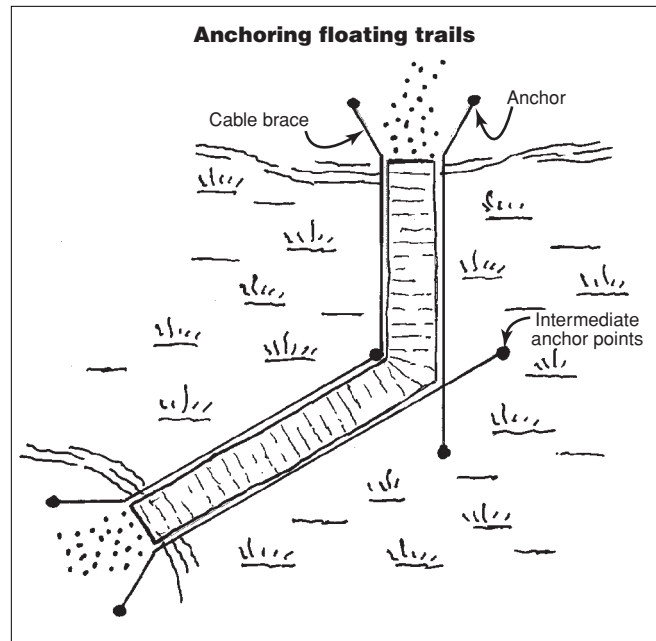
Figure 67—True floating trails need solid anchorages. Often they are secured with wire rope.

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Construction Materials

Choosing Materials

Materials used in trail design should be appropriate for the setting. Steel, plastic, concrete, and asphalt may be appropriate in an urban greenbelt, but out of place in the backcountry. Log construction, stone masonry, and dirt trails are appropriate in a primitive, backcountry setting, but out of place in a city.

The Forest Service recognized this problem in the late 1970s and developed a system called the Recreational Opportunity Spectrum (ROS).

The ROS system establishes seven types of recreational land uses and describes the level of development, management, and construction materials suitable for each of them. The ROS principles may appear overly structured, but their application should result in construction and management that is compatible with the environment surrounding a wetland trail whether that trail is in a remote area, an urban greenbelt, or another setting. The ROS concepts are too detailed to include here, but they should be understood by anyone planning to design and construct wetland trails.

Logs

Wood from logs cut onsite is commonly used in trail construction, but wood is susceptible to attack by insects and fungi. Bark separates from the wood. The gap collects water and provides shade and protection for insects and fungi. Peeling off the bark reduces the likelihood of these attacks. Depending on local conditions, removing the bark may double the life of a log.

The bark can be removed by hand or machine. Using a draw knife or bark spud is the traditional way of peeling logs. The random scrape marks left on the peeled logs gives them a rustic appearance. Machine peeling "chews" the bark and some of the wood in a spiral pattern. The finished pieces are almost uniform in size, with a machined appearance that lacks the rustic character of peeled logs.

Wood that is exposed to the weather or is in contact with the ground will eventually require replacement. In wetlands, a flood, a heavy snow, a buildup of ice, fallen trees, or animal damage may shorten the life of wooden materials. Trees growing near a wetland site are unlikely to provide a sustainable source of logs for replacement structures. Even in remote areas, logs cut from trees growing in the vicinity may not be the best choice of materials.

Using logs cut onsite for trail construction is an inefficient use of wood and does not represent sustainable design. Tearing up areas near a site and destroying the character of the wetland makes no sense. Today, responsible trail crews are taking commercially obtained logs and other wood materials to remote wetland sites by boat, horse, mule, off-highway vehicle, by hand, or by helicopter, even when adequate material is growing a few feet from where it could be used. Sometimes materials can be hauled in more easily over snow during the winter for use the following summer.

Lumber and Timber

For the purposes of this text, lumber is wood that has been sawed and planed into uniform pieces with a minimum dimension of 2 inches or less. For instance, a 2 by 6 is a piece of lumber. Timber is wood that has been sawed into more or less uniform pieces, with a minimum dimension of at least 3 inches. Usually, timbers have not been planed smooth.

It helps to understand how logs are processed into lumber and timbers. Logs run through a sawmill are typically sawed into standard-size pieces, usually 1-inch thick or in increments of 2 inches. Common sizes are: 1 by 4, 1 by 6, 2 by 4, 2 by 6, 2 by 8, and 4 by 4. The pieces can also be cut into 3-inch stock. However, such nonstandard timbers would not be readily available at the local lumberyard. Most 4-by-4, 6-by-6, and larger timbers are cut from the center of the log. Generally 1- and 2-inch materials are cut from the outside of the log.

After the pieces of wood are cut from the log, they are referred to as rough sawn. The first step produces a piece that is sawn on its two widest faces. The bark remains on the narrow edges. At this point the piece is described as rough sawn and waney edged. The edges are not parallel or square. Waney-edged wood is used for rustic siding. Waney-edged lumber can be special ordered (figure 68).

Next, the piece of wood is run through another saw, the edger, that trims the edges square and to a standard 2-inch dimension. The piece of wood is now rough sawn on all four sides and is full size—a 2 by 4 is 2 inches thick, 4 inches wide, and as long as the log.

The pieces are cut to standard lengths. Normally, the shortest pieces are 8 feet long. Longer pieces are cut in multiples of 2 feet, up to 16 feet. Rough-sawn lumber or timbers can be ordered. A piece of rough-sawn, 2-inch lumber is considerably heavier than the finished lumber normally carried at a lumberyard. Rough-sawn pieces are not completely uniform.

Lumber cuts

Waney edged   Rough sawn   Trimmed   Planed with edges eased
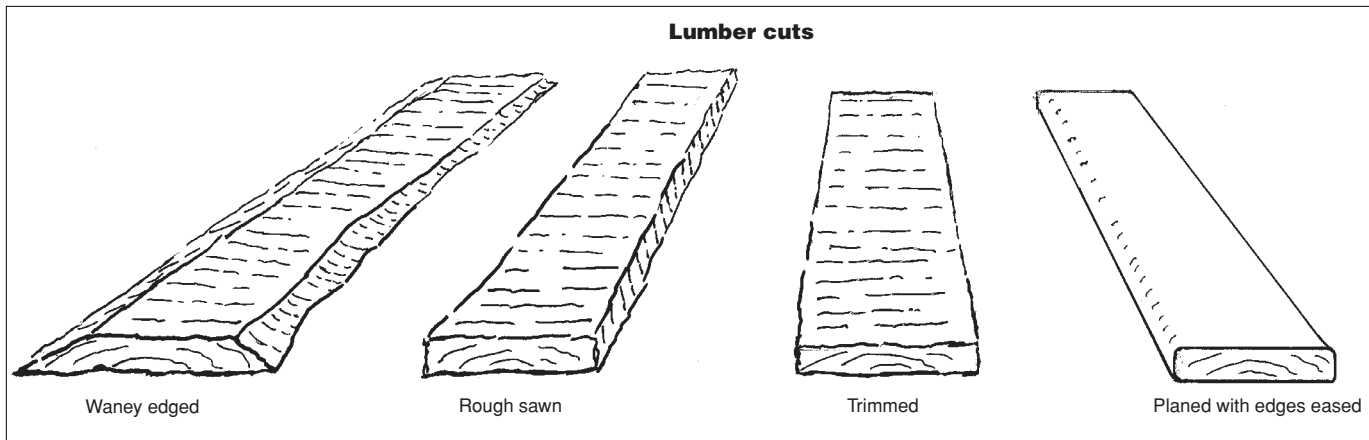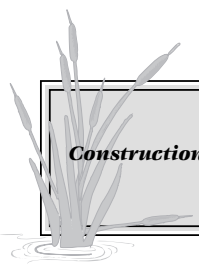
Figure 68—Lumber terminology.

Depending on the capability of the sawmill, similar pieces may vary $\frac{1}{8}$ to $\frac{3}{8}$ inch from each other. The pieces will not have a smooth surface, and the edges will be sharp and splintery.

Finally, the rough-sawn pieces are run through a planer. The planer removes enough wood to smooth the surface on all sides and to produce standard-size pieces. After planing, a 2 by 4 is $1\frac{1}{2}$ inches by $3\frac{1}{2}$ inches and is described as S4S (surfaced four sides). The size after the lumber has been surfaced on all four sides is referred to as nominal size.

Most 2-by-4 material is usually run through a special planer to round off the corners. This process is called edges eased and reduces the chances of splinters when handling the wood. Edges eased can also be specified for other dimensions of lumber and the smallest dimension timbers, but must be special ordered.

Waney-edged material should be less expensive than rough-sawn because it requires less processing. Rough-sawn material should also be less expensive than nominal-size material because it has not been through a planer or had the edges eased. If the imperfections of waney-edged or rough-sawn material are acceptable, there is no point in specifying the nominal size material for a project. Why pay for someone to turn wood into sawdust and shavings that you can't use? Besides, the additional work results in a weaker piece of wood.

Wholesalers sell wood by the thousand board feet. A board foot is 12 inches by 12 inches and 1 inch thick, or 144 cubic inches. The board footage of lumber and timber is determined at the time the piece of wood is rough sawn. See appendix E for a table of board feet contained in most standard sizes of lumber and timber, and for various standard lengths.

Decay-Resistant Wood

Using decay-resistant wood will greatly increase the life of the material and reduce maintenance. Some species of trees are naturally decay resistant. Wood from other species can be treated with preservatives to extend its life. Depending on the climate and the location of the piece of wood in the finished work, construction without decay-resistant wood may last only 7 to 10 years, while installations of naturally decay-resistant woods may last 70 years or more.

Naturally Decay-Resistant Wood

The most common decay-resistant species include the various cedars, redwood, baldcypress, black locust, honeylocust, and some white oaks. A tannin found in the wood of these trees colors the heartwood and makes it decay and insect resistant. The sapwood of the same tree is almost white and is not resistant. The wood of Douglas-fir and the white oaks does not contain a toxin, but it is dense enough to repel some fungus and insect attacks.

Preservative-Treated Wood

Using chemically-treated wood in wet environments may mean the structure lasts 30 years instead of 7 to 10 years. It is important to know which chemical treatments are appropriate, and whether or not they cause adverse health or environmental effects.
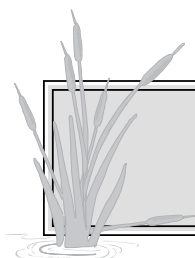
The subject of chemically-treated wood is complex, and is an area of continuing research and product development. Follow the recommendations in the *Best Management Practices for the Use of Treated Wood in Aquatic Environments* (Western Wood Preservers Institute 2006). Another comprehensive source of information is *Preservative-Treated Wood and Alternative Products in the Forest Service* (Groenier and LeBow 2006).

In a nutshell, there are several good reasons to use preservative-treated wood in wet areas and few reasons not to use them. All of the treatments effective in wet areas must be applied under pressure in a factory to exacting standards. The exception is copper naphthenate, which can be applied carefully and sparingly with a brush and is good for spot treatment. Both oil-type and waterborne preservatives are suitable for wet environments from a standpoint of preserving wood, but the person specifying materials needs to know the characteristics and effects of each type of preservative before deciding which to use. Water-soluble preservatives, such as borates, are not suited for wet environments. The borates do not permanently "fix" to the wood.

Workers need to take safety precautions when handling or disposing of treated wood. Treated wood should not be burned. Some States and other jurisdictions may also impose disposal restrictions. Best management practices call for proper collection and disposal of treated wood debris and sawdust.

Each of the preservatives containing copper imparts a color that disappears in time. Normally, the color disappears within 2 years, but depending on site conditions and exposure, the process may take several months to 3 or 4 years. One of the most popular preservative treatments, chromated copper arsenate (CCA), is no longer used if anyone is likely to contact the preservative-treated wood. Replacement treatments are more corrosive than CCA, so hot-dipped galvanized hardware and fasteners are recommended to prevent corrosion.

Recycled Plastic

Many manufacturers of recycled plastic are producing this material in the shapes and dimensions of standard wood lumber and timber products. Some of these products are being marketed as premium deck coverings. Recycled plastic can be worked like wood. It can be sawed, drilled, nailed, screwed, bolted, and painted. Although the surface is smooth, it is not slippery.

The properties of some recycled plastic may present unexpected challenges and disappointments. The material can be up to three times heavier than wood. By itself, 100-percent recycled plastic has little strength. It must be reinforced with a steel backing or core to have any structural value, increasing its weight and introducing another material.

Plastic is decay resistant. The thermodynamic properties of plastic—how much it expands and contracts in the heat or cold—are quite different from those of concrete, steel, or wood, the materials that would normally be used with recycled plastic. The surfaces of some recycled plastic severely degrade in sunlight. The problems of strength, thermodynamics, and ultraviolet degradation are being studied. These problems have resulted in new, improved formulations of recycled plastic. These products have not yet withstood the test of time.

Some recycled plastics contain sawdust or another form of wood fiber or fiberglass. These composites are usually stronger and do not have the same thermodynamic problems as most 100-percent plastics. When sawed or drilled, the exposed sawdust and wood fiber may be just as subject to fungus and insect attack as untreated wood. However, wood fibers completely encased in plastic will be decay resistant.

A problem is created when any of the recycled plastics are drilled or sawed in the field. Unlike wood, the shavings and sawdust will not decompose. This problem can be resolved by drilling and sawing over a large plastic sheet and carrying the shavings out, the same process that is recommended for disposing of treated wood residues.

Recycled plastic is not a traditional construction material. It may be inappropriate where a rustic appearance is important. Recycled plastic costs 50 to 300 percent more than treated wood. The increased weight of plastic will be reflected in higher shipping and onsite construction costs. One advantage of this plastic is that it does not support combustion.

Hardware
Connectors

The nails, bolts, washers, nuts, and other connectors used for outdoor construction should be made of corrosion-resistant steel. Hot-dipped galvanizing provides more durable protection than electroplating. Products commonly available at most building supply stores are electroplated. It is especially important to use galvanized or stainless steel connectors on wood that has been treated with waterborne preservatives containing copper.
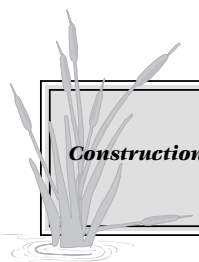
Nails

Most nails used in trail construction are ringshank nails, barn spikes, or occasionally, roofing nails. Ringshank nails have closely spaced circular rings around the shank of the nail. These nails rarely work loose and are very difficult to remove if driven incorrectly. The steel is quite brittle. It will usually break off if it is bent or hit on the side. Nails are sized by the penny, an old form of measurement. See appendix D for gauge (thickness), lengths, and number of nails per pound for each size. Barn spikes are from 8 to 12 inches long, with a wide thread making a complete revolution around the shank every 4 to 6 inches.

Bolts

Bolts are used for constructing bents. Bolted connections are better than screwed connections because the bolt passes completely through at least two timbers or a timber and a steel plate or angle. Both ends of the bolt are visible and can be tightened if the wood shrinks. Three different types of bolts can be used: carriage bolts, machine bolts, and long bolts that are custom cut from threaded rod (called *all thread*).

Carriage bolts were used to construct wooden wagons and carriages. A square portion of the head of a carriage bolt penetrates into the wood, preventing the bolt from turning when it is tightened. Carriage bolts were originally used with oak, a hardwood that did not allow the bolt head to turn. Carriage bolts are effective with most woods, except for softwoods such as redwood and western redcedar. Carriage bolts do not require washers between the head of the bolt and the wood, but a washer is needed between the nut and the wood. Carriage bolts may be up to 12 inches long.

Machine bolts have a hexagonal head that is flat on the top and bottom. Machine bolts require steel between the head and the wood and between the nut and the wood. The steel can be either a washer or a steel angle or plate. Machine bolts may be up to 12 inches long.

All-thread rods are available in lengths of 2, 3, 6, and 12 feet and diameters of $\frac{1}{4}$ to 1 inch. The rod, threaded for its entire length, is useful where long bolts are needed. The appropriate length is cut from the long rod with a hacksaw, and a nut and washer are attached to each end. Bolt cutters should not be used to cut the rod. They will mash the threads, making it impossible to attach the nut (figure 69).
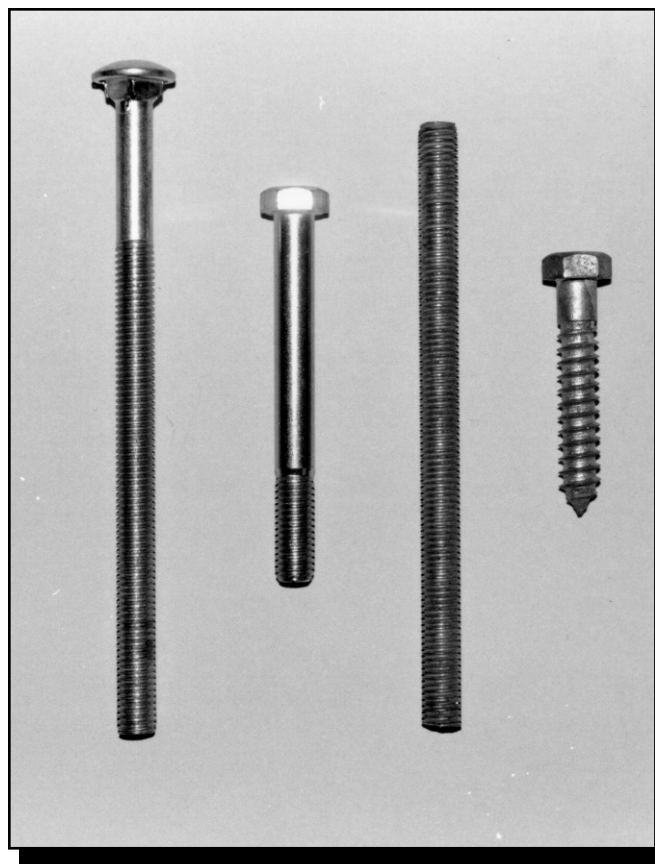
Figure 69—Fasteners (from left): carriage bolt, machine bolt, all-thread rod, and lag screw.

Lag Screws (Lag Bolts)

Most people working with these connectors refer to them as lag bolts. Manufacturers call them lag screws. Regardless of their name, they usually have a square or hexagonal head, a threaded tapered shank, and a sharp point. They must be tightened with a wrench. They are made in lengths from 1 to 8 inches and diameters from $\frac{1}{4}$ to $\frac{5}{8}$ inch.

Washers

Four types of washers are suitable for working with wood in a wetland trail: flat washers, fender washers, lockwashers, and malleable iron washers. Flat washers are the most commonly
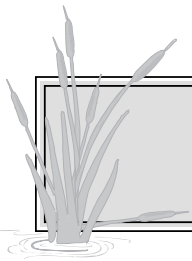
used. They are placed between the wood and nuts and between the wood and the head of machine and lag bolts. The washer prevents the bolt head or nut from being drawn into the wood. Fender washers are wider than flat washers, but they have the same purpose. Fender washers are used if the wood or other material is soft. Lockwashers are not a closed circle; they are cut once and the ends are offset on one side or the other. They are used with the other washers and against the nut to prevent the nut from loosening.

Malleable iron washers are much larger and thicker than other washers. These washers were used when large-diameter bolts joined logs and heavy timbers in traditional rustic construction. Malleable iron washers can be used with ⅜- to 1-inch-diameter bolts.

Nuts

Nuts fit over the threaded ends of carriage and machine bolts and all-thread rods. They must be used against a washer or a piece of structural metal. Nuts are either square or hexagonal, with a round, threaded hole in the center to fit over the bolt or rod. Locknuts fit more snugly on the bolt than common nuts. They are used when vibration may loosen a common nut. Locknuts function better than lockwashers, but they are not as readily available.

Wood Screws (Deck Screws)

A screw is threaded and tapers to a point. The use of a screw determines the desired shape of the screw's head and point, and the material from which it is made. There are perhaps 100 kinds of screws, but wood screws are the ones most likely to be used in wetland trail construction. Wood screws are used to attach tread plank to a nailer, or an interpretive sign to a post. The head of a wood screw is wedge shaped to penetrate into the wood without protruding above the surface. Most screw heads will either have a recessed slot or cross to accommodate a standard screwdriver or a Phillips-head screwdriver. Hot-dipped galvanized steel, stainless steel, and brass screws should be used for trail work.

Most stainless steel deck screws are produced with a hexagonal recess in the head to accommodate an Allen wrench, which makes them somewhat vandal resistant. Other vandal-resistant screws require special screwdrivers for removal. These screws are best for installing signs.

Steel Reinforcing Bars

Steel reinforcing bars used for driftpins must be protected from the weather and the copper in wood treated with preservatives. Epoxy-coated steel reinforcing bars are available from suppliers of heavy construction materials. Usually these suppliers sell only to contractors. Epoxy can be purchased from some mail-order companies. The crew building the trail can cut the uncoated bars to size and dip the ends and paint the bars with the epoxy compound. The epoxy coating will resist saltwater corrosion. Before epoxy compounds were available, steel driftpins were protected with a thin layer of heavy automobile grease. The grease also made driving the driftpins easier.

Staples

Heavy steel fence staples, ¼ to ½ inch in size, are useful for attaching hardware cloth to wooden piles used for bog bridge and boardwalk in areas frequented by beavers. Staples can also be used to attach geotextile fabric to wood.

Hardware Cloth

Hardware cloth consists of two sets of steel wires placed per-pendicular to each other and welded together. The result is a pattern of equal squares. The squares are either ¼ or ½ inch. After welding, the hardware cloth is hot-dipped galvanized. It is available in 20- and 50-yard rolls, and in 2-, 3-, and 4-foot widths (figure 70). Hardware cloth is sometimes stapled around piles to discourage beavers from chewing on them.
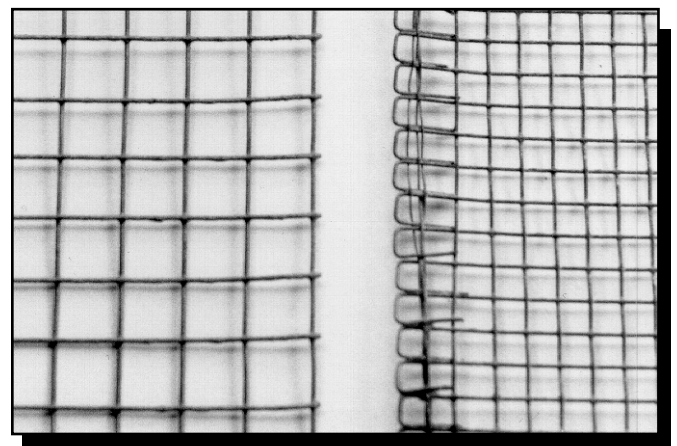
Figure 70—Two sizes of hardware cloth.

Geosynthetics

Geosynthetics are synthetic materials used with soil or rock in many types of construction. Geosynthetics can improve construction methods and offer some alternatives to traditional trail construction practices.

The Missoula Technology and Development Center produced a detailed report, *Geosynthetics for Trails in Wet Areas: 2000 Edition* (Monlux and Vachowski 2000), about these versatile products. The following information is summarized from that report. MTDC plans to update the report in 2007.

Geosynthetics perform three major functions: separation, reinforcement, and drainage. Geosynthetic materials include geotextiles (construction fabrics), geonets, sheet drains, geogrids, and geocells. All these materials become a permanent part of the trail, but they must be covered with soil or rock to prevent ultraviolet light or trail users from damaging them.

Geotextiles, sometimes called construction fabrics, are the most widely used geosynthetic material. They are made from long-lasting synthetic fibers bonded to form a fabric. They are primarily used to separate trail construction materials from wet, mucky soil and to reinforce the trail. They have the tensile strength needed to support loads and can allow water, but not soil, to seep through. Nonporous geotextiles can be used in drainage applications to intercept and divert groundwater. Felt-like geotextiles are easier to work with than heat-bonded, slit-film, or woven products that have a slick texture.

Geotextiles are often used in trail turnpike or causeway construction. They serve as a barrier between the silty, mucky soil beneath the fabric and the mineral, coarse-grained, or granular soil placed as tread material on top of the geotextile. The importance of separation cannot be overemphasized. Once mineral soil contains about 20 percent of silt or clay, it takes on the characteristics of mud—and mud is certainly not what you want for your tread surface. Most geotextiles commonly used in road construction work for trail turnpikes. The fabric should allow water to pass through it, but have openings of 0.3 millimeters or smaller to prevent silt from passing through.

Geotextile is sensitive to ultraviolet light. It readily decomposes when exposed to sunlight. When geotextile is not exposed to sunlight, it lasts indefinitely. Always store unused geotextile in its original wrapper.

Geonets or geonet composites (figure 71) have a thin polyethylene drainage core that is covered on both sides with
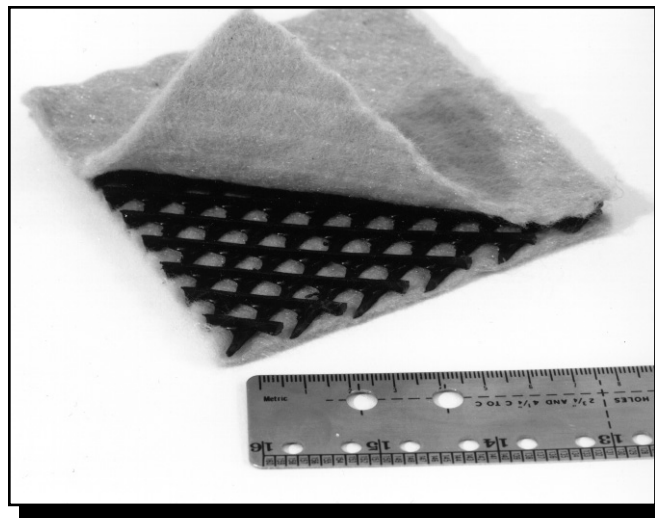
Figure 71—The net-like core of geonet allows drainage.

geotextile. They are used for all three functions—separation, reinforcement, and drainage. Since geonets have a core plus two layers of geotextile, they provide more reinforcement for the trail than would a single layer of geotextile.

Sheet drains are a form of composite made with a drainage core and one or two layers of geotextile. The core is usually made of a polyethylene sheet shaped like a thin egg crate. The core provides separation, reinforcement, and drainage. Since sheet drains have greater bending strength than geotextiles or geonets, less tread fill is often needed above them.

Geogrids are made from polyethylene sheeting that is formed into very open grid-like configurations. Geogrids are good for reinforcement because they have high tensile strengths, and because coarse aggregate can interlock in the grid structure. Geogrids are normally placed on top of a layer of geotextile for separation from saturated soil.

Geocells (figure 72) are usually made from polyethylene strips bonded to form a honeycomb structure. Each of the cells is filled with backfill and compacted. Geocells are good for reinforcement, reduce the amount of fill material required, and help hold the fill in place. Geocell usually has geotextile under it to provide separation from saturated soils. The grids need to be covered with soil so they will never be exposed. Exposed geocells present a substantial hazard to vehicles due to loss of traction, and can cause hikers or packstock to trip.

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Figure 72—Geocell being laid in courses for a bridge approach. When the approach is completed, the geocell will not be visible.

Other options to reduce the likelihood of users slipping on the trail include the use of strips of rubber-like material with a non-skid surface. The strips adhere to clean decking. When wood is painted, stained, or sealed, a nonskid additive (sold at paint stores) can be mixed with the paint, stain, or clear sealer before they are applied.

Silica-treated fiberglass mats are available from some of the grating manufacturers. They come in thicknesses of $\frac{1}{8}$ to $\frac{3}{4}$ inch and in panel sizes of 5 to 12 feet. Fiberglass can be sawed to size. Holes can be drilled for nailing or screwing fiberglass to wood planks.

Most gratings are extremely expensive, well beyond the budgets of most trail projects. The exceptions would be for wetland trails at very heavily used sites such as visitor centers or for short interpretive trails.

In Alaska, slippery surfaces are a reality on miles and miles of boardwalk. The Forest Service Alaska Region's *Trails Construction and Maintenance Guide* (1991) offers several ways of dealing with this problem. These methods are described next.

Nonslip Gratings and Grit-Treated Mats

Gratings are normally used for walking surfaces at industrial sites and boat docks. They may be useful where a slippery tread in a wetland trail has become a problem, or where this problem can be anticipated because of deep shade, heavy rainfall, or icy conditions.

Gratings are made in a variety of sizes from steel, stainless steel, aluminum, and fiberglass. Some manufacturers use fine serrated teeth on the surface of the grating to prevent users from slipping; others use small, round, raised knobs on the surface; still others embed silica grit. The gratings can be attached to an existing deck or used by themselves in the original construction.

Roughened Wood Surface

Use a saw or adz to cut grooves perpendicular to the line of travel. Make the cuts deep enough to be effective, but not so deep that they hold enough water to cause decay.

Mineral Paper

Mineral paper is available in a 9-inch width in 50-foot rolls. This tar-fiberglass material is tacked down every 3 to 4 inches along each edge with galvanized roofing nails. Mineral paper should be used on pressure-treated wood because it will hasten the decay of untreated wood. If properly installed, it has given good service for up to 10 years. Mineral paper is inexpensive and easy to replace.

Fishing Net

Nylon fishing net (No. 96 Bunt Web) has been used successfully in the Alaska Region and has been found to be durable and effective. Make sure the net is properly stapled to each pressure-treated plank before delivering and installing the planks. Use an air-driven pneumatic stapler (that can be rented with an air compressor) to drive galvanized staples. Staple at 4-inch intervals to keep the net from bunching and creating a tripping hazard. The netting can be applied in the field using hand-driven galvanized fencing staples.

Neatly hide all edges underneath the walking surface of the plank or logs. Black 1- to 2-inch mesh netting has been used successfully on trails in Alaska. The color blends into the landscape. Used net material can usually be obtained free from net hangers in most Alaska fishing towns.

Cleats

Cleats, narrow boards screwed or bolted perpendicular to the tread at step-sized intervals, are an effective way to reduce slipping, especially on slopes. Metal cleats are common on steep gangways leading to docks subject to tidal fluctuations.

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Construction Tools

The standard tools used for trail construction are also needed for building a trail in a wetland. Standard trail tools are not described here. Instead, this report focuses on tools specifically needed for wetland trail construction. Find out more about handtools in MTDC's *Handtools for Trail Work* report (Hallman 2005) and two-part video (98–04–MTDC).

Measuring Tapes

Measuring tapes are a necessity for estimating and constructing a wetland trail. Construction measurements for wetland trails are often taken from the trail centerline. It is frequently necessary to divide by two. Metric measurements offer an advantage over English measurements in such cases. In addition, there is a move from the English system of measurement to the metric system (appendix F). Buy new tapes that are graduated in both systems.

Tapes 50 feet and longer are made of fiberglass, cloth, or steel. Fiberglass is best for the wet, brushy environment of wetlands. Cloth is not recommended because it will wear and rip easily. Long steel tapes may rust, kink, and break when used in wetlands. Short steel tapes, 6 to 30 feet long, are essential.

The longer tapes are best for estimating quantities of materials and hours needed for construction and for laying out centerlines of sleepers, bents, and other structures. The shorter steel tapes are handy for the actual construction.

Framing Squares

Framing squares (figure 73) are thin, L-shaped pieces of steel with a 90-degree angle at the corner. Each leg of the L is 1 to 2 inches wide and graduated in inches (or centimeters) from both the inside and outside corners of the L. The legs may be 8 inches to 2 feet long. Framing squares are used to mark hole centers and timbers to be cut at a 90-degree angle and to provide a straight, firm edge for marking angled cuts.

Plumb Bob

A plumb bob is a solid steel or brass cone, 3 inches long by 1½ inches in diameter. The plumb bob accurately transfers
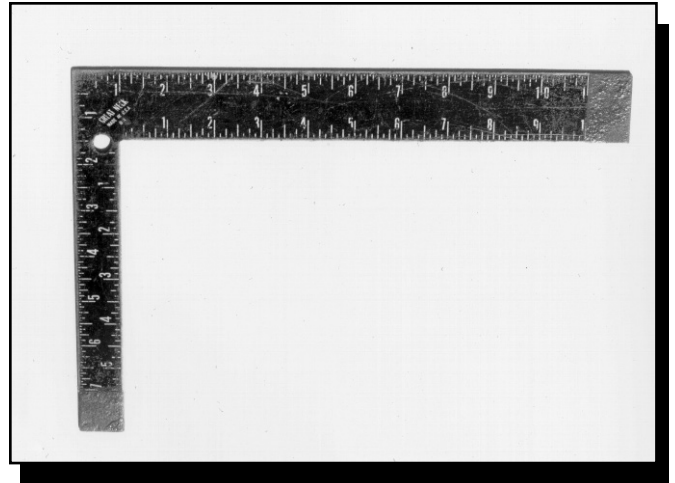
Figure 73—Framing square.

measured points above the ground to comparable points on the ground. It is useful for locating the centers of holes to be dug.

Levels

Specialized levels are useful for wetland trail work. An Abney hand level or a clinometer is accurate enough to be used for setting grades during the preliminary layout of most wetland trails (figure 74). String or line levels and carpenter's and mason's levels are needed during construction.

Figure 74—Use a clinometer to set grades for preliminary trail layout.
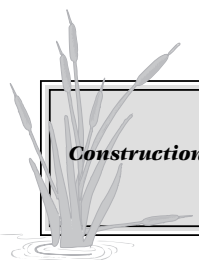
String or Line Levels

There are two types of string or line levels: one establishes percent of grade easily, the other does not. Each level is about 3 inches long by ½ inch in diameter and has a hook at each end to hang the level on a string. The string is pulled tight between two points in an almost horizontal line. One of the points must be at a known elevation. The string level will be used to establish the elevation of the other point.

The most common type of string level has two marks on the level tube. These marks are equidistant from the high point of the level tube. Center the level bubble between the two marks on the tube by raising or lowering the string at the second point. When the bubble is centered, the string is level. If the tread is to be level, this is the elevation to be met. If the tread is to be sloped, the difference between the two points must be calculated; the elevation to be met is established by measuring the difference needed, up or down, from the level line.

In the second type of string level, the high point of the level bubble is off center. The level tube has five graduations. The first two are widely spaced. The rest are closer together, but evenly spaced. When the bubble is centered between the two widely spaced marks, the string is level. When the edge of the bubble touches the third mark, the string is at a 1-percent grade, the fourth mark is at a 2-percent grade, and so forth. A string level is accurate enough to begin to establish relative elevations and slopes for small wetland trail projects (figure 75).
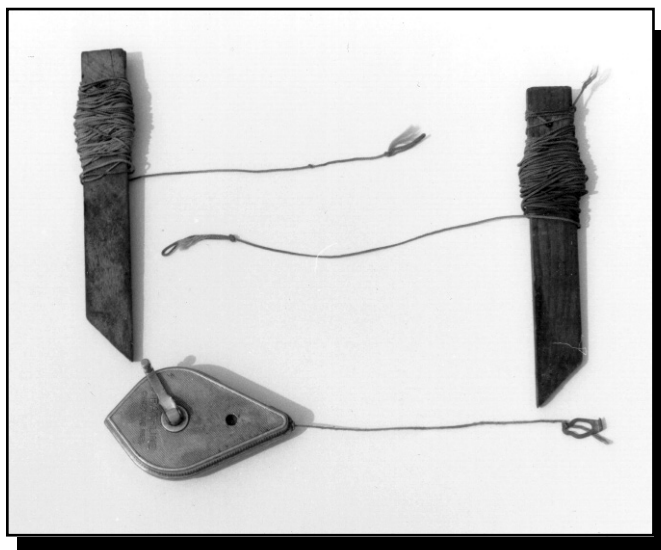
Figure 75—String levels and a chalkline.

Stringlines

Almost any type of string can be used for a stringline, but for repeated use a professional stringline is best. This type of stringline is a tightly braided string wound around a short, narrow piece of wood, plastic, or metal. Usually there is a metal clip, or a loop, tied on the end.

The stringline extends a straight line to reference the location of the next section of construction. The stringline can also be used with string levels to establish relative elevations and slopes.

Chalklines

A chalkline is another type of stringline used to mark a straight line between two points on a flat surface. The marked line is commonly a guide for sawing.

Professional chalklines come in a metal case that holds the coil of string and the chalk dust. One end of the chalkline is held tightly at a fixed point on the surface of the object to be marked. The chalkline is stretched to the mark at the opposite end and held tightly at that point. Hold the chalkline at about midpoint, pull the chalkline straight up from the surface and release it. The chalkline will snap back into place, leaving a sharp, straight line of chalk between the two points.

A chalkline is useful for marking the centers of sleepers and bents for a deck that needs to be in a straight line, or the edges of a deck to be trimmed uniformly, or the edges of a log to be cut with a flat face.

Carpenter's and Mason's Levels

There used to be a distinction between carpenter's levels and mason's levels. Carpenter's levels were wood or wood with steel strips to protect the edges. The mason's level was all or mostly steel. Today, wood, steel, aluminum, and plastic are used in either type of level.

These levels are available in lengths of from 2 to 6 feet. Given the abuse trail tools take, steel or aluminum levels are best. A 3- to 4-foot-long level is more accurate than a shorter level. These levels are easier to pack than 5- to 6-foot-long levels. Plastic levels are also available and cost less.

The levels have three tubes mounted in the body of the level. One level tube is parallel with the length of the level, one is perpendicular to it, and one is at 45 degrees to the other two. When a level bubble is centered, the edge of the level is either level, vertical, or at 45 degrees.

Torpedo Levels

A torpedo level is steel or aluminum and plastic and only 8 to 12 inches long and 1 to 2 inches wide. It is used to determine if a surface within a confined area is level, for example the surface of a notch. Although the torpedo level is not as accurate as the longer levels, it can be used to check whether an item is out of level, or out of plumb. If so, a more accurate level can be used to make the corrections.

Post Levels

Post levels save time when setting posts and piles. They are basically plastic right angles that are 4 inches long in three dimensions. Two level tubes are mounted in the two faces of the level. Set the level along the side of the post or pile, and use a crowbar or shovel to adjust the post or pile until it is plumb (figure 76).
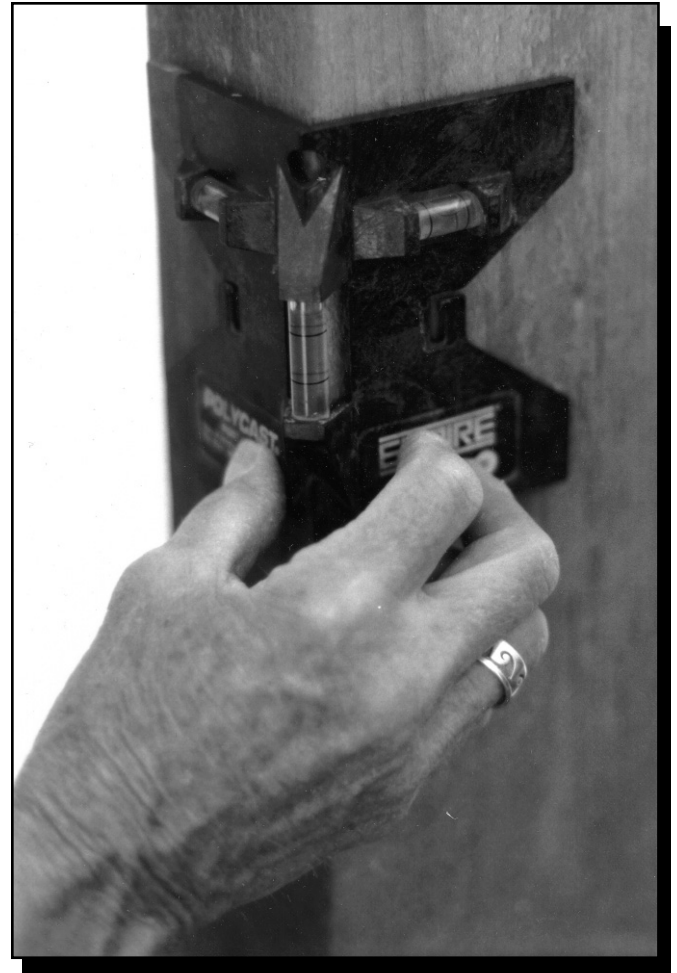
Figure 76—Post level.

Surveyor's Transits and Electronic Instruments

Hand-held tapes and levels are adequate for short destination or loop trails in a wetland, or for low, poorly drained sections of existing trails. However, for trails longer than a quarter mile or over undulating terrain, more precise measurements might avoid future problems. Control points for elevation and slope can be established using surveyor's transits or a variety of electronic instruments.

Surveyor's Levels or Transits

Old surveyor's levels or transits may be hiding in a closet or storage area at some agency offices. Blow the dust off and try to find someone who knows how to run the instrument. A builder's level or transit may be less accurate, but should work. A surveyor's level rod will be needed to obtain distances and elevations. Distances can be quickly measured optically using stadia.

Electronic Distance Measuring Instruments

Two types of electronic distance-measuring instruments (EDMs) are available. The least expensive type is hand held and can measure distances across a flat surface to a point from 2 to 250 feet away. This type of instrument does not provide elevations of points or information needed to determine slopes and relative elevations. It will not provide accurate distance measurements if vegetation impedes the line of sight.
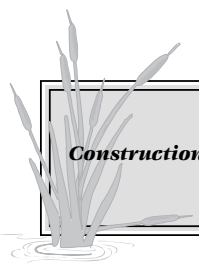
More expensive instruments can measure distances up to 12,000 feet with an accuracy of 0.02 to 0.03 feet. A direct, clear line of sight is required.

Global positioning systems (GPS) provide horizontal positioning through the use of coordinates and can provide elevations. This equipment may cost from a hundred dollars to several thousand dollars depending on the quality. The skills needed to operate GPS equipment vary depending on the equipment's sophistication and accuracy.

The accuracy of small hand-held instruments can be close to 1 meter (3.28 feet), in open, relatively level terrain, sufficient accuracy for trail work if frequent points are taken along the route.

Survey-grade GPS instruments also are available for more precise work. These instruments require extensive training and experience in their use. They are also very expensive.

GPS technology changes quickly. Technological advances, reduced costs, and increased accuracy have resulted in many practical and affordable GPS trails applications.

Saws
Handsaws

Most timbers and logs used in wetland trail construction are of relatively small diameter. Usually the largest are the piles, 6 to 10 inches in diameter.

If only a few pieces must be cut, or if wilderness regulations require, a one-person crosscut saw can do the job. This is an old-fashioned large handsaw. The blade is 3 to 4 feet long and heavier than a carpenter's handsaw, with much larger teeth (figure 77).

Chain Saws

If many pieces of wood need to be cut, and if regulations permit them, chain saws do faster work for cutting the small sleepers, piles, and planks used for some wetland trails. A small, lightweight saw designed for tree pruning is better for cutting horizontally on vertical piles, posts, and other items. Pruning saws are available weighing 8 pounds, with a 12- to 14-inch bar.

The sawyer should be adequately trained and experienced in the use of the chain saw and the safety equipment. Most government agencies, the Forest Service included, require workers to receive special training and certification before they are allowed to use a chain saw.

Figure 77—A one-person crosscut saw is a good choice for back-country settings.

Hand-Held Pruning Saws

Small hand-held pruning saws are used on most projects. Most types have a curved blade 12 to 26 inches long. For wetland work, the shorter saws are adequate. Some saws have a wood or plastic handle that the blade folds into when it is not being used. Small pruning saws with a straight blade 6 to 8 inches long are available. The short saws with the straight blade work well for cutting shallow notches in log sleepers. When the saws are folded, they can be carried in a pocket (figure 78).
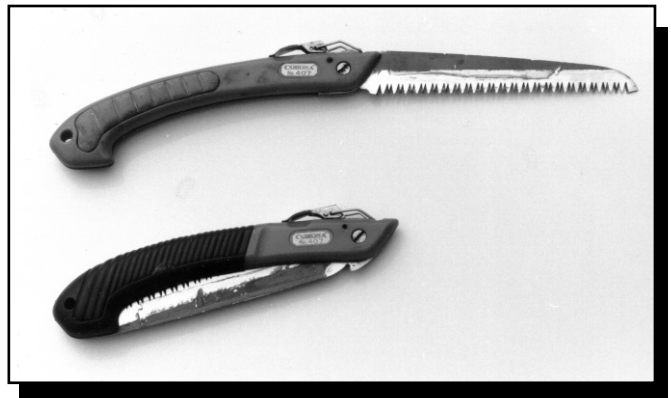
Figure 78—Pruning saws.
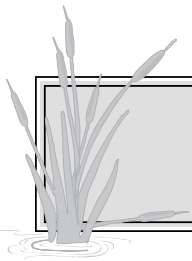
Axes

Three kinds of axes are commonly used in trail work: single-bit, double-bit, and broad axes. The hatchet is not included in this tool list. A Maine guide once wrote that the hatchet is the most dangerous tool in the woods. He may have been right. It takes only one hand to use a hatchet. The other hand is often used to hold the piece of wood to be cut—not the safest thing to do. Few trail crews include a hatchet in their toolbox.

Proper ax selection, care, and use is described in MTDC's videos and reports: *An Ax to Grind: A Practical Ax Manual* (Weisgerber and Vachowski 1999) and *Handtools for Trail Work* (Hallman 2005).

Adzes

If the hatchet is the most dangerous handtool in the woods, the carpenter's adz is the second most dangerous. A person getting hurt with a hatchet has usually been careless. It is not necessary to be careless to get hurt using an adz. The carpenter's adz is used for cutting a level surface on a log for some types of puncheon and gadbury and for removing knots and bulges on log surfaces.

The blade of a carpenter's adz is 5 inches wide and similar to an ax except that it is mounted perpendicular to the line of the handle, similar to a hoe. The edge must be sharp. The handle is curved, similar to a fawn's-foot handle on a single-bit ax.

Workers using an adz normally stand on a wide log (16 inches or more in diameter) and swing the adz toward their feet, almost like hoeing a garden. An adz can be used on smaller-diameter logs by a worker standing next to the log and chopping sideways along the length of the log. When one face of the log is cut to a level plane, the log can be turned and another face can be cut. It is extremely difficult to use a long-handled adz to cut anything but the upper surface of a log.

Two other types of carpenter's adzes have short handles. They are not suitable for shaping large logs, but work well for removing knots and bulges and for cutting notches. Short-handled adzes are made with a straight or concave blade, about 3 inches wide. Striking the back of the adz head with a hammer will eventually crack the head (figure 79).
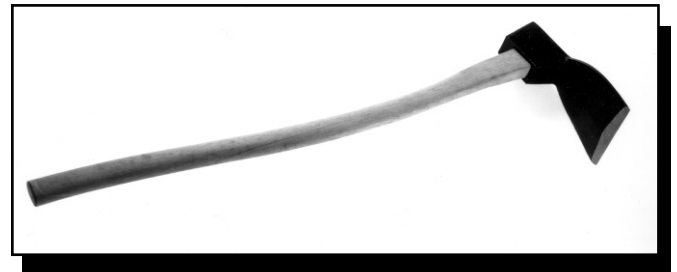
Figure 79—Using an adz safely requires that the adz has a razor-sharp edge and that the worker use the utmost control and concentration when making the swing.

Planes

Small block planes can be used for shaping bevels and chamfers, for removing unevenness where two pieces of wood butt together, and for smoothing splintery edges that visitors might touch. Block planes are small, about 2 inches wide and 4 inches long, and easily packed to the worksite (figure 80).

Draw Knives

Draw knives are often used to peel the bark off logs. Logs will last longer without the bark. Draw knives work best on logs with thin bark.
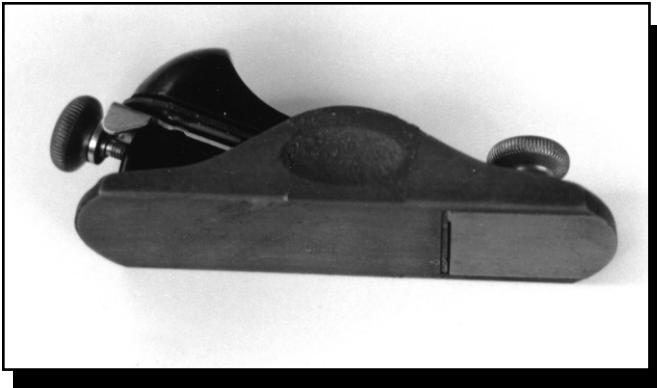
Figure 80—A small block plane is useful for finish work on wood structures.

Figure 82—A bark spud works well when peeling green logs.

Draw knives have either straight or concave steel blades that are 12 to 15 inches long with a wooden handle at each end. The draw knife is pulled toward the worker. The straight draw knife does not put as much of the edge against the wood as the concave knife, making the concave knife more efficient and more popular (figure 81).

Figure 81—Straight and concave draw knives.

Bark Spuds

Bark spuds are better suited for removing the bark from thick-barked or deeply furrowed logs and logs with many knots or large knots. Normally, logs are most easily peeled when the tree is still green, but this characteristic varies by tree species. Bark spuds are from 18 inches to 6 feet long. All have a steel head that is 2 to 3 inches wide and 3 to 5 inches long, sharpened on the end and both sides. The wooden handle is 15 inches to 5½ feet long (figure 82).

Tools For Drilling Holes in Wood
Bits

Bits are used to drill holes in wood for bolts and for pilot holes for nails and screws. Some of the types of bits available are twist bits, chisel bits, augers, and ship augers.

Twist bits are intended for use on steel, but the smaller bits can be used for drilling pilot holes in wood for nails and screws (see appendix D for appropriate pilot hole sizes). Chisel bits resemble a chisel with a point in the center. Chisel bits tend to tear up the wood around the hole on the top and bottom surfaces of the wood, but they are readily available in diameters of $\frac{1}{16}$-inch increments. Augers resemble a widely threaded screw with a sharp end and sharp edges. Augers do not tear up the wood like chisel bits do. A normal auger bit is 6 inches long and readily available in $\frac{1}{4}$- to 1½-inch diameters, in $\frac{1}{8}$-inch increments, less readily in $\frac{1}{16}$-inch increments. With a 6-inch-long auger, it is difficult to get the holes to line up when two 3-inch ledgers are on each side of a 6 by 6 pile. Ship augers help in this situation because they are longer. Ship augers are 15, 17, 18, 23, and 29 inches long and are indispensable when working with timbers and logs.

Old auger bits were made with a four-sided shaft to fit into a manually powered brace or drill. A six-sided shaft is designed for use in a power drill and will spin uselessly when used in a manually powered brace or drill. Today, most bits are made for power drills. When selecting a bit from a maintenance shop, check to see that the shaft of the bit matches the brace or drill to be used at the worksite (figure 83).

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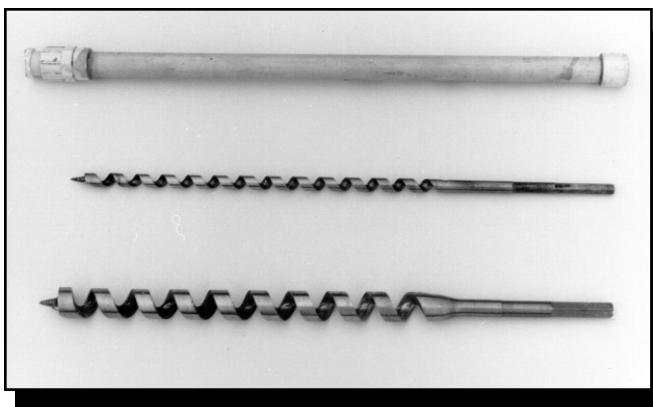
Figure 83—Ship augers are longer than normal 6-inch augers.

Braces

Braces and bits are the traditional tools for drilling holes in wood. The brace, a handtool suitable for wilderness use, is extremely slow. Old braces require an auger bit with a four-sided shaft (figure 84).
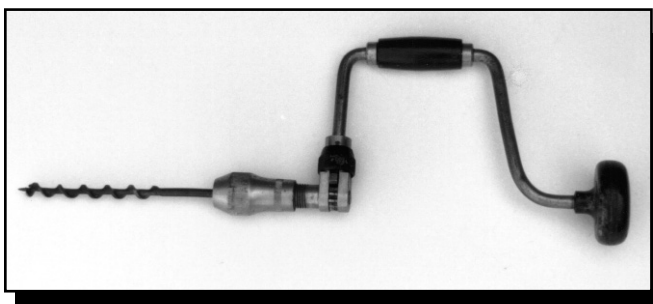
Figure 84—A traditional brace and bit.

Some braces are made with a ratchet, which is helpful when working in close situations where the brace cannot be turned a full circle. People have a tendency to lean on the brace to speed up drilling. This practice bends inexpensive braces. Buy a good brace or don't lean on it. Keep the bits sharp.

Battery-Powered Drills

Small battery-powered drills are useful for drilling holes $\frac{1}{16}$ inch to $\frac{3}{8}$ inch in diameter. Some heavy-duty drills can drill

holes up to 1 inch in diameter. Battery-powered drills may be practical for backcountry use where only a few holes are to be drilled, where the crew returns to the shop after work, or where a generator or photovoltaic power source is available.

Gasoline-Powered Drills

Many trail crews use gasoline-powered drills. These tools can drill holes up to 1 inch in diameter and weigh from 10 to 12 pounds, plus fuel (figure 85).

Figure 85—Gasoline-powered drills are great for backcountry work if regulations allow their use.

Only the more expensive heavy-duty drills, whether battery or gasoline powered, have a reverse gear. A bit can become stuck if it does not go all the way through the wood. To avoid getting a bit stuck, lift the drill up a few times while drilling each hole. If the bit does get stuck, disconnect the bit from the brace or drill and use a wrench to twist the bit backward.

If you have a generator at the worksite, another alternative is to use a $\frac{1}{2}$-inch-diameter electric drill. Most of these drills have a reverse. An annoying drawback is stepping over a long extension cord and getting it tangled in brush and timbers. If the operator is standing in water, electric shock is a possibility. Generators are heavy and require fuel. Although some generators have wheels, most are awkward to transport to wetland sites.
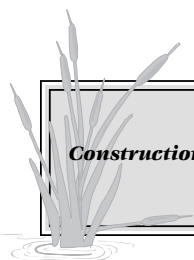
Clamps

A pair of large jaw clamps can speed the installation of two ledger bents. The clamps should have at least a 12-inch opening. These clamps are used for making furniture and may be all steel or part steel and part plastic. Both ledgers are placed roughly in position and clamped loosely to each pile. The height of each ledger is adjusted, the clamps are tightened, and the bolt holes are drilled (figure 86).
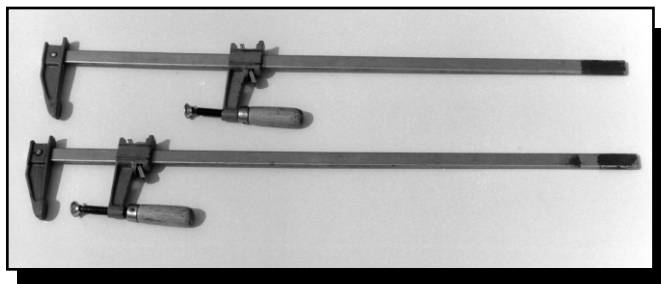
Figure 86—Large jaw clamps.

Wrenches

At least one wrench is needed to securely fasten carriage bolts and lag screws. Two wrenches are needed to fasten machine bolts and all-thread rod. Specialty wrenches or screwdrivers are needed to install vandal-proof screws. Closed-end and open-end wrenches, and a set of socket wrenches, may all be needed. Tying one end of a cord to the wrench and the other end to your belt may help keep the wrench from getting lost in the water or mud.

Chisels

Wood chisels are needed for wetland trail structures. The blade may be ¼ to 2½ inches wide. Wood chisels are typically made with short handles, which often contribute to scraped knuckles. It is worthwhile to repair or replace the handles of old, long-handled chisels.

For a small amount of close work, the wood chisel can be hit or pushed with the palm of the hand. If this technique is impractical, use a wooden mallet. Hitting a wood chisel with a steel hammer will damage the chisel's handle. A good wood chisel should not be used close to nails, screws, or bolts. The cutting edge should be kept sharp.

The socket slick, an oversized chisel, is a difficult tool to find. However, if considerable notching or other accurate work is required, obtaining a slick will be worth the extra effort and expense. The blade is 3⅜ inches wide with an 18-inch wooden handle. The slick weighs 3 pounds. A 2-inch-wide chisel weighs just 10 ounces. The advantages of the slick are its wide blade and long handle. The slick can remove wood twice as quickly as a wide chisel. The long handle keeps the hands farther from the wood being cut (figure 87).

Figure 87—Socket slicks can be hard to find.
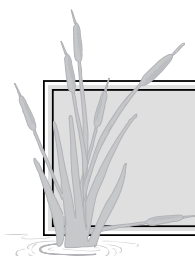
Mallets

Mallets are made with plastic, wooden, leather, or rubber heads. Mallets with plastic or wooden heads should be used for hitting wood chisels.

Hammers
Claw Hammers

A carpenter's claw hammer is helpful for nailing log culverts, bog bridges, boardwalks, and geotextile fabric. A 28-ounce framing hammer is better than the lighter models, although the heavy hammer may be awkward for workers who are unaccustomed to it.

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Sledge Hammers

A variety of different weight sledge hammers should be available at the worksite. A 4-pound sledge is good for starting driftpins and spikes. A 6- or 8-pound hammer is better for driving them. The 8-pound hammer is better suited for moving heavy timbers and logs fractions of an inch when they are almost in place. Surveyor's sledge hammers have shorter handles. They are better for driving long pieces of steel because they provide better control.

Figure 88—A hand auger.

Crowbars

A crowbar is indispensable for building trails in rocky terrain. For most wetland trail work, the crowbar is used to move fallen trees and logs out of the way and to align piles, logs, and timbers. A crowbar, also called a rock bar or pry bar, is much stronger than a hollow-pipe tamping bar. The two are often confused.

Tools for Digging Holes
Shovels and Posthole Diggers

The sharp-pointed shovel can be used for digging a narrow deep hole, but a posthole digger or manual auger is more efficient. The posthole digger with its clamshell-like blades is most common, but it is slow and awkward to use. The auger is more expensive, but more efficient.

Augers

The auger blade consists of two pieces of immovable curved steel set at opposing angles to each other. The wooden handle is turned in a horizontal plane while the blades drill a hole in the ground. In most soils an auger is more efficient than a posthole digger (figure 88).

Gasoline-Powered Augers

Gasoline-powered augers are available. These can usually be rented from local equipment rental companies. A one-person auger weighs 18 to 140 pounds. A two-person auger weighs 35 to 75 pounds. These augers are easily moved to a site. The heavier one-person augers have an engine mounted on wheels that is separate from the auger. Power augers usually make fast work of drilling holes in almost any soil. Problems occur when the auger runs into a boulder, a large root, or soil containing 4- to 6-inch pieces of gravel. The bit will stop, and the torque of the engine may cause back injury.

Wheelbarrows

Wheelbarrows are an underrated and often forgotten piece of equipment for trail work. A wheelbarrow is a necessity for moving fill for most turnpike construction and can be helpful for moving tools, materials, and supplies. For big jobs, two wheelbarrows are handy. One can be loaded while the other is being dumped.

Steel and fiberglass are the most common materials for the body. Steel is heavier and stronger, but fiberglass is cheaper and more easily repaired.

Wheelbarrows commonly available at most local building supply stores do not withstand the rigors of trail work. Contractor's wheelbarrows are made with stronger steel, and the handles are made of heavier, better quality wood. Although more expensive, a contractor's wheelbarrow will far outlast the flimsy backyard variety. Contractor's wheelbarrows can also be rented.

The solid-body wheelbarrow is the type that comes to mind when we think of wheelbarrows, but the gardener's wheelbarrow also has a place in trail construction. This wheelbarrow, without sides, is easier to use when loading large stones, short timbers and logs, and bags and boxes of materials. Gardener's wheelbarrows are more expensive than contractor's wheelbarrows and are difficult to find. Most have steel wheels. Pneumatic rubber tires are better for trail work. The frame of a standard wheelbarrow can easily be converted to a gardener's wheelbarrow. Temporary flat-tire repair sealants, sold in aerosol cans, help prevent pneumatic tires from going flat. Motorized carriers could greatly ease the burden of moving materials, where their use is allowed.

Compactors

Compactors should be used when placing fill for turnpike and for backfill around end-bearing piles. Several companies make a vibratory tamper type of compactor that is suitable for compacting small areas of fill. These companies also make vibratory plates, which are better suited for larger areas, such as turnpike and accessible surfaces. Vibratory tampers have an area 8 inches square that contacts the ground. Vibratory plates have an area 15 inches square that contacts the ground (figures 89 and 90).

A third type of compactor is an attachment to the Pionjar rock drill. It can be used for compacting backfill in narrow spaces around end-bearing piles, fenceposts, and signposts.
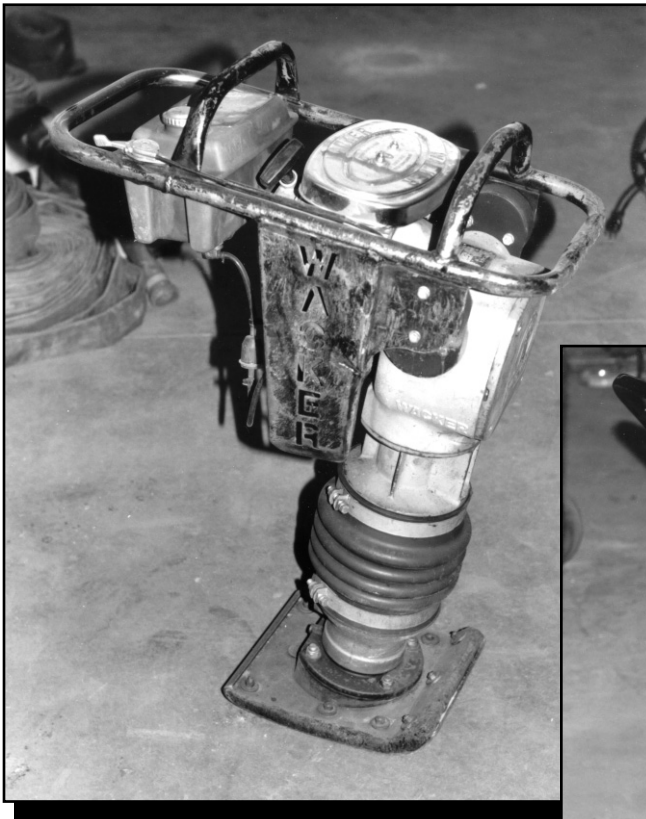
Figure 89—A vibratory tamper.
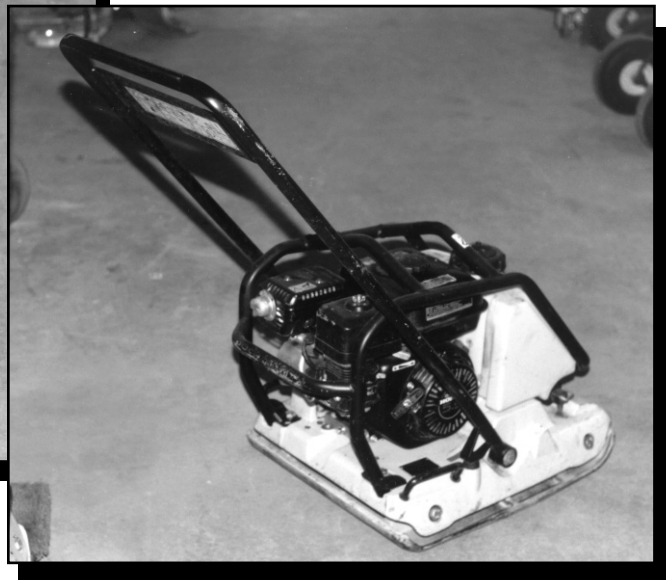
Figure 90—Vibratory plate compactor.

Practicing the Craft

Working With Logs

You learn some time- and labor-saving procedures after working with logs a few times. Here are some tricks that can make your work easier.

Felling

Trees needed for log construction should be felled during the growing season, mid-April to early September in most regions. The bark is easier to remove from trees cut during this season.

Ideally, fell trees uphill from the construction site, and out of sight of trail users. Select straight trees free of obvious defects. Often defects are not noticeable until the tree is down, but outward signs of decay, fungus growth, and insect attack indicate a tree to be avoided. Special training and agency certification are required for fallers, a very hazardous occupation.

Bucking and Seasoning

After felling, the tree is bucked, or cut, into log lengths. The logs can be peeled, which will reduce their weight and permit them to dry out, or *season.* Leaving the bark on the logs will protect the surfaces when the logs are moved, especially if the logs are dragged. Whether the logs are peeled or not, they should be stacked off the ground on two or three stringers of low-quality logs. Stickers should be used between layers of usable logs to allow uniform seasoning. Stickers can be 2 by 4s or small-diameter logs placed across a layer of logs at the ends and midpoints of a layer (figure 91).

Stickers for stacking logs
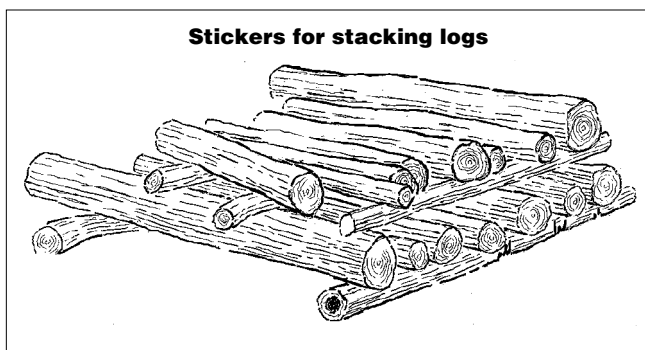
Figure 91—Stickers placed between layers of logs help the logs dry faster and reduce decay.

Moving Logs

Logs are heavy. Footing is uneven and often slippery. Accidents can happen easily, and the emergency room is far away. When logs are carried by hand, the tendency is to pick up the logs and carry them on the shoulder or at the waist. If workers holding the log slip, the log will come down on them. The result can be a serious injury to the ribs, hip, ankle, or foot.

To avoid or reduce the severity of this type of injury, use two or more log carriers. Log carriers are large steel tongs mounted in the center of a 2- to 3-inch-diameter wooden handle that is 4 feet long. Two workers can use one log carrier to drag a log. At least two carriers are needed to lift a log, one carrier at each end. Each carrier requires one worker on each side of the log.

Log carriers are awkward to pack, heavy, and serve only one purpose. The teeth of log carriers indent the wood half an inch or so on each side of the log. The indentations mar the appearance of the log and provide a place for decay to begin.

A cheaper and lighter method for moving a log is to use rope slings and the removable handles of mattocks or adzes (or small-diameter logs that are 3 to 4 feet long). The slings are made by taking 6 feet of 1,000-pound-test nylon rope and tying a fisherman's knot, double fisherman's knot, or a grapevine knot at the ends, forming a loop.

Roll the log onto the slings and slip the handles over the log and through the loops of the slings. With one worker on each end of the handles (four workers total), lift the log off the ground. The log should be about ankle high. If anyone slips and drops the log, the most serious injury will be to the ankle or foot, and the log will not have fallen far enough to develop much force (figure 92).

Slings to carry logs

Handles

Nylon ropes
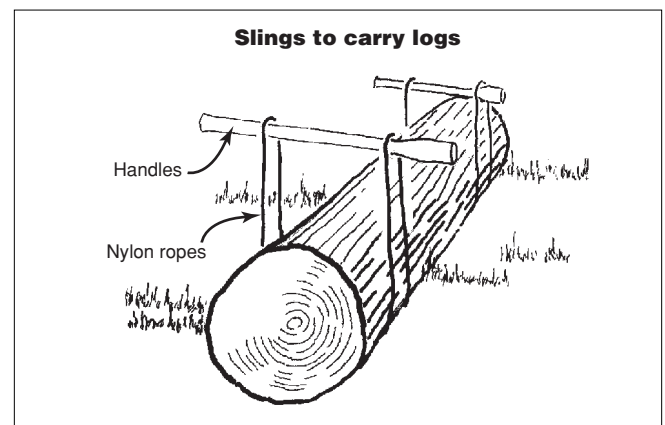
Figure 92—Slings are a good way to move logs and timbers, bundles of steel bars, wheelbarrows that must be carried over soft ground, or bags of cement carried on plywood.
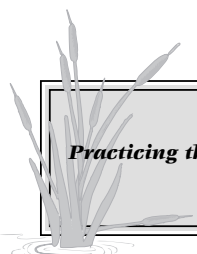
Peeling

Peeling is a tedious process. There is little reason to peel the bark off a log if you plan to hew or plane it, unless the bark is dirty and likely to dull your cutting tools. Pine, fir, and other evergreen trees may develop pitch pockets just under the bark. On freshly cut trees, pitch may be runny rather than thick or sticky. The cutting edge of a drawknife is never more than an arm's length from a worker's face, and the drawknife is pulled toward the worker's body. Cutting into a pitch pocket splatters pitch on the worker. A drop of pitch in an eye results in the same burning effect as a drop of turpentine. Wear safety glasses or goggles when peeling logs of most evergreen species.

Squaring a Log

It is not easy to cut a uniform plane surface on a log. That difficulty plus the desirability of using treated timbers for longevity is the reason less work is being done with native logs on site. However, if you are determined to use logs because of their availability and their rustic appearance, here is how to do so. The first step is to place the log on nearly level ground and roll it over to determine which face is easiest to work with. Avoid areas with many knots or large knots. The crook of the log, if any, should be in the direction that will cause the least problem when the construction is completed. Roll the log until the best face is up and in a roughly horizontal position (figure 93).

Determine the width of the plane surface that is needed. Put a carpenter's or mason's level in a horizontal position against the end of the log. Use a measuring tape or framing square to measure the distance between the solid wood and the inside of the bark at the edge of the level. By trial and error, move the level up or down until its upper edge is level and on a line that measures the dimension needed. Draw a line across the end of the log on the edge of the level. Without moving the log, use the same process to draw a line across the other end.

Drive a nail into the bark where each horizontal line meets the bark. Stretch a chalkline or stringline between the two nails on one side of the log. If the bark is thin or has been removed, a chalkline can be used and snapped, leaving a chalk mark to work to. A chalkline will not leave an accurate or discernible mark on thick, deeply furrowed bark or on a log with an inch or more of crook. In this situation, drive nails to hold the string every 2 feet or so along the line of the string. Repeat the process on the other side of the log.

After scoring parallel cuts down to the chalkline with a chain saw or ax, use an adz to remove the wood from the top of

Squaring a log

1—Roll the log so the best face (without knots or other defects) is on top.

2—Use a level on the end of the log, mark out the width of the planed surface you need. Do this on both ends of the log.

Level

3—Snap a chalkline the length of the log on both sides.

4—Score parallel cuts with an ax or chain saw down to the chalkline. Remove the remaining wood with an adz or chain saw.
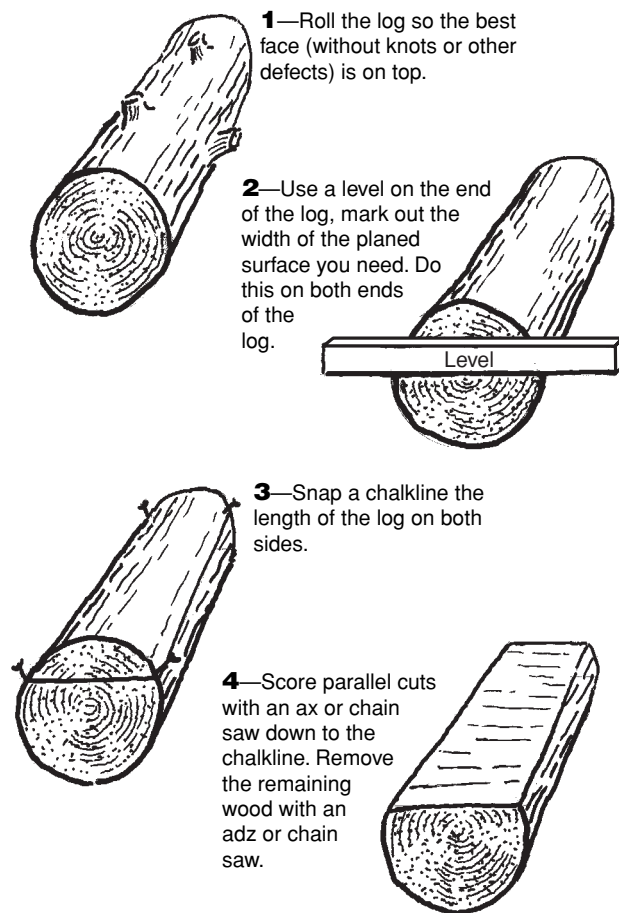
Figure 93—Steps to square a log.

the log down to the chalklines. Use small-diameter logs, 2 by 4s, or log dogs to hold small logs in place while doing the adz work. To control how much wood is removed, cut with the grain of the wood. This technique reduces the likelihood of breaking out deep chips of wood. The direction of the grain will be obvious after the first few cuts.

A chain saw will do the work much faster. A helper is needed to make sure the sawyer doesn't cut below the chalkline on the far side of the log (which the sawyer cannot see). Otherwise, you will end up with a wavy surface. If the wavy surface is used as a tread, it will cause hikers to slip and fall when the tread is wet or frosty.

If you are not using a chain saw, the technique described above is practical only on small logs. The adz is considered a finishing tool for surfaces that have already been hewed to size. If a lot of wood must be removed and power equipment is not available, hewing with a broad ax is more common and

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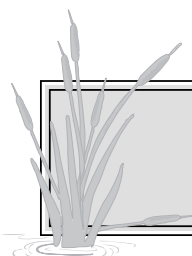
more efficient. The process starts out much like that de-scribed for adz work, but instead of horizontal cuts, broad ax cuts are made vertically, for the length of the log along the chalkline. This technique is spelled out in more detail in *An Ax to Grind: A Practical Ax Manual* (Weisgerber and Vachowski 1999).

Check the surface with a straightedge, a framing square, or a long level. Check across the log and also along its length. Mark any high spots and remove them. It is easier to detect high spots by kneeling on the side of the straightedge in shadow and looking between the straightedge and the wood (figure 94).

Perpendicular cuts

Framing square

Figure 95—Use a framing square to mark a perpendicular cut.

Smoothing the surface of a log

Figure 94—Use a long level to find high spots that need to be removed.

After the first surface is complete, a second surface can be marked and cut. If the second surface is perpendicular to the first, a framing square can be used to mark the ends of the log. Repeat the marking procedure with the chalkline or strin-gline and nails. The log can be rolled over so that the second surface is horizontal and can be adzed, or the log can be left in place so the second surface can be shaped with a broad ax. This method is suitable for making log puncheon that must be two logs wide (figure 95).

If the second surface needs to be parallel to the first, place the log with its ends resting on two other logs with the first surface facing up and the log level (figure 96). Determine either the thickness of the log needed, or the width of the second surface needed. Using the level, mark a line along the log's edge parallel with the first surface. Roll the log until the first surface is facing down and repeat the chalkline or stringline procedure for the second surface. Use an adz or saw to level the second surface. This technique is suitable for situations where one surface must be level for a tread and the bottom at each end must rest on log or stone piers.

Parallel surfaces

Figure 96—Use this procedure when a second flat surface must be parallel to the first.

Cutting Planks With Chain Saw Mills

Where chain saws are allowed, native logs are available, and distance or other factors preclude hauling in treated timbers, consider using an Alaskan sawmill (figure 97). This is about the only way to effectively channel the power of the saw to create uniform, square planks. Several sizes of mills are available. A basic mill costs less than $200. You also need a powerful chain saw, one equipped with ripper teeth.

Working With Timbers

Rough-sawn timbers are splintery, and some species of wood are more prone to splinter than others. To avoid a handful of splinters, wear good-quality, heavy work gloves.

Timbers to be used in a horizontal plane, (ledgers, stringers, and culvert inverts) should be checked for camber, a slight bend in the length of a piece of wood. Although camber usually is slight—less than $\frac{1}{2}$ inch per 10-foot length—it should be used to your advantage.

Camber can usually be determined by sighting along all the surfaces of the timber from one end. Sometimes a stringline held to each end of the timber helps to identify camber. Many timbers will not have any camber.

If camber is present, the convex face should be placed up and the concave face placed down, even if this contradicts the "green-side up" general rule of placing growth rings down to reduce cupping. Weight on a timber will cause the timber to deflect or sag. With the convex surface up, deflection will act to straighten the timber. If camber is ignored and the timber is installed with the concave surface up, it is already sagging. Additional weight will cause the timber to sag even more.

Figure 97—An Alaskan sawmill works great for creating planks from native logs. The mill requires a powerful chain saw (at least 3.8 cubic inches of displacement, more is better) and a special ripping chain.

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Working With Treated Wood

At a preservative treatment plant, freshly treated wood is stacked on areas of concrete where excess preservative drips from the stack and is collected and recycled. The treated wood is air dried, which works well in a dry climate. However, the wood is sometimes dry at the surface but wet below the surface when it is shipped. This wood will weigh more because of the moisture. You need to consider this factor when transporting the wood to remote locations. The high moisture content of newly treated wood will also cause tools to bind and tear the wood. This is not intended to deter you from using treated wood, but it is something you need to be aware of.

Treated wood may be kiln dried if that process is specified. Kiln drying to 19-percent humidity can be required. However, the minimum order for large plants may be a truckload. Most small local plants probably cannot do this at all. Kiln drying does cost more.

Pinning Logs and Timbers

Driftpins (usually ½-inch-diameter steel reinforcing bars, also called #4 deformed rebar) are used to pin logs and timbers. Some trail crews prefer to use driftpins cut from ½-inch-inside-diameter galvanized steel pipe. The length of the driftpins will vary. When driftpins are used to anchor a log or timber to the ground, about 12 to 18 inches of the driftpin should be in the ground. If rock or boulders are encountered before the driftpin is driven its full length, it will have to be cut off with a hacksaw. When pinning one log or timber to another, the driftpins should be long enough to go through the upper piece and all the way through the lower piece, or at least 12 inches into it.

First, drill holes in the wood $\frac{1}{16}$ inch smaller than the diameter of the rebar. Before driving the driftpins, dip the end of the driftpin in heavy automobile grease. The lubricant will make it easier to drive the driftpins, will protect the driftpin from the weather, and will provide a thin, protective film between the steel and the copper in treated wood. Driving the driftpins is much easier if you make a striking plate out of a short piece of pipe with a 2- to 3-inch round plate welded to one end.

The top of the driftpin should be countersunk (figure 98). Countersinking can be done neatly by placing a 4- to 6-inch piece of steel pipe around the driftpin and a 12-inch piece of a smaller diameter rebar inside the pipe. With the pipe resting on the log or timber and the smaller diameter rebar resting on the driftpin, hit the rebar with a sledge hammer until the top of the driftpin is below the surface of the wood. This depression can be filled with grease to protect the steel from rusting. Wipe any surplus lubricant off of the wood.

Countersinking driftpins
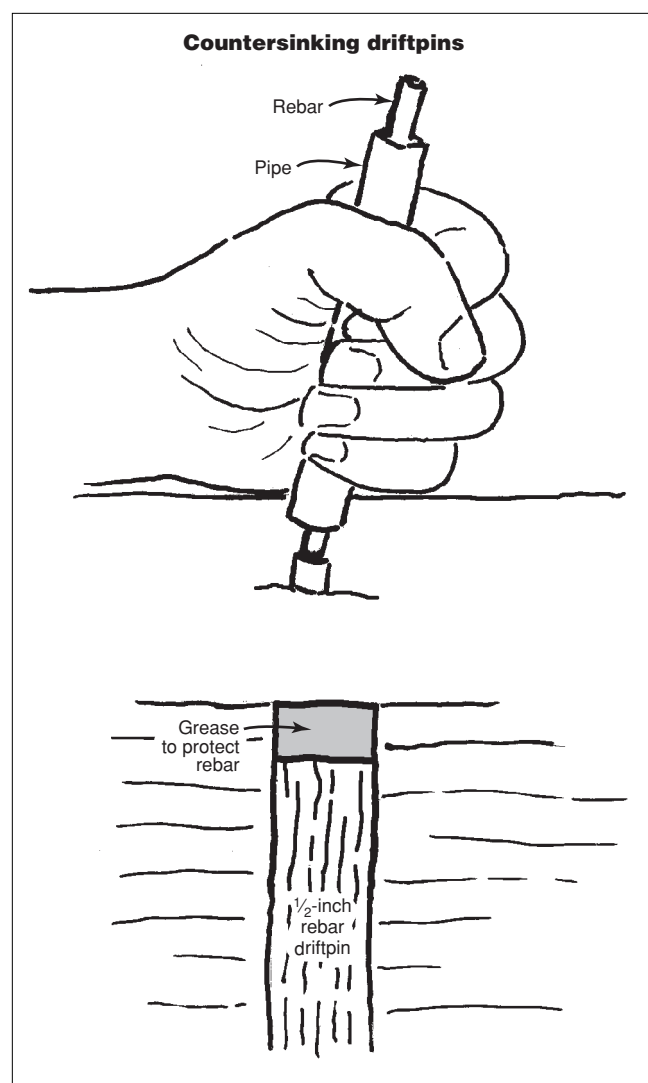
Figure 98—Countersinking the driftpin is a good practice easily accomplished by striking a short piece of rebar inside an even shorter piece of pipe.

Tread Surface
Slippery Wooden Treads

We are frequently asked how to correct a slippery wooden tread. Often, the surface is not the source of the problem. The slippery surface usually is the result of overlooking factors such as trail grade, cross slope, or soil conditions.

Trail Grade

If the grade of the trail surface is too steep, there is little that can be put on the tread to eliminate slipperiness. A wooden surface that has been installed at an 8-percent grade will be slippery with only a heavy dew. Pedestrians will find a wooden surface built at 5-percent grade slippery with frost or light rain. Shaded and north-facing sites aggravate the problem. The maximum grade for a trail with a wooden surface should be 2 percent ($\frac{1}{4}$ inch per foot).

Cross Slope

Another cause of a slippery tread is a cross slope that is too steep. To prevent excessive cross slope on a trail, use a simple carpenter's, mason's, or torpedo level to identify any difference in elevation between parallel stringers, the notch in sleepers, and ledgers attached to the piles. To eliminate or reduce cross slope, shim up the stringers or ledgers, excavate the high end of the sleepers, redrill the bolt holes, or replace the ledgers (figure 99).

It is much cheaper to build the foundation correctly than to try to correct problems later through maintenance.

Eliminating cross slope

Shim stringers or ledgers

Excavate to level
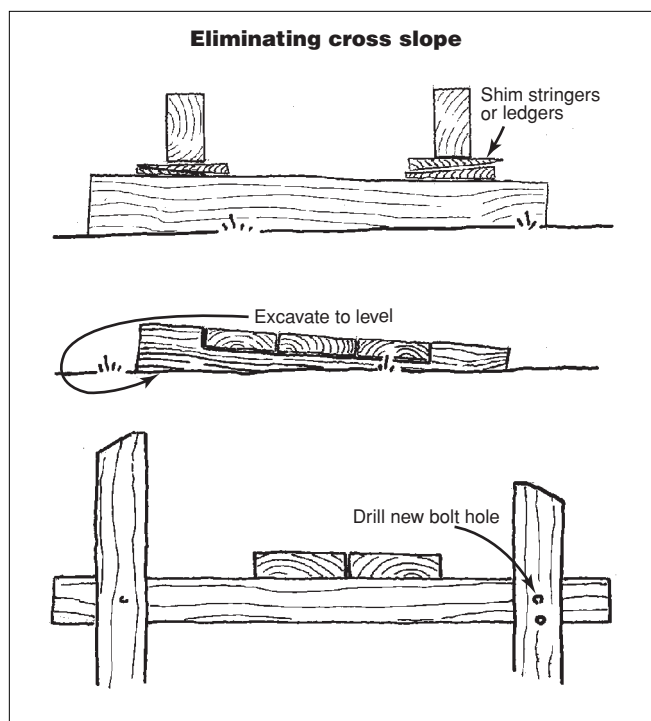
Drill new bolt hole

Figure 99—Eliminate cross slope with shims, by excavating the high side of sleepers, or by drilling new bolt holes on the ledgers.

Soil Conditions

Another factor that can create a slippery tread is settlement, a problem that occurs when soil settles after a trail has been constructed. The trail may have been built properly, but all or part of the trail may have settled over time. Perhaps sleepers or a bent on end-bearing piles were used instead of a bent on friction piles. That part of the foundation settled over time, causing the trail to sag. The result is that one or both sections of trail on each side of the sag are steeper than intended.

One part of a trail support may settle. For example, one end of a sleeper may settle and the other end may not, or one pile in a bent may settle and the other may not. Both piles may settle, but one may settle more than the other. This type of settling will affect cross slope.

Cross slope of $\frac{1}{4}$ inch per foot (2 percent) is common for concrete and asphalt surfaces, but is excessive for wood. The cross slope should be level or $\frac{1}{8}$ inch or less per foot (0 to 1 percent). Settlement can be corrected by shimming the low side, notching the high side, or a little of each. This is extremely difficult to do after construction and can be avoided to a degree by taking ample rod soundings and digging a number of test holes during the design phase. During construction, the crew should be alert for changes in soil conditions and should take remedial actions when necessary.

Surface Treatments

If the hazard of a slippery tread cannot be corrected by shimming, notching, or adding steps, a few surface treatments can be applied. These treatments will require maintenance.

Latex Paint

A nonskid latex paint is made for boat decks. This paint is opaque, unlike a clear wood stain, but it can be tinted. As with all painted surfaces, peeling, scraping, and periodic repainting must be expected.

Walnut Chips

Walnut chips are a hard, angular material produced in various sizes. The number 4 size is suitable for nonslip surfaces. Walnut chips can be applied to a wooden surface by sand painting (using chips and paint mixed at the factory), using chips mixed into the paint at the site, or by painting the wood and sprinkling on chips while the paint is wet.

Mineral Products

Nonslip products are also made from pumice and aluminum oxide. Some are premixed. Others are sold as a gritty powder that is mixed with paint.

Nonslip Gratings and Grit-Treated Mats

Another method for correcting a slippery trail tread is to replace a wooden plank tread with nonslip gratings or to apply grit-treated fiberglass mats to the planks.

Working With Rock, Stone, and Gravel

The construction industry recognizes differences between rock, stone, and gravel. It helps to understand the differences in the materials so you will know what to specify or order.

Rock

Rock is the parent material in and under the ground. Sometimes it is called bedrock or ledgerock. Moving rock usually requires drilling and the use of explosives.

Stone

When rock is broken or crushed, the pieces are referred to as stone. Stone, when used in construction, describes usable

pieces of what once had been rock. Stone may be large enough to use for walls, or it may be small pieces that have been through a rock crusher for use as aggregate in concrete or as a base course in a road. Stone is angular on all sides.

Among the byproducts of rock-crushing operations are "crusher fines," screened material smaller than $\frac{1}{4}$ inch that is not suitable for most crushed stone contracts. This material is often sold at a discount at crusher operations and makes a fine trail surface when it is wetted and compacted.

Gravel

Small pieces of rock that have broken naturally and have been subject to glacial action or tumbled in a river or creek are called gravel. The glacial action or the effect of water has rounded and removed all the corners of the original piece of rock.

Uses of Stone and Gravel

Rock is rarely found in a wetland. Stone can be brought to the site for use as riprap. Crushed stone can be used for walking surfaces. Because crushed stone is angular, when it is compacted it will knit together to form a solid mass. Gravel cannot be compacted to produce a solid mass. Gravel's rounded shape is useful because water can move through the spaces between the gravel particles. Crushed stone should not be used for drainage (around perforated pipe or to carry water from one point to another). Use gravel for drainage (figure 100).

Compaction comparison

Crushed stone   Gravel
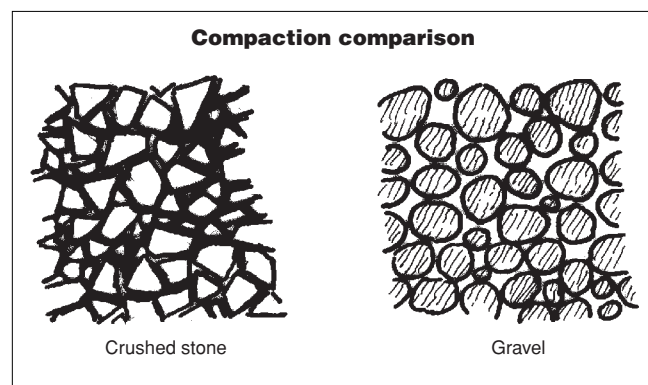
Figure 100—Crushed stone has angular edges and compacts well. It is good for tread surfacing. Gravel does not make good surfacing because it has rounded edges. Gravel is good for subsurface drainage because water flows freely through it.

Station & distance	Tread width	Sideslope (percent)	Gradient (percent)	Notes

Station & distance	Tread width	Sideslope (percent)	Gradient (percent)	Notes
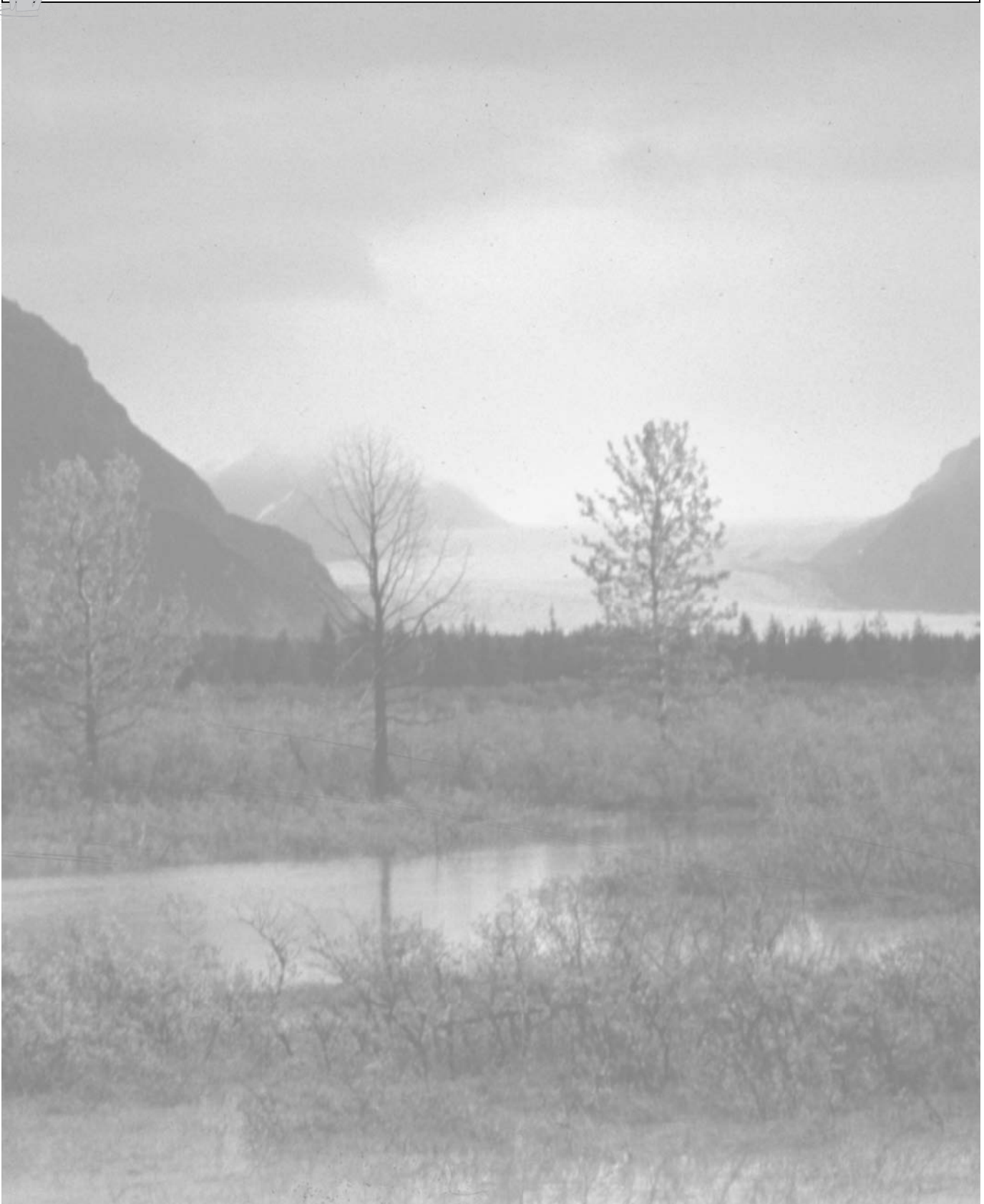
Appendix B — Slope Conversion Table

Slope Conversion Table		
Percent grade	[1]Slope	[2]Pitch
0.5	1 ft per 200 ft	$\frac{1}{16}$ in per 1 ft
1	1 ft per 100 ft	$\frac{1}{8}$ in per 1 ft
2	1 ft per 50 ft	$\frac{1}{4}$ in per 1 ft
2.5	1 ft per 40 ft	$\frac{5}{16}$ in per 1 ft
3	1 ft per 33 ft	$\frac{3}{8}$ in per 1 ft
3.3	1 ft per 30 ft	$\frac{7}{16}$ in per 1 ft
4	1 ft per 25 ft	$\frac{1}{2}$ in per 1 ft
5	1 ft per 20 ft	$\frac{5}{8}$ in per 1 ft
6	1 ft per 16.5 ft	$\frac{3}{4}$ in per 1 ft
7	1 ft per 14.3 ft	$\frac{7}{8}$ in per 1 ft
8	1 ft per 12.5 ft	1 in per 1 ft
8.33	1 ft per 12 ft	1 in per 1 ft

[1] One unit of climb or descent per 100 units of horizontal distance.

[2] Number of vertical inches per horizontal foot. Vertical inches shown are rounded off to the nearest $\frac{1}{16}$ of an inch.

Maximum grade recommended for wood surface trails = 2 percent.

Appendix C— *Comparison of Round and Rectangular Culverts*

These tables show the open-end area of round culvert pipe and the open-end area of rectangular timber culverts.

Round Pipe Culverts								
Diameter (inches)	8	10	12	15	18	24	30	36
End area (sq. ft)	0.4	0.6	0.8	1.2	1.8	3.1	5.0	7.1

Rectangular Timber Culverts								
Height (inches)	Clear width (inches)							
	20	24	30	36	48	60	72	84
	End area (sq. ft)							
5	0.7	0.8	1.1	1.3	1.7	2.1	2.5	2.9
11	1.4	1.8	2.3	2.8	3.7	4.5	5.5	6.4
17	2.1	2.9	3.6	4.3	5.0	7.1	8.5	9.9
23	2.9	3.8	4.8	5.8	7.7	9.6	11.5	13.4

Appendix D — *Sizes of Hot-Dipped Galvanized Nails*

[1]Penny (d)	Length (inches)	[2]Penetration required (inches)	Nails per pound	Gauge (inches)	Bit size for pilot holes (inches)
10	3	2	75	10	NA
12	$3\frac{1}{4}$	$2\frac{1}{8}$	69	10	NA
16	$3\frac{1}{2}$	$2\frac{1}{4}$	54	9	$\frac{3}{32}$
20	4	$2\frac{5}{8}$	33	7	$\frac{1}{8}$
30	$4\frac{1}{2}$	3	29	7	$\frac{1}{8}$
40	5	$3\frac{1}{4}$	22	$5\frac{1}{2}$	$\frac{1}{8}$
50	$5\frac{1}{2}$	$3\frac{5}{8}$	20	$5\frac{1}{2}$	$\frac{1}{8}$
60	6	4	18	$5\frac{1}{2}$	$\frac{3}{16}$

[1] Nails are sold by the old English system of pennyweight. The value of the penny has changed since the system was devised, and today there seems to be no relation to the size and weight of the nail to the penny. The standard symbol for penny is "d."

[2] The "penetration required" column shows the minimum depth the nail must penetrate into the second piece of wood to make a sound connection. The penetration must be increased by one-third when nailing into the end of the piece of wood (end nailing).

*A*ppendix E — *Table of Board Feet*

The most common sizes of boards used for boardwalk and bog bridge construction.

Size of board	Length of board (ft)						Finished size (inches)
	6	8	10	12	14	16	
	Yield (board ft)						
1 x 6	3	4	5	6	7	8	¾ x 5½
2 x 4	4	5.33	6.67	8	97	11	1½ x 3½
2 x 6	6	8	10	12	14	16	1½ x 5½
2 x 8	8	10.67	13.33	16	19	21	Normally rough sawn
2 x 10	10	13.33	16.67	20	23	27	Normally rough sawn
2 x 12	12	16	20	24	28	32	Normally rough sawn
3 x 4	6	8	10	12	14	16	Normally rough sawn
3 x 6	9	12	15	18	21	24	Normally rough sawn
3 x 8	12	16	20	24	28	32	Normally rough sawn
3 x 10	15	20	25	30	35	40	Normally rough sawn
3 x 12	18	24	30	36	42	48	Normally rough sawn
4 x 4	8	10.67	13.33	16	19	21	3½ x 3½
4 x 6	12	16	20	24	28	32	Normally rough sawn
6 x 6	18	24	30	36	42	48	Normally rough sawn

METRIC CONVERSIONS

To convert from this unit	To this unit	Multiply by
inch	millimeter	25.4*
inch	centimeter	2.54*
foot	meter	0.3048*
yard	meter	0.9144*
mile	kilometer	1.6
millimeter	inch	0.039
centimeter	inch	0.394
centimeter	foot	0.0328
meter	foot	3.28
meter	yard	1.09
kilometer	mile	0.62
acre	hectare (square hectometer)	0.405
square kilometer	square mile	0.386*
hectare (square hectometer)	acre	2.47
ounce (avoirdupois)	gram	28.35
pound (avoirdupois)	kilogram	0.45
ton (2,000 pounds)	kilogram	907.18
ton (2,000 pounds)	megagram (metric ton)	0.9
gram	ounce (avoirdupois)	0.035
kilogram	pound (avoirdupois)	2.2
megagram	ton (2,000 pounds)	1.102
ounce (U.S. liquid)	milliliter	30
cup (inch-pound system)	milliliter	247
cup (inch-pound system)	liter	0.24
gallon (inch-pound system)	liter	3.8
quart (inch-pound system)	liter	0.95
pint (inch-pound system)	liter	0.47
milliliter	ounce (U.S. liquid)	0.034
liter	gallon	0.264
liter	quart	1.057
degrees Fahrenheit	degrees Celsius	(°F − 32) ÷ 1.8
degrees Celsius	degrees Fahrenheit	(°C x 1.8) + 32

*These items are exact conversion factors for the units—the others give approximate conversions.

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Glossary

Aggregate—Crushed stone or gravel used as a base course for riprap, asphalt, or concrete pavement. Aggregate is also used in asphalt and concrete mixes.

Asphalt—A mixture of aggregate and asphalt cement, correctly called asphaltic concrete.

Baluster—One of many vertical pieces between the top and bottom rails of a guardrail.

Balusters

Balusters
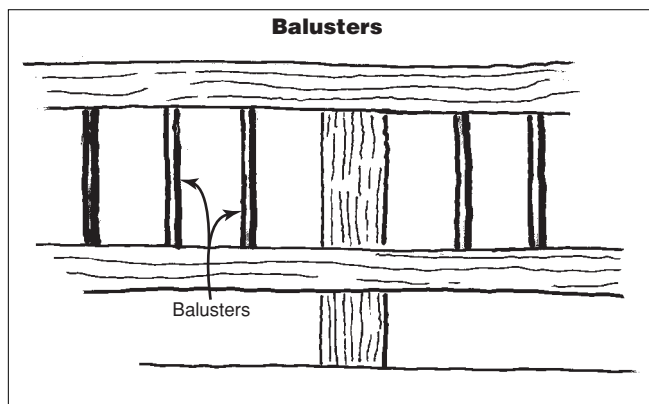
Batter, battering—Sloping the exposed face of a wall back either at a uniform angle, or stepping it back uniformly, the structurally sound way to build a timber wall.

Bevel—Finishing the corner of a piece of lumber by removing a narrow portion of wood at a uniform angle to the edge and face. A bevel follows the grain of the wood (see chamfer).

Borrow pit—An excavation used to obtain fill for a construction site.

Braided trails—Parallel trails around a low, wet spot. These trails are not constructed, but are worn in the ground by trail users who do not want to get their feet wet or walk in mud. Each new trail funnels water to a low point. Users repeat the process, producing a series of trails.

Camber—A slight bend in a timber.

Cantilever—The portion of a beam or plank extending beyond one or both of its supports.

Chamfer—Similar to a bevel but done at the end of the piece of wood and across the grain.

Batter

Amount of batter

Amount of batter

Beveled edge

Cantilever

Chamfer

Chamfered edges

Countersinking

Screw head is countersunk in the wood

Cross slope

Cross slope

Level

Cupping
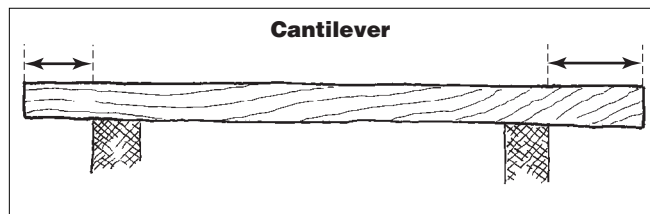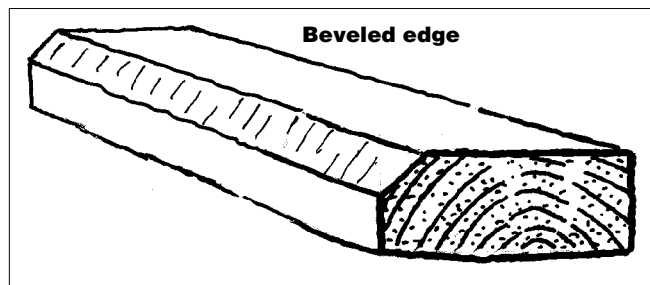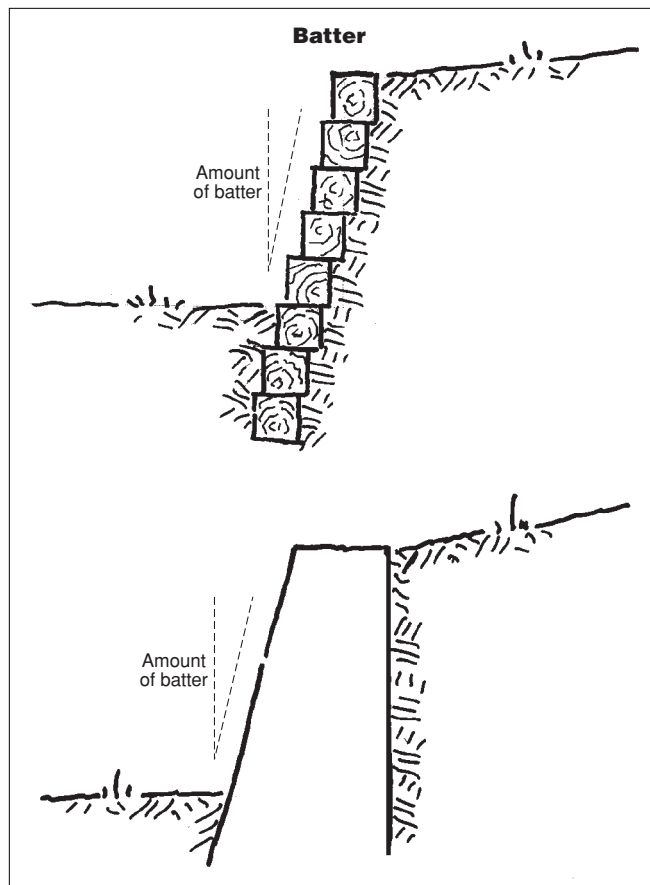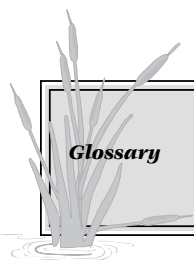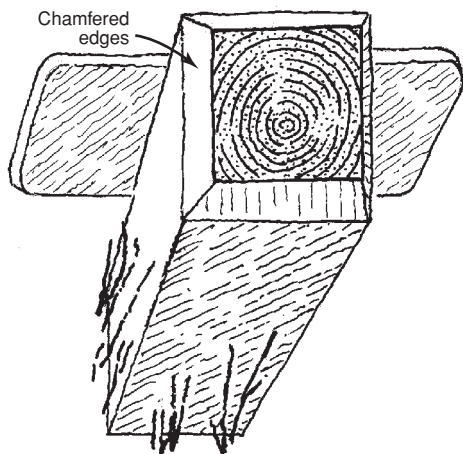
Concrete—A mixture of sand, coarse aggregate (crushed gravel or crushed stone), portland cement, and water correctly called Portland cement concrete. The wet mixture is placed in a form or trench and dries to a hard material.

Control points—Natural, recognizable features on the site or a series of survey stakes used to establish distances and elevations during trail construction.

Countersinking—Drilling a wide, shallow hole in a piece of wood for a washer and nut or for the head of a bolt or screw. Countersinking allows the hardware to be recessed below the surface of the wood. Countersinking reduces the amount of treated wood and will accelerate decay if the hole is exposed to moisture.

Course—A single layer of building material of a uniform height. The material is placed one layer (or course) at a time on top of another layer (or course). Materials laid in courses include bricks, concrete blocks, timbers, and logs.

Crook—A defect in a log caused by a crooked tree.

Cross slope or cross pitch—The amount a surface slopes, measured perpendicular to the centerline of a road or trail.

Crown—The branches, twigs, and leaves of a tree. Also a paved surface that is higher in the center than at the edges.

Cupped, cupping—A board or plank whose edges are higher or lower than the center. Cupping is often found in decks, where the board edges are higher than the middle. Water, trapped in the cupped area, accelerates decay.
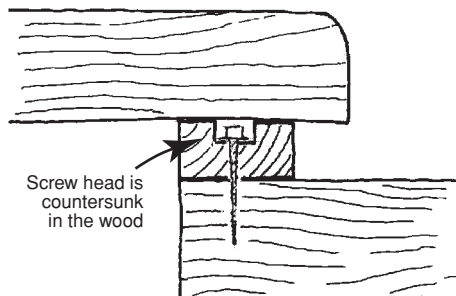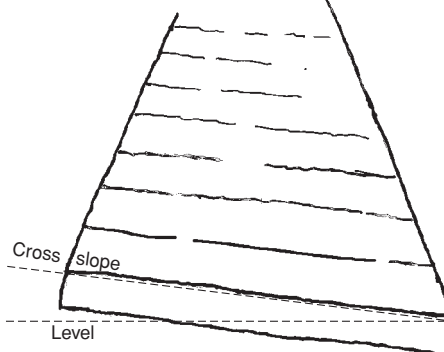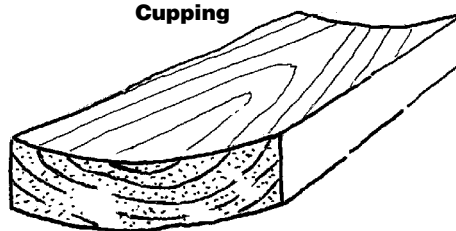
Curb—A wood, concrete, or stone trail component that rests on the ground or on the trail tread, rising 2 to 8 inches above the trail tread.

Dap—A shallow hole or slot drilled or routed in a piece of wood. A dap is usually drilled to fit over a piece of hardware (a nut, the head of a bolt, or a portion of a steel plate or angle) that is connected to an adjacent piece of wood.

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Dap

Space notched in upper board
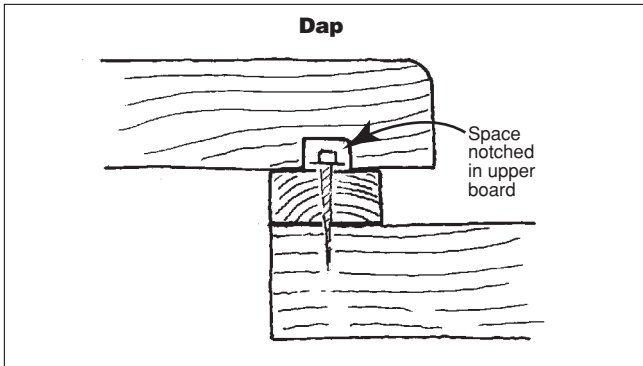
Deadman—A log or logs, heavy timber or timbers, a large block of concrete, a large boulder, or combination of the above that is partially or completely buried. Eyebolts placed in deadmen are used to anchor cables. Log or timber dead-men (without eyebolts) are used in log or timber retaining walls. They are placed perpendicular to the face of the wall, extending into the earth behind it to prevent the wall from falling over.

Deadmen

Concrete deadman

Timber deadman
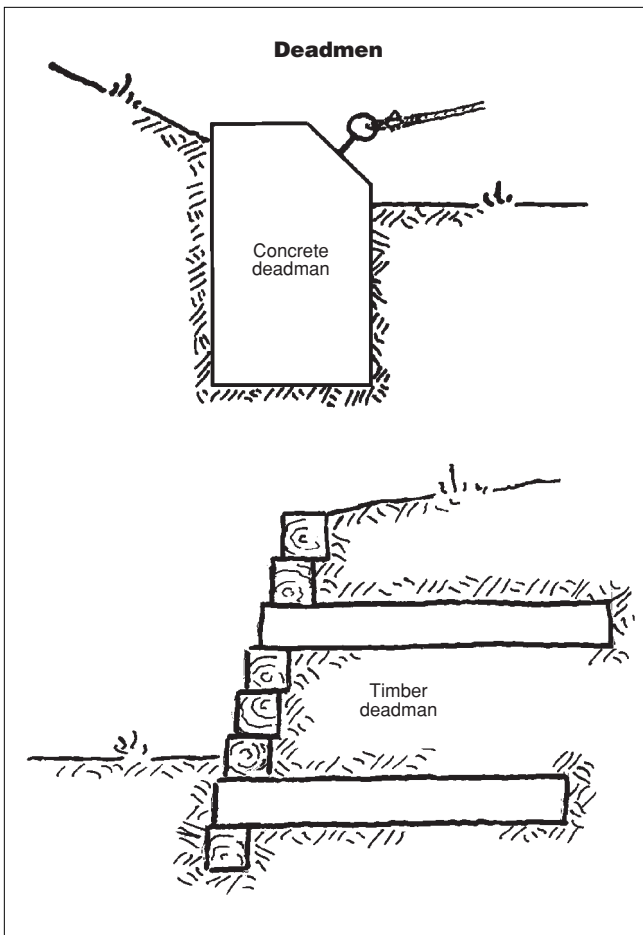
Destination trail—A trail route that starts at a trailhead and ends at a point of interest, the destination. The trail user returns by the same route.

Driftpin—A piece of 12- to 30-inch rebar or steel pipe used to keep logs and timbers in place.

Fisherman's knot—A knot used to tie a rope sling for moving logs and timbers. A single length of rope is tied into a loop using two overhand knots tied in each end of the rope and around the opposite end.

Footing—The part of a structural foundation that rests on the ground, spreading the weight of the structure and supporting the structure above. Footings are usually concrete. At remote sites the footings may also be mortared stone masonry.

Footing

Footing
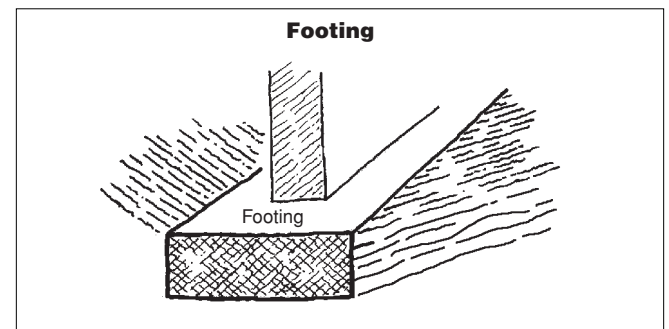
Froe—An old handtool used originally for splitting shingles and shakes. The froe consists of a heavy, 12-inch-long, straight steel blade with a wooden handle. The cutting edge of the blade is placed against the wood to be cut and a club or mallet is used to hit the face.

Froe
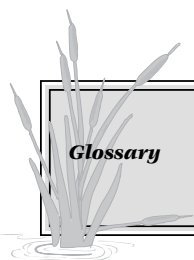
Frostline—The maximum depth that frost can be expected to penetrate into the ground.

Glulaminated—A process used to fabricate long beams from short lengths of 2 by 4, or 2 by 6, or 2 by 10 lumber. The pieces are placed flat on top of each other with glue spread between them. Lengths are varied so that transverse joints in each layer are not opposite one another. Pressure binds the pieces together. The assembly may be two to four times longer than the longest individual piece of lumber within it.

Grade—The rate of climb or descent along the centerline of a trail. It is described as a percentage and expressed as the number of units of climb or descent per 100 units of horizontal distance. A +5-percent grade rises 5 feet in 100 feet, or 5 meters in 100 meters. A -2-percent grade descends 2 feet per 100 feet (or 2 meters per 100 meters). The plus symbol indicates climb. The minus symbol indicates descent.

Groundwater—Water contained in the soil a few inches to several feet below the surface of the ground. In wetlands, the depth to groundwater is often higher in winter and spring and lower in summer and fall.

Guardrail—A railing at the edge of a deck to prevent people from falling. A guardrail should be 36 to 42 inches above the deck.

Handrail—A railing along a stairway to help people avoid falling down the stairs. A handrail should be 32 to 35 inches above the stairs.

Hardwood/softwood—Inaccurate logger's terms that have nothing to do with how hard or soft the wood is. By the logger's definition, hardwoods are deciduous trees with broad leaves and softwoods are conifers with needles. Aspen and red maple are "hardwoods," but their wood is soft; Douglas-fir and Atlantic white cedar are "softwoods," but their wood is hard. Some hardwoods, such as live oak and southern magnolia, keep their leaves through the winter. Some "softwoods," such as larch and baldcypress in the northern portion of its range, lose their needles in the fall.

Heartwood—The oldest wood of a tree, extending from the center of a log to the sapwood. The heartwood is the densest, strongest, and darkest wood in a log.

Helical pile—A solid steel shaft $1\frac{1}{2}$ to $2\frac{1}{2}$ inches square with a series of steel helixes welded to the shaft. The helixes are similar to threads on a bolt or the threads on a powered earth auger. The smallest helical piles or screw piles are 6 inches in diameter and 30 inches long. A machine screws them into the ground.

Heartwood
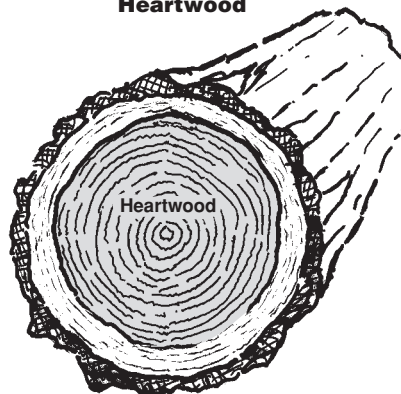
Hewing—Using an ax or adz to cut a log so that its cross section is a square or rectangular.

Hummocky—Wetland terrain containing hummocks, ridges, and small mounds of earth 2 to 4 feet higher than the surrounding area.

Invert—The bottom surface of a pipe, ditch, or culvert over which water flows.

Invert
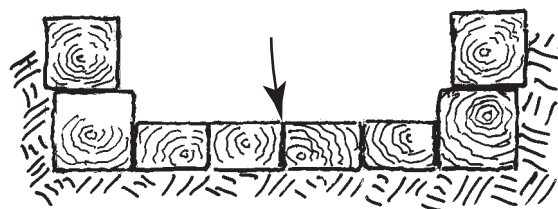
Joist—Usually a wooden 2 by 6, 2 by 8, 2 by 10, or 2 by 12, with the 2-inch dimension resting on a sleeper (sill) or ledger, toenailed into place, supporting a floor or deck.

Joist hanger—A steel angle or strap nailed to the side of a ledger and shaped to hold a joist. If a top flange hanger or face mount hanger is installed, the joist is placed within the hanger and the two are nailed together.

Ledger—A horizontal piece of wood attached to, and supported by, piles or concrete or stone masonry piers. The ledgers support stringers or tread timbers.

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Top flange hanger

Log dogs

18 to 30 inches

A smaller log dog that is easier to pack.
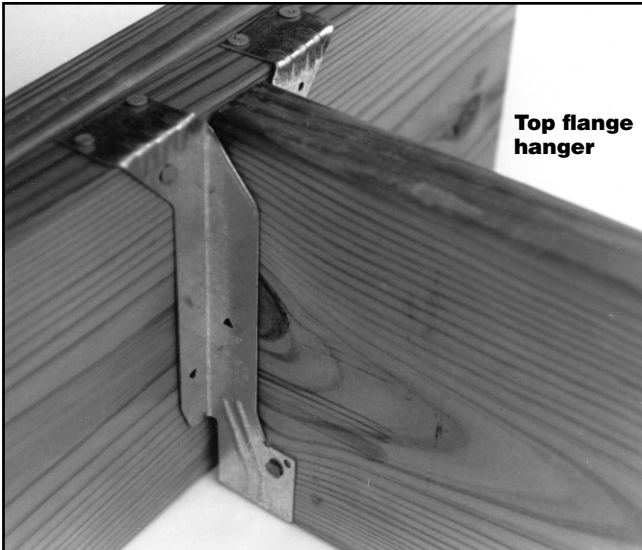
Log dogs—The first type of log dog is a broad U-shaped steel bar 18 to 30 inches wide, with pointed ends, which is used to temporarily hold two logs at right angles to each other.

The second type of log dog is smaller and easier to pack. It consists of a 6-inch to 12-inch-long steel plate that is 2 to 3 inches wide and pointed at each end. A second steel plate (3 to 6 inches long, identical width, pointed at one end and straight on the other) is welded across the center of the first to form a T.

Loop trail—A trail route that forms a closed circuit connecting a number of points of interest. The trail returns to the trailhead where it began but the trail user does not cover the same route twice.

Lumber—As used in this text, wood that has been sawed into a square or rectangular cross section that is 2 inches thick or less.

Moraine—Moraines are made of debris deposited by glaciers. The most common moraines are end (or terminal) moraines and lateral (or slide) moraines. Rock that the glacier has broken out of the valley is deposited in the moraines. Rock in moraines has been broken up and ground into boulders and various sizes of gravel and sand.

Mortar—A mixture of sand, lime, Portland cement, and water. Mortar is used in masonry construction to bind bricks, concrete blocks, or stone to form structural elements such as retaining walls and piers. Mortar may also be used when constructing riprap.

Nailer—A strip of wood attached to a stringer that tread planks are nailed or screwed to.

Nailer

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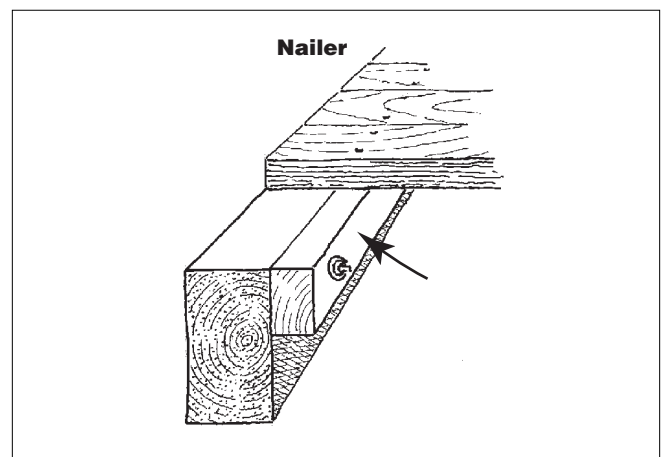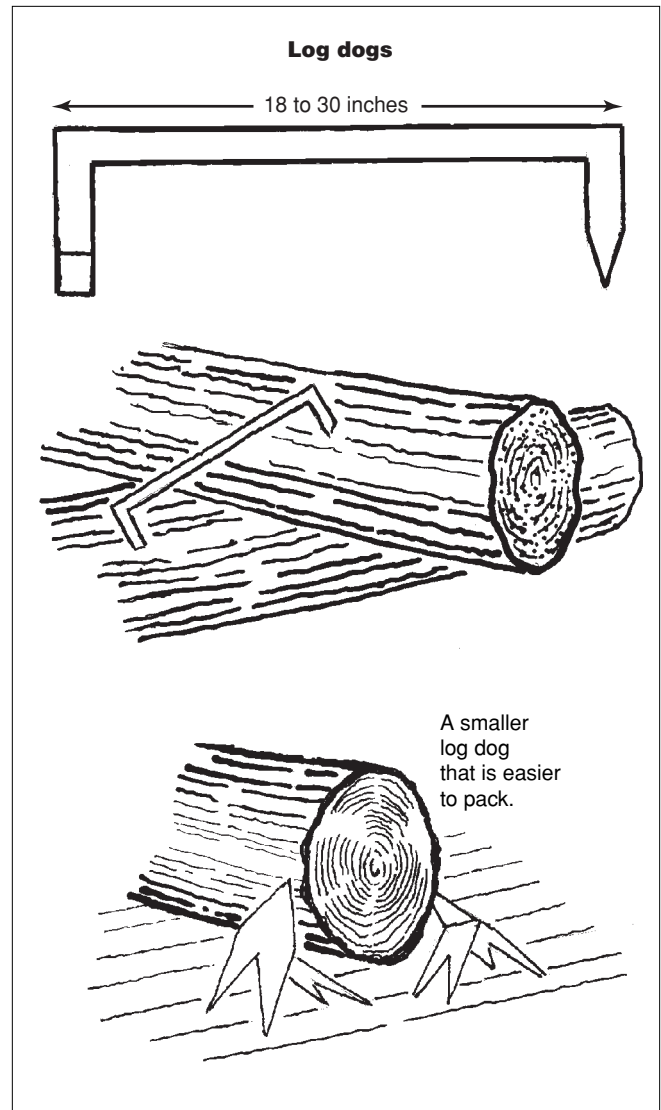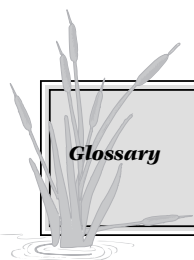
Peen—To strike a piece of metal with a hammer, denting the surface, or mashing the threads of a bolt after installing a nut, to prevent the nut from being removed.

Pier—Piers are used to support one or both ends of a beam or stringer. Piers may be timber or log cribbing or piles, helical piles, stone masonry, or concrete.

Piers

Piers
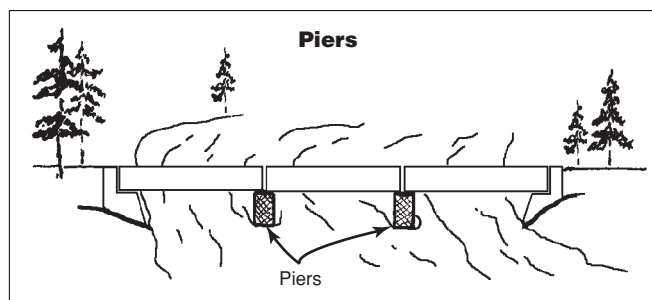
Pile—For wetland construction piles may be wooden logs, poles, or timbers, steel helixes, or concrete that is cast in place. A pile is usually no more than 12 inches in diameter. The pile is either placed in a hole dug to the depth required (end bearing pile), driven with a heavy weight (friction pile), or screwed into the ground by a machine (helical pile).

Pilot hole—A small hole drilled in wood or steel to guide a nail, screw, or drill bit.

Pinning—Driving driftpins through a log or timber into a log or timber, or into the ground.

Plank—A 2 by 4, 2 by 6, 2 by 8, 3 by 6, or wider board or timber. In wetland construction, planks are usually used as a walking surface or tread.

Plumb—A line or plane perpendicular to the Earth's surface.

Ponding—Water that has accumulated in a low area.

Portland cement—A gray powder made from limestone that is mixed with sand and water to make mortar, or mixed with sand, small stones or gravel, and water to make Portland cement concrete. In this text Portland cement concrete is referred to as concrete.

Puncheon—Short-span footbridges or a series of short-span footbridges supported by sleepers.

Riprap—Stones placed to prevent fast water from scouring and eroding a surface. Large stones (12 by 12 by 6 inches or larger) are hand placed on a setting bed of either aggregate or mortar. With an aggregate setting bed, adjacent stones

are butted tightly together. Because of the irregularity of the stones, spalls are used to prevent them from moving. If the stones are placed on a mortared setting bed, the stones may be ½ to 3 inches apart.

Rod sounding—Driving a steel rod or pipe into the ground to determine the location of firm soil or rock.

Saddle notch—A half-circle notch cut in the bottom of a log to fit over a log in the course below.

Saddle notch
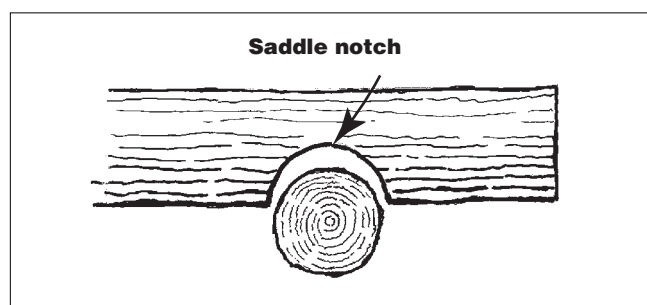
Sapwood—Wood just under the bark of a tree. Sapwood is only a few years old. This wood is usually a light color and not as strong or as dense as the heartwood.

Sapwood
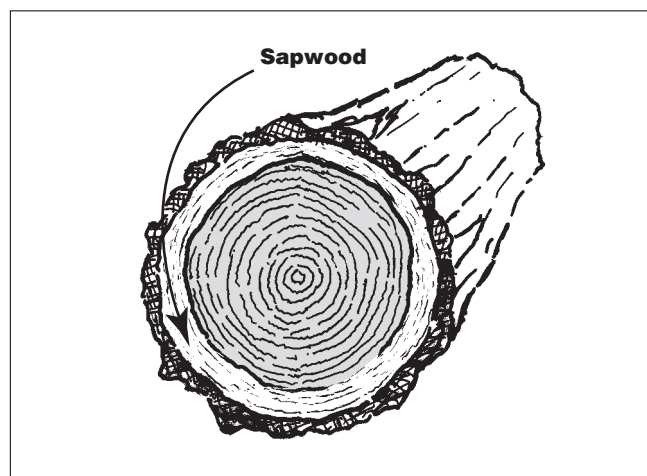
Square notch—A notch cut in a log to fit snugly against a square notch cut in another log, the square cut end of another log, or a plank. The portion of the notch in contact with the other log is cut as a flat, uniform plane. The end or ends of the square notch are perpendicular to the flat plane.

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Square notches
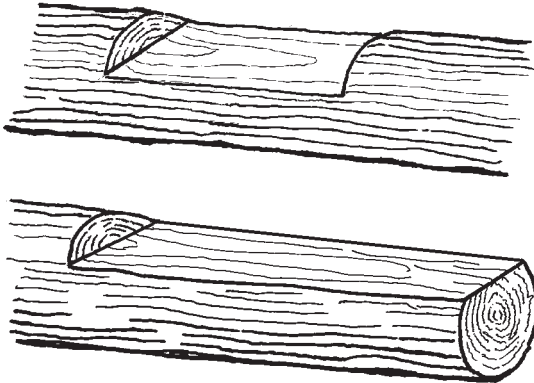
Setting bed—A layer of aggregate (either crushed stone or crushed gravel), or mason's sand, mortar placed on solid rock, or a compacted subgrade of existing ground or fill. Depending on the setting bed, material, and subsurface conditions, the setting bed may be from 4 to 12 inches deep.

Shim—A short, thin piece of wood, usually oak or redcedar, used between two pieces of wood or between a piece of wood and steel, earth, or rock. The shim is used to bring a ledger, stringer, or tread to level.

Slackwater—Floodwater with little or no velocity. Slackwater is formed when water in creeks, streams, and rivers backs up into low terrain, creating a temporary ponding condition.

Sleeper ß—A horizontal log or timber laid in a shallow trench to support a plank or logs.

Slope measurements—Measurements taken on the ground or parallel with the slope of the ground. Slope measurements provide a true indication of the quantities of materials needed for construction. Maps and construction drawings for roads and utility lines are measured horizontally. Measurements taken electronically are also measured horizontally. Slope measurements can sometimes be as much as 10 percent greater than horizontal measurements.

Sonotubes—Hollow cardboard cylinders used for forming round concrete columns. The sonotube is removed after the concrete sets.

Spalls—Small angular pieces of hard, durable stone. Spalls are wedged between stones that have been placed without mortar. Spalls have a function similar to that of shims used in wood construction.

Stringer—One of two or more beams placed parallel with the centerline of the tread that supports the tread plank.

Tamping—Using a narrow machine compactor, a tamping bar, the handle of a shovel, or other tool to compact earth backfill around a post, pole, or pile.

Test boring—A deep, narrow hole drilled into the ground with a power auger. A record is kept of the types of soils encountered and their depth. Test borings are usually done by geotechnical engineers (see test holes).

Test holes—Frequently, soil information does not require the sophistication and accuracy of test borings. A test hole can be dug by hand, or it can be dug with a backhoe. Test holes are wider than test borings, allowing the soil strata on the sides of the hole to be easily seen. Test holes can be no deeper than the equipment can easily and safely dig. The information provided by test holes is usually sufficient to determine construction techniques needed for wetland trails in areas where there is no previous wetland construction experience. It is simpler and cheaper to dig test holes than it is to drill test borings.

Timber—As used in this text, wood that has been sawed or hewed into a square or rectangular cross section that is at least 3 inches thick.

Toenail—Joining two pieces of wood by driving nails at an angle to the surface of one piece and into the second piece.

Toenailing
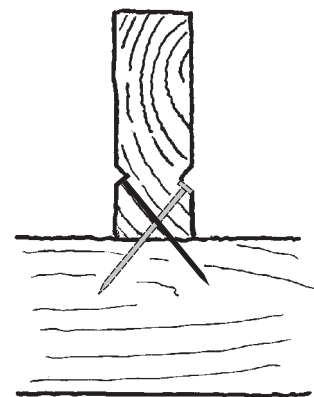
Tread—The walking surface of a trail. Applied to wetland trails constructed of wood, tread refers to the portion of the timber, log, or plank that the user steps on.

Twist—A defect in lumber and timber caused by a tree growing with a twisted grain. The result is a piece of lumber or timber with surfaces at one end that are not in the same plane as the surfaces at the other end. Occasionally, usable short
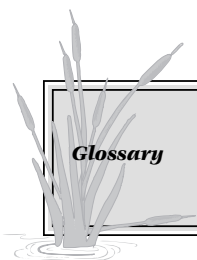
lengths with little twist can be cut from the original piece. More commonly, the original piece is useless.

Water table—The level below the ground surface where groundwater will fill a test hole.

Twist

Water table

Wane—A defect in a piece of lumber or timber, caused by bark that was not removed or a beveled edge.

Waney edge—A term used at the sawmill to describe a board, plank, or timber of nonuniform width when one or two edges contain bark or irregular sapwood just below the bark. A waney edge is considered a defect, but the board or plank may be suitable for rustic construction.

Weir—A depressed channel in a dam providing an outlet for the overflow water in a pond when the water level exceeds a desired height. Weirs are usually concrete or timber, or a combination of the two.

Waney edge

Weir

Warp—Severe bend in a piece of lumber or timber making it unusable in its original length. Sometimes the warp occurs mostly at one point, usually a knot, and short usable pieces can be cut on either side of that point.
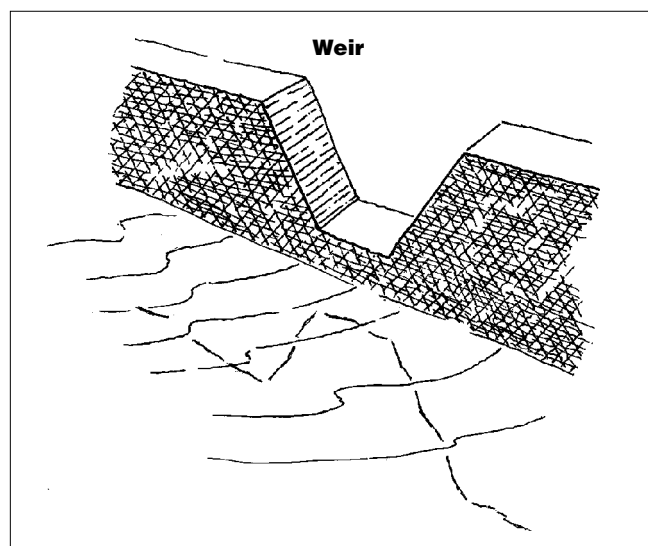
Wetland indicator plants—Various species of plants that are tolerant of wet soils. When many specimens of these species are present at a site, they indicate a wetland environment.

Warp

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References

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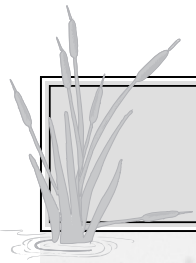
Notes

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Brian Vachowski has been a project and program leader at the Missoula Technology and Development Center since 1993. He received a bachelor's degree in forestry from the University of Massachusetts and a master's degree in outdoor recreation from Utah State University. He has worked for the Nez Perce, Bighorn, Winema, and Routt National Forests in recreation, wilderness, lands, planning, rural community assistance, special uses, fire, and timber positions.

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RECREATION

Geosynthetics for Trails in Wet Areas (2000 edition)

Geosynthetics for Trails in Wet Areas

2000 Edition

Geosynthetics for Trails in Wet Areas

2000 Edition

Steve Monlux
Geotechnical Engineer, Northern Region

Brian Vachowski
Project Leader

**Technology and Development Program
Missoula, Montana**

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August 2000

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Acknowledgments

Introduction

Trails in soft, water-saturated soils present special challenges to trail managers. Muddy trails are anathema to livestock and hikers, which tend to skirt the edges of mud holes. This increases the area of damage to sensitive soils. Incorrectly constructed trails in wet areas lead to soil compaction, sedimentation, multiple trails, and unhappy trail users. Traditional trail construction methods for wet areas include turnpike or puncheon. These have worked well where rock or wood materials are readily available. However, geosynthetics can increase the effectiveness of construction methods and offer additional alternatives.

Geosynthetics are synthetic materials (usually made from hydrocarbons) that are used with soil or rock in many types of construction. Their use has grown significantly in road construction over the past 20 years, and in trail construction for the past 10 years.

Guidelines on how to use geosynthetics in trail construction have not been readily available to trail managers. The information presented here applies some roads technology to trail design and construction in five categories:

❖ General information on geosynthetic products.

❖ Basic geosynthetic design and utilization concepts.

❖ Specific design diagrams for trail construction over wet saturated soils.

❖ A list of product manufacturers, price ranges, and physical properties.

❖ Identification of unsuitable tread fill materials.

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Section 1: Geosynthetics—General Information

Geosynthetics perform three major functions: ***separation***, ***reinforcement***, and ***drainage***. Geosynthetic materials include geotextiles (construction fabrics), geonets, sheet drains, geogrids, and geocells. All these materials become a permanent part of the trail, but must be covered with soil or rock to prevent early deterioration by ultraviolet light. *TrailMaster,* a proprietary product, is also discussed. *TrailMaster* can be used as trail tread, and is placed directly over wet areas. Since all these products are synthetic, their use in wilderness should be reviewed and approved prior to use.

Figure 1—Geotextiles. Felt-like products are easier to work with than heat bonded, slit film, or woven products that have a slick surface texture. They are easier to cut and their flexibility makes them easier to place on curved trail sections.

Geotextiles

Geotextiles (Figure 1) are the most widely used geosynthetic. Geotextiles are often called construction fabrics. They are constructed from long lasting synthetic fibers that are bonded to form a *fabric* held together by weaving, heat bonding, or other means. They are primarily used for ***separation*** and ***reinforcement*** over wet unstable soils. They have the ability to support loads through tensile strength and can allow water, but not soil, to seep through. They can also be used in drainage applications where water flow is much greater than normally exists in wet areas. The physical requirements listed for all geotextiles in Section 4 are stringent enough so the products will also work for properly designed high-flow drainage applications. These representative products are low cost, readily available, and easy to use. There are many other products on the market.

Figure 2—The net-like core of geonet allows sideways drainage that is normally adequate for the amount of seepage found under trails in wet areas.

Geonets

Geonets or geonet composites (Figure 2) have a thin polyethylene drainage core that is covered on both sides with geotextile. They are used for all three functions—***separation***, ***reinforcement***, and ***drainage***. Since geonets have a core plus two layers of geotextile, they provide more reinforcement than a single layer of geotextile.

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Sheet Drains

Sheet drains (Figure 3) are another form of composite made with a drainage core and one or two layers of geotextile. The core is usually made of a polyethylene sheet that is formed into an egg-crate shape. The core provides an impermeable barrier unless perforated by the manufacturer. Perforated cores are always covered with geotextile on both sides to prevent soil clogging the drainage passages. Geotextile is bonded to one or both sides of the core to provide filtration and separation. When used under the trail tread material, sheet drains provide **separation, reinforcement,** and **drainage**. Since they have greater bending strength than geotextiles or geonets, less tread fill is often needed. They can also be used vertically in covered trenches beside the trail to drain off subsurface water.
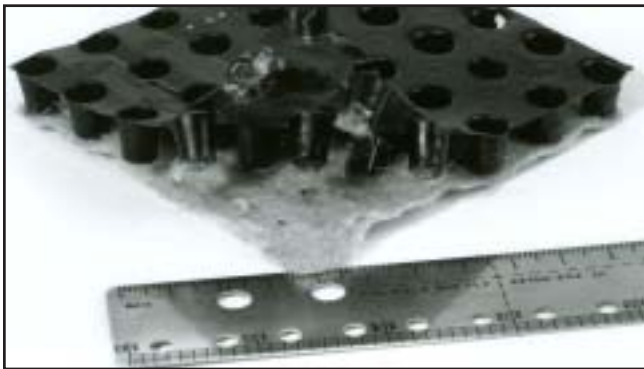
Figure 3—Sheet drains have a large cross-section that provides significant drainage capacity. If placed under the trail tread, orient the sheet drain with the geotextile side on the bottom and the plastic core on top. This orientation reduces the amount of fill needed.

Geogrids

Geogrids (Figure 4) are made from polyethylene sheeting that is formed into very open grid-like configurations. Geogrids are good for **reinforcement** because they have high tensile strengths, and coarse aggregate can interlock into the grid structure.
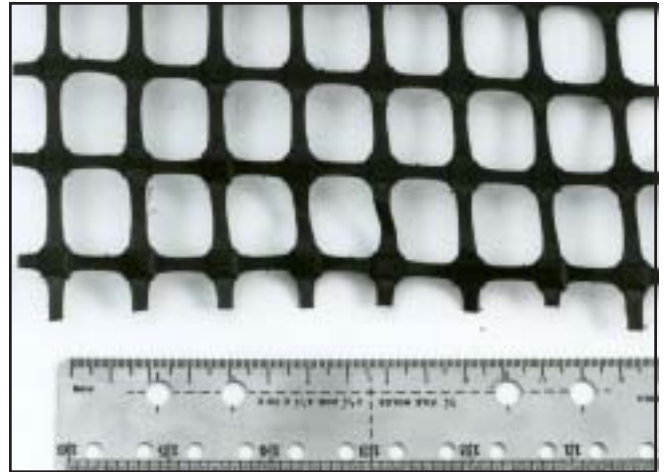
Figure 4—Geogrids are normally placed on top of a layer of geotextile to obtain separation from saturated soils in wet areas.

Geocells

Geocells (Figure 5) are usually made from polyethylene strips from 50 to 200 millimeters (2 to 8 inches) high that are bonded at intermediate points to form a honeycomb structure. The product is shipped in a collapsed and compact form. During installation, the material is pulled open and the honey-comb structure is staked to the ground surface. Each of the cells is filled with select backfill and compacted. Compacting trail tread material within the cell increases the bending strength of the layer, which reduces settlement into soft saturated soils. Geocells are good for **reinforcement** and reduce the amount of fill material required.

Figure 5—Geocell usually has geotextile under it to provide separation from wet saturated soils.

Proprietary Products

TrailMaster (Figure 6) is made from 3-millimeter (⅛-inch) thick polypropylene that has 13-millimeter (½-inch) diameter extruded holes about 32 millimeters (1¼ inches) on center. The extrusions extend 16 millimeters (⅛ inch) below the top of the sheet. This product was originally marketed under the *Gripmaster* name and weighs about 2.8 kilograms per square meter (0.57 pounds per square foot). Bending strength is high enough to distribute loads from pack animals over a large enough area so that the material essentially floats on top of saturated soils. *TrailMaster* is excellent for **reinforcement** because no fill material is required.
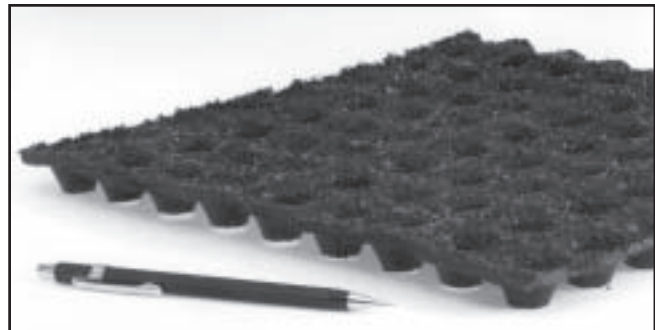
Figure 6—*TrailMaster* is a very stiff material, but it can be rolled up for relatively easy transport.

Section 2: Basic Geosynthetic Design and Utilization Concepts for Trail Construction in Wet Areas

Geosynthetics provide a stable trail surface in wet areas. Unstable trail surfaces are usually caused by saturation from subsurface moisture and precipitation. Geosynthetics assist in obtaining stable surfaces by providing:

❖ **Separation**—Geotextiles, geonets, and sheet drains keep saturated, weak native soils from contaminating stronger, load-bearing trail surface materials. They allow water, but not soil, to pass through.

❖ **Drainage**—Geotextiles, geonets, and sheet drains improve subsurface drainage to avoid saturation and weakening of the trail tread.

❖ **Reinforcement and Load Distribution**—All geosynthetics discussed in this paper provide some degree of tread reinforcement and load distribution. This decreases the amount of imported fill material required. *TrailMaster* provides enough load distribution so it can be placed directly on the saturated soil and also serves as the trail tread with no additional fill needed.

Geosynthetics are relatively simple to use. Products that meet the physical requirements discussed in Section 4 are tough enough to be placed over small stumps that stick up from the ground surface after brushing. Cutting stumps and brush to within a few inches from the ground is usually all that is necessary. Where joints occur in geotextiles, geonets, or geogrids, the overlap should normally be at least 300 millimeters (12 inches). Pins or clips are used at joints for the other products. All geosynthetics must be stored in shipping wrappers until installation since they will gradually deteriorate when exposed to ultraviolet light.

Selecting good tread fill material is very important. Organic, silt, or clay soils should not be used as tread fill since they become muddy during wet weather. Use firm mineral soil, coarse-grained soils, granular material, or small well-graded angular rock instead. Soil from wet areas is normally not suitable for use as tread fill. Unsuitable organic soils are easily identified by a dark color and musty odor when damp. Many soils containing clays and silts are just as unstable, but identification is more difficult. Avoiding unsuitable tread fill is very important because poor materials will fail when wet and costs for excavation and haul are high. Poor materials can be identified in the field by several methods discussed in Section 5.

How much acceptable tread fill material you need over the geosynthetic selected depends on several site-specific factors:

FACTORS AFFECTING TREAD THICKNESS NEEDED	MAXIMUM THICKNESS	MINIMUM THICKNESS
Trail fill quality	Mineral soil with little rock, less than 20-percent silt or clay	Granular, free-draining materials
Trail tread surface	Horse or motorcycle	Foot traffic
Tread surface moisture content during traffic	Predominantly high	Predominantly low
Amount of foundation settlement	Continuously wet areas over 2 feet deep	Intermittent soft, wet areas under 2 feet deep
Geosynthetic alternative selected	Single layer of geotextile (Figure 1)	Geotextile with logs (Figure 9) Geocell, (Figure 13)
Trail surface crown maintenance	Less than annual	Annual

In addition to the nine applications illustrated in Section 3, other combinations are possible and perhaps preferable, depending on mud hole conditions and natural building materials available. Once you understand the design/utilization concepts and product capabilities, try different applications.

Section 3: Specific Design Applications

ost all of the techniques shown can be integrated into standard trail turnpike construction specifications. To simplify the illustrations, not all the components of a complete turnpike (ditches, curb rocks, or logs, etc.) are shown. For many trail locations through flat muddy sites, the traditional trail side ditch and long outlet ditch will not be necessary. Curb logs or rocks are still needed to confine tread fill except where tread fill materials are quite granular. Shoulders must be maintained to keep geosynthetics covered to protect them from ultraviolet light and traffic abrasion. The figures are simplified cutaway cross-sectional views of the trail. They normally look much better on paper than they do during construction.

Geosynthetics are usually placed directly on the natural ground without prior excavation. Many of the illustrations show the various applications with a sag in the native soil surface along the center of the trail alignment. This sag is caused by adding the weight of the tread fill. The actual amount of settlement is very site specific and depends on soil type, level of saturation, and weight of tread fill used. Less tread fill can be used over geosynthetic products that are rigid or have high bending strengths because the weight of fill is distributed over a larger area. Settlements are decreased when less fill is needed to obtain a stable tread surface. For example, much more tread fill is required for a single layer of geotextile (Figure 7), than for geocell with

geotextile (Figure 13). In this example, the cost of importing tread fill must be compared to the increased cost of the geocell.

All alternatives that use tread fill should have a crowned or outsloped surface to help shed water quickly and improve stability and control erosion and sediment. Additional tread fill may be necessary to rebuild the crown after initial settlement. More imported fill will be necessary to maintain the crown if tread wear is high. Alternatives are compared in Table 1.

Geotextile or Geonet

Single-layer geotextile or geonet (Figure 7) separates fill material from saturated soils and distributes fill weight so less settling takes place. Since geonets cost more, use them only where drainage and subsurface moisture conditions are worst. Avoid using organic, silt, or clay soils for trail tread material because little subsurface drainage will occur and the trail tread will become muddy in wet weather. Rocky soils or crushed aggregate should be used as a tread material if possible. These materials retain much of their strength

Table 1—Comparisons of geosynthetic alternatives.

Evaluation Criteria of Construction Objectives	Geosynthetic Application									
	Figure 7[1] Geotex	Figure 7[2] Geonet	Figure 8[3]	Figure 9[4]	Figure 10[5] Geotex	Figure 10[6] Geonet	Figure 11[7]	Figure 12[8]	Figure 13[9] Geocell	Figure 14[10]
Separation (keep tread fill separate from poor soils)	B	B	A	A	B	B	B	NA.	A	C
Reinforcement (turnpike over deep layer of very weak soil)	D	D	A	A	B	A	B	NA.	A	B
Reduce quantity of imported fill material	D	D	B	A	B	A	B	C	B	A
Eliminate trail side ditching	D	C	A	B	C	C	B	D	B	A
Ease of product placement	A	B	C	C	C	C	B	D	C	A
Low-cost geosynthetic	A	C	A	B	C	C	C	C	D	D
Cost for geosynthetics per square meter . . . . **per square yard . . . . .**	0.68 0.57	4.05 3.42	1.36 1.14	2.04 1.71	4.13 3.47	7.50 6.32	7.50 6.26	7.50 6.26	10.08 8.45	16.68 14.07
Weight of geosynthetics: **kilogram per square meter . . . .** **pound per square yard . . . .**	 0.14 0.25	 0.89 1.64	 0.28 0.50	 0.42 0.75	 0.32 0.60	 1.07 1.98	 2.3 4.25	 2.3 4.25	 1.9 3.45	 3.0 5.40
Alternative Rating Code: A = Best alternative; **B** = Better than most; **C** = Not as good as most; **D** = Least effective; **NA.** = Not applicable										

[1] Single layer of geotextile.
[2] Single layer of geonet.
[3] Geotextile with encapsulated free-draining rock. Rock can be large, single-size cobbles, down to relatively clean sands.
[4] Geotextile with poles, logs. Must have small trees onsite.
[5] Geogrid with geotextile.
[6] Geogrid with geonet.
[7] Sheet drains under tread fill.
[8] Sheet drains or geonets for drainage cutoff wall. Extensive ditching required.
[9] Geocell with geotextile and permeable tread. Granular fill material required; costs and weights are based on 100-mm-deep cells.
[10] *TrailMaster* with geotextile. Curb logs are required.

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when saturated. Excess surface moisture can drain off through these permeable materials if the trail is located on a grade or side slope.

Geotextile With Encapsulated Free-Draining Rock

(Sausage Technique, Figure 8). The geotextile provides separation from the saturated soil, and the rock provides drainage for excess water. Twenty-five-millimeter (1-inch)

flexible plastic pipe outlets for subsurface water may be desirable where trails are constructed on very flat terrain to avoid the "bath tub" effect. If the trail has grade or is built on a sideslope, other drainage options exist. The rock may be single-size material from pea gravel size to cobbles (75 to 300 millimeters or 3 to 12 inches), or it may be a mixture of rock materials that does not contain silt or clay. The free-draining rock can be placed to a thickness equal to the maximum size rock if only drainage is desired. If reinforcement is also needed, at least 75 millimeters (3 inches) of rock is recommended. The geotextile is wrapped over the rock layer with a 300-millimeter (12-inch) overlap to ensure encapsulation, since settlement of saturated soil can pull the overlap joint apart.
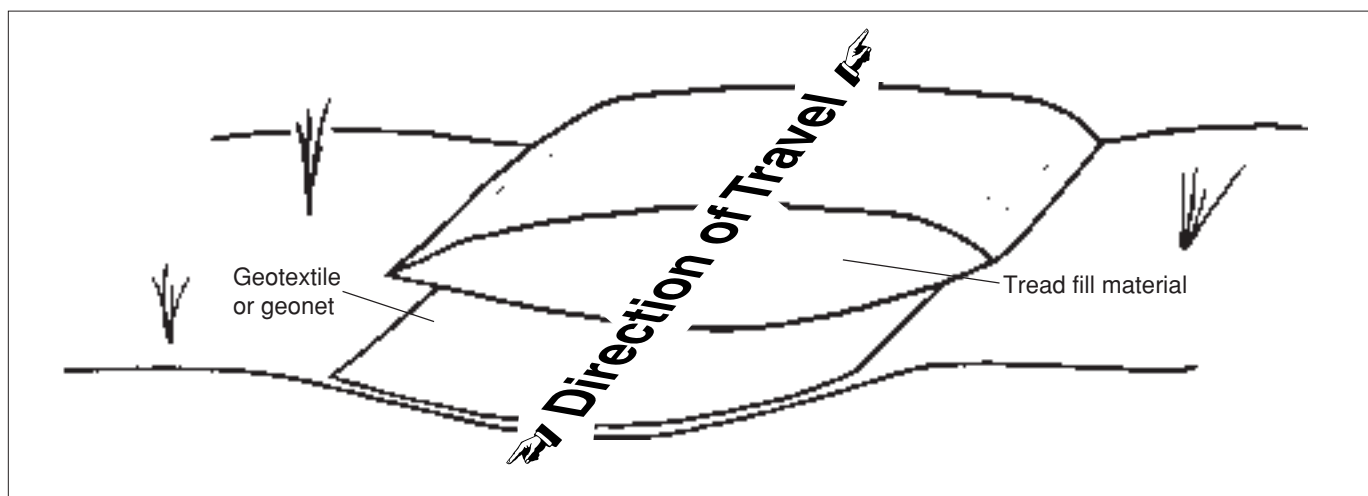
Figure 7—Typical placement of geotextile or geonet through flat, boggy areas. Side or lead-off ditches may not be needed.
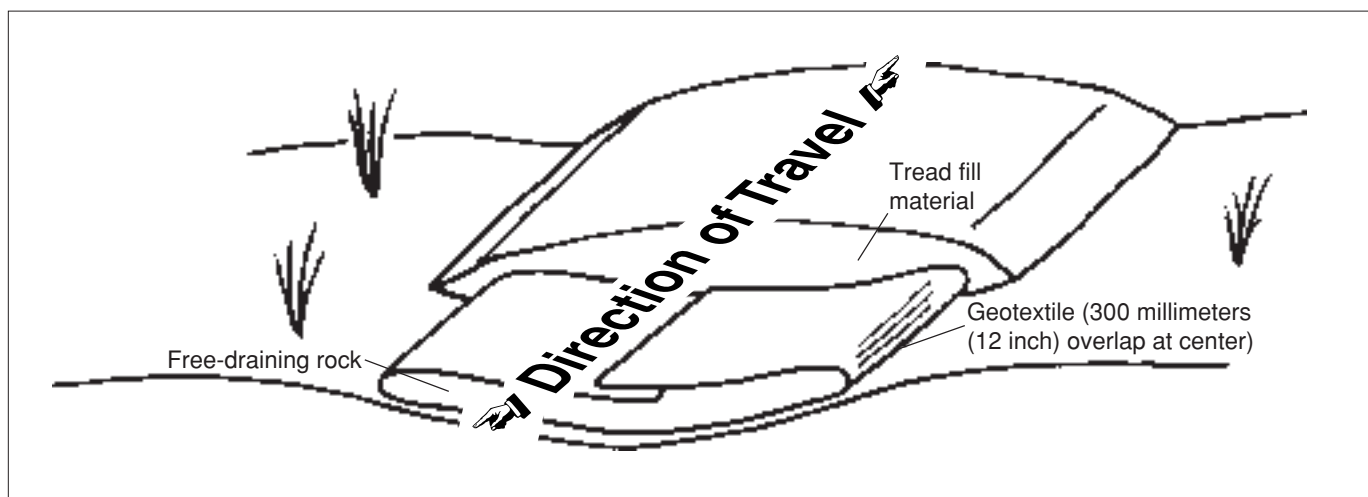
Figure 8—Encapsulation or "sausage" technique where native rock is used for drainage.

Geotextile With Poles or Logs

Figure 9 provides a system that requires less imported fill and resists being pushed down into soft saturated soils. No subsurface drainage is provided with this design, although longitudinal drainage may occur along the poles if the trail is on a grade. Another approach is to place interior logs perpendicular to the trail after cutting them to lengths equal to the trail width. This method does not utilize log bending strengths as effectively and is more labor intensive. An outlet pipe or daylight section would provide drainage where trails are on a grade or side slope.

Settling of saturated soil is minimal; the turnpike structure is light weight since it is primarily wood; the bending strength of wood distributes dead load (tread fill) and live loads (traffic); and wrapping trees together with geotextile distributes concentrated live loads.

This alternative is attractive for areas that have wood and not much rock for obtaining drainage. If the trail alignment is very swampy, this alternative has strong advantages because the flotation and bending strength of wood is utilized. Keeping wood continually wet or dry is necessary to control rotting. Otherwise the life of the structure will be cut to less

than half. A layer of geotextile placed down the centerline over the logs will help keep the wood saturated and also keep individual logs from coming up through the trail tread surface.

Geogrid With Geotextile or Geonet

Figure 10 shows geogrid placed on top of the geotextile or geonet adds bending strength to the system and decreases settling. This reduces the amount of fill material required. Very little drainage is required with this design, unless geonets are used or the tread material is permeable (rocky soils or crushed aggregate). The geogrid should be pulled taut to remove wrinkles before staking. The stakes and poles provide some pretension of the grid, to better utilize its strength. The geotextile or geonet provides separation from the saturated soil and keeps the drainage paths along the bottom of the fill material from clogging. See Section 913 of the *Standard Specifications for Construction of Trails* for additional information.
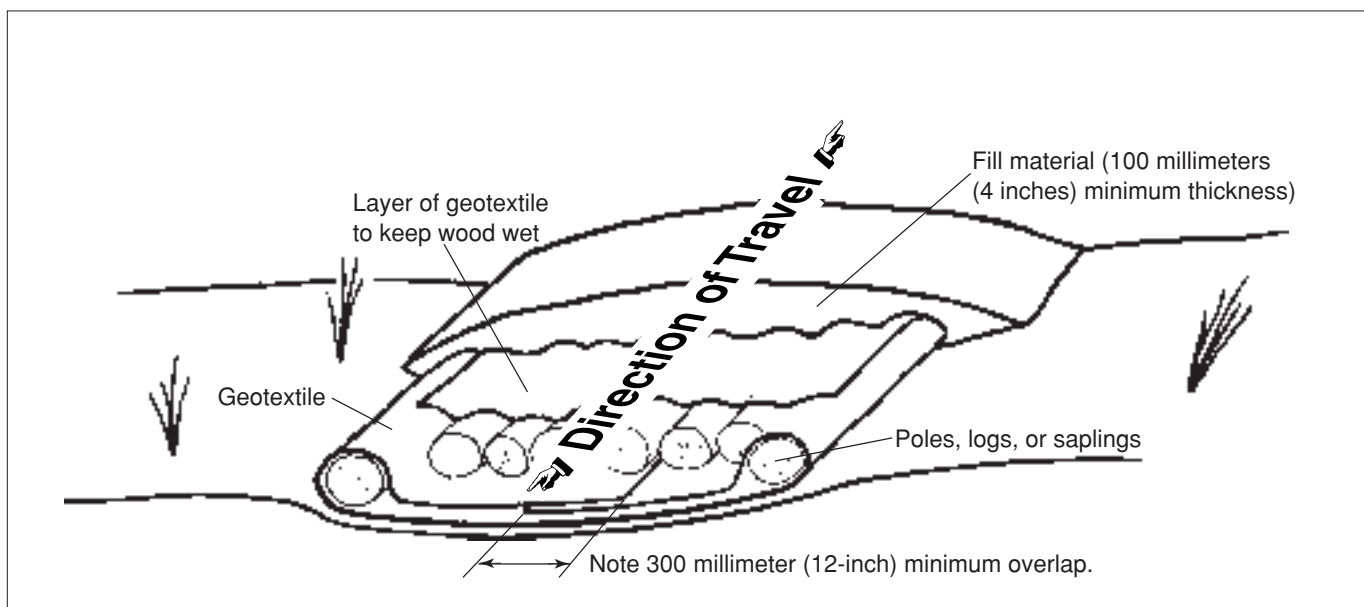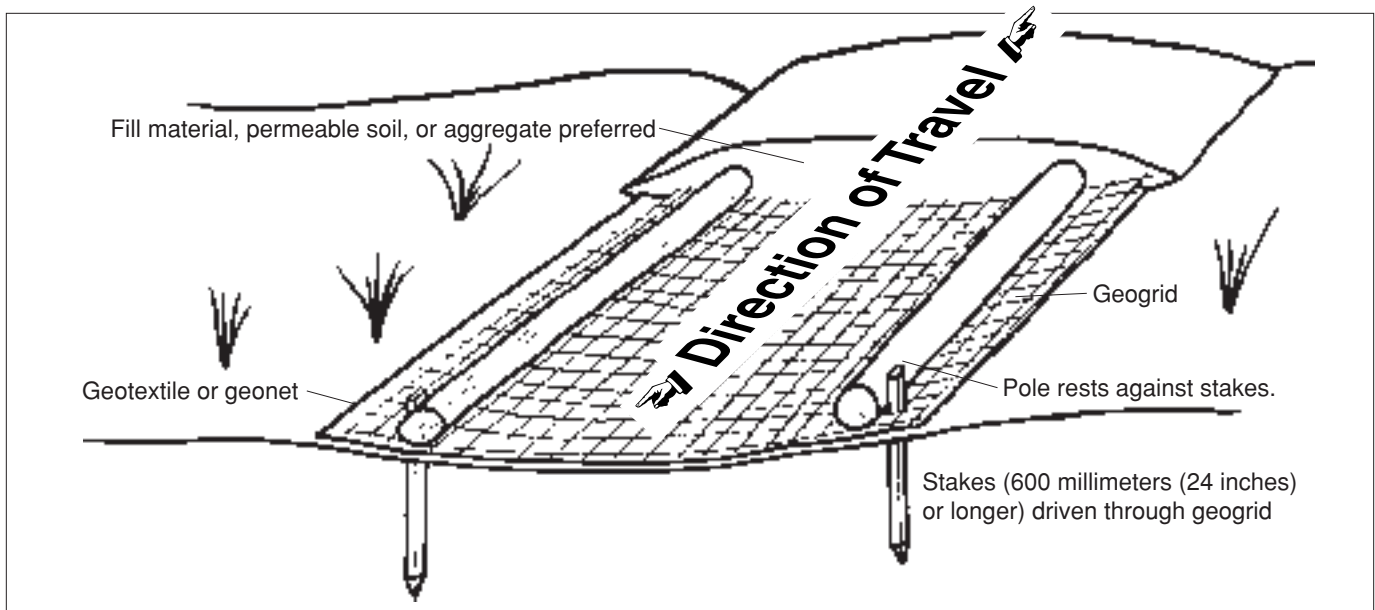

Figure 9—Poles or logs wrapped with geotextile.

Figure 10—Geogrid with geotextile or geonet.

Sheet Drains Under Tread Fill

Sheet drains under tread fill (Figure 11) provide separation from saturated soils and distribute the trail tread weight to limit settling. Install the product with the plastic core side facing up and the fabric side facing down. This orientation takes advantage of the plastic core compressive strength and the fabric's tensile strength, which will reduce the amount of settling and also the amount of tread fill required. Twenty-five-millimeter (1-inch) diameter flexible plastic pipe can be used as a drainage outlet to take full advantage of the drainage capability of the sheet drain. If the trail is on a grade or side slope, an outlet pipe or daylight section could provide drainage.
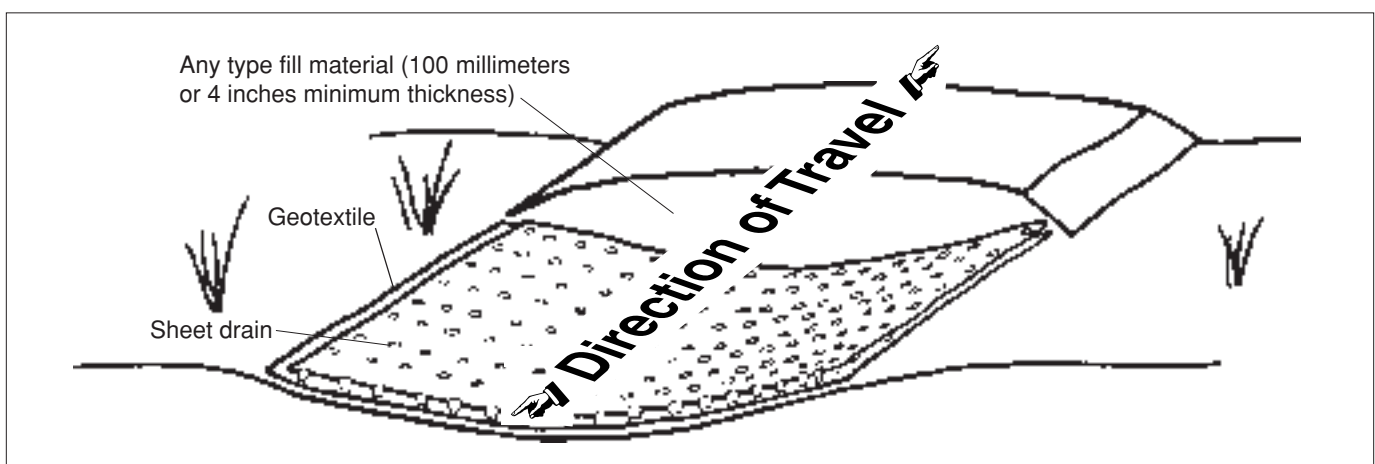
Figure 11—Sheet drain under fill material.

Sheet Drains or Geonets Used as Drainage Cutoff Walls

If the trail section is on a sideslope where subsurface water saturates the uphill side of the trail, a cutoff wall can be constructed to intercept surface and subsurface moisture (Figure 12) and help drain and stabilize the trail section. This application is especially beneficial where cutslope sloughing continually closes ditches. The sheet drain or geonet should be installed within 1 meter (3 feet) of the trail's edge. The proper depth of the collection pipe and location of the sheet drain can be determined by probing the saturated soil with a short length of Number 4 reinforcing steel. Collector and outlet pipes can be made from flexible plastic pipe. Keeping the top edge of the drain above the ground will capture surface runoff moving downslope. Cover the exposed material with large rocks to protect it from deterioration from ultraviolet light. The collector pipe can be drained into an outlet pipe or with a sheet drain or geonet panel under the trail section. This application requires ditching for proper interception and drainage of water. Ditching is normally more extensive on flatter terrain.

Geocell With Geotextile and Permeable Tread Material

The geocell provides confinement chambers that distribute the trail tread loads over a wider area and reduce settling (Figure 13). This works best in sandy soils, rocky soils, crushed aggregate, or free-draining rock. The net effect is to increase the load-bearing capacity of the tread and prevent feet and hooves from punching down into the trail. The geotextile provides separation between saturated soil and the tread fill. Somewhat less tread fill is required because settling is reduced. There is no subsurface drainage if the trail is on flat ground. If the trail has a grade or is built on a sideslope, drainage will occur through the permeable tread fill. Organic, silt, and clay soils are not desirable fill for geocells because these soils will likely remain saturated and unstable, and thus not strong enough to carry the loads placed on the trail. Geocell itself does not increase the load-bearing strength of clay or silt.
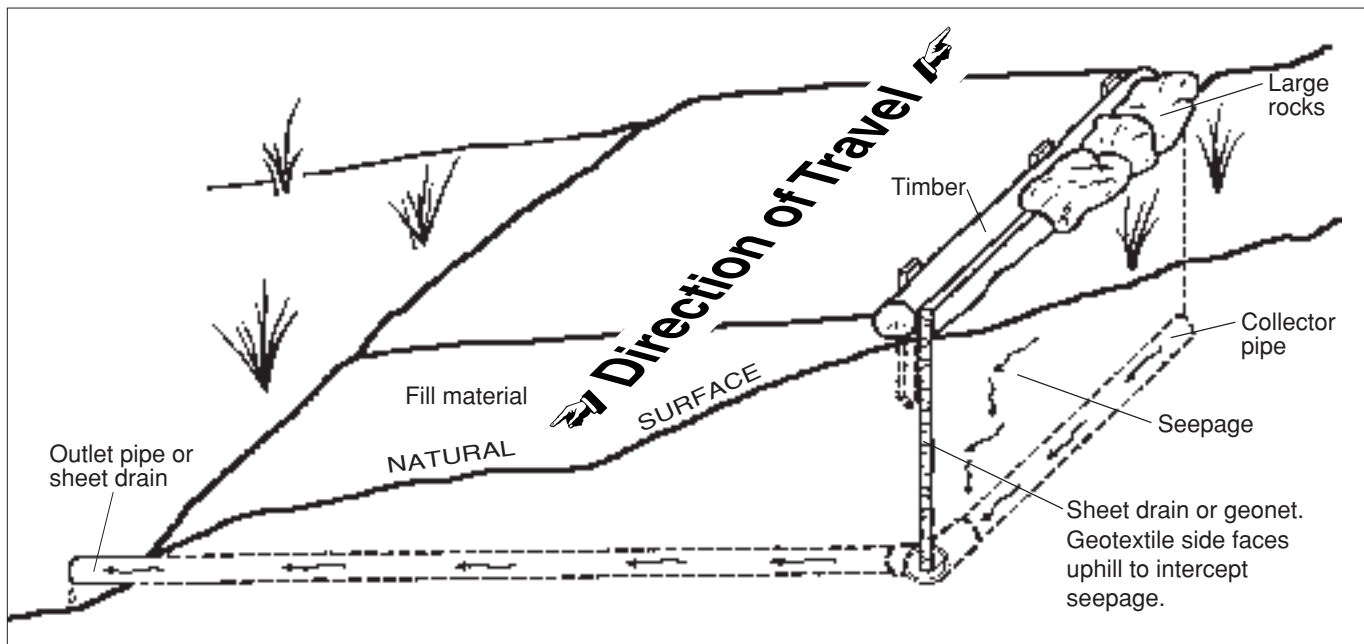

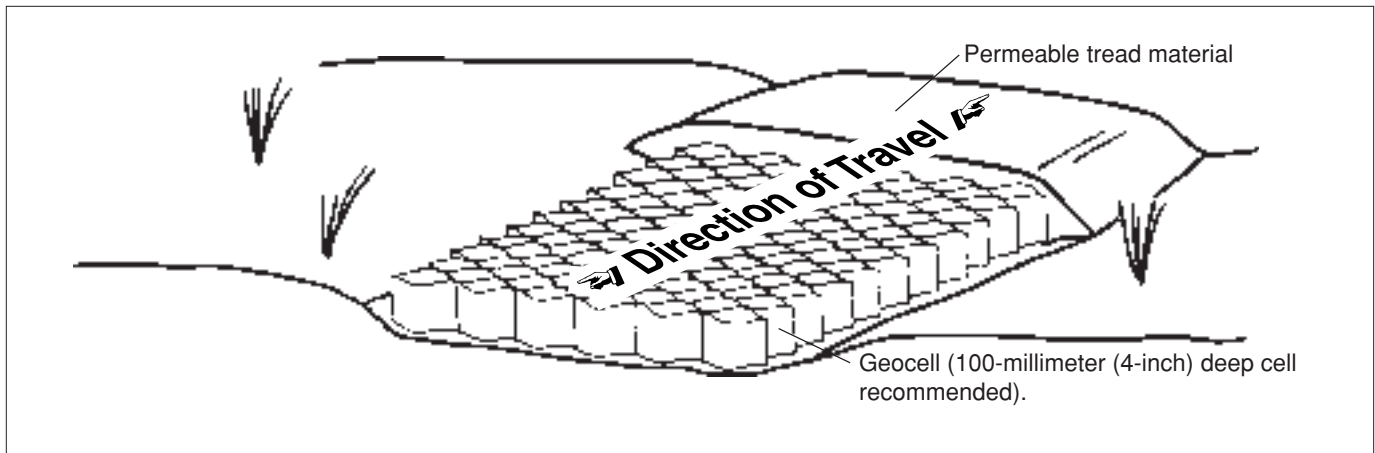Figure 12—Sheet drain or geonet used to intercept seepage.

Figure 13—Geocell with geotextile and permeable tread material.

TrailMaster With Geotextile

TrailMaster with geotextile (Figure 14) is made from 3-millimeter ($\frac{1}{8}$-inch) thick polypropylene with 16-millimeter ($\frac{5}{8}$-inch) diameter extruded holes about 32 millimeters ($1\frac{1}{4}$ inches) on center. This material is quite rigid, although it can be rolled up for easier transport. It is widely used in horse stalls to keep hooves dry.

It can be used without fill material since it has significant bending and tensile strength and is durable enough to resist abrasion from pack animals and even motorcycles. Since the material is used as the trail surface and grasses can grow through, it also resists erosion better than tread fill materials. The geotextile allows water, but not soil, to be pumped through the *TrailMaster*. The water collected on the surface can be removed by an outlet ditch at the lowest point on flat trail sections, or by using rolling dips or outsloping on other trails. Since the surfacing will deflect under the weight of stock, rebar with hooks on the upper ends must be used to anchor the geotextile and *TrailMaster* to the ground. Rebar staples are normally needed for transverse joints. The poles provide a curb to keep traffic on the surface and also help anchoring. Settling should be minimal since the weight of *TrailMaster* is only 2.8 kilograms per square meter (0.57 pounds per square foot). The high price of this product may be offset by not having to import fill for a turnpike section. It can be cut with a hand saw. Turns in the trail are normally cut on angles, which makes constructing winding trail alignments more difficult.

Before placing a large order, it's a good idea to obtain a sample for examination. This is a manufactured material and does not blend well with natural forest environments. Since installation is relatively quick, it may be especially useful as a temporary surface until a more aesthetically pleasing alternative is constructed.
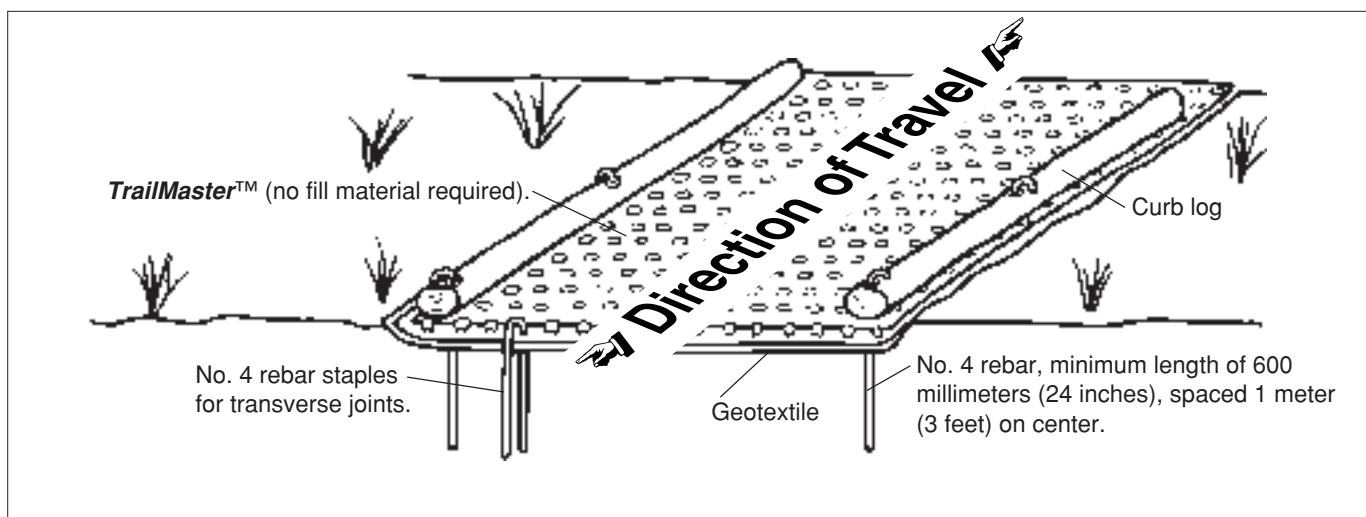
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Figure 14—*TrailMaster* with geotextile.

Section 4: Geosynthetic Product Information

General Notes

The listed manufacturers and products were obtained from the *Geotechnical Fabrics Report, 1995 Specifier's Guide*. The products listed meet the physical properties shown for each type of geosynthetic. These physical properties were selected to meet typical muddy trail construction conditions. These properties are on the "low end" of those available since trails applications are much less demanding than geosynthetic applications in road construction where heavy machinery and large angular boulders require heavier products. These products are lighter, easier to work with, and also cost less.

Phone numbers and web sites have been updated using the *Geotechnical Fabrics Report, 2000 Specifier's Guide.* However, we have not updated the product numbers, prices, and specifications. Geosynthetic products that have entered the market since 1995 are not described here. For a copy of the newest *Specifier's Guide,* contact the Industrial Fabric Association International (page 18).

The products listed are ones that are readily available. Many other products from these and other manufacturers may be appropriate. There are literally hundreds of products available from manufacturers and even home improvement centers. Most manufacturers and Geotechnical/Materials Engineers can assist in selecting products if you provide details on soil and moisture conditions and expected loads (light loads for trails).

Price ranges shown are approximate and vary throughout the country due to shipping costs. Call the listed phone numbers for current prices delivered to your area, or for the local sales representative. For comparison, price ranges shown are in dollars per square meter for all products. Price ranges in parenthesis are in dollars per square yard. Manufacturers may provide prices by the square meter, square yard, square foot, or for full roll quantities. Unit costs decrease as the amount ordered increases. Prices shown are based on the minimum one roll quantity, FOB the manufacturing location.

All geosynthetic products can be either field cut or precut by the manufacturer to meet your width requirements and weight handling capability.

Geotextiles

Manufacturers:

COMPANY	PRODUCT
AMOCO Fabrics & Fibers Phone: 800–445–7732	4545
TC Mirafi Phone: 888–795–0808 Web site: http://www.tcmirafi.com	140N
Linq Industries Phone: 800–543–9966 Web site: http://www.linqind.com	1300EX

Price Range: $0.63 to $0.72 per square meter ($0.53 to $0.60 per square yard)

Typical Product Unit Weight: 0.13 kilogram per square meter (0.25 pound per square yard)

Critical Physical Properties for Trail Construction:

- **Material structure:** Nonwoven.
- **Polymer composition:** Polypropylene.
- **Apparent opening by ASTM D 4751-87:** Less than 0.297 millimeters (greater than No. 50 mesh).
- **Permittivity by ASTM D4491-92:** Greater than 4060 liters per minute per square meter (Greater than 100 gallons per minute per square foot).
- **Puncture strength by ASTM D48833-88:** Greater than 0.245 kilonewtons (greater than 55 pounds).
- **Mullen burst by ASTM D 3786-87:** Greater than 1275 kilopascals (more than 185 pounds per square inch).
- **Trapezoid tear strength by ASTM D4533-91:** Greater than 0.18 kilonewtons (more than 40 pounds).
- **Grab tensile at 50 percent elongation by ASTM D4632-91:** Greater than 0.40 kilonewtons (Greater than 90 pounds).
- **Ultraviolet degradation:** Greater than 70 at 150 hours.

Notes: The products listed are nonwoven, felt-like materials that are easier to work with than heat bonded or slit film products that have a slick surface texture. Physical property requirements are minimum average roll values where applicable. Compare desired widths with standard roll widths and consult with manufacturers for field or factory cutting. Costs are based on one roll quantities which normally cover 400 to 500 square meters (475 to 600 square yards).

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Geonet (Geonet Composites)

Manufacturers:

COMPANY	PRODUCT
Tenax	TNT 204042

Phone: 800–356–8495
Web site: http://www.tenax.com

COMPANY	PRODUCT
Tensar Corp.	DC4205

Phone: 800–836–7271
Web site: http://www.tensarcorp.com

Price Range: $3.50 to $4.60 per square meter ($2.97 to $3.87 per square yard)

Typical Product Unit Weight: 0.89 kilograms per square meter (1.64 pounds per square yard)

Critical Physical Properties for Trail Construction:

- **Polymer composition of core (net or mesh):** Medium or high-density polyethylene.
- **Geotextile:** Must be attached to both sides of the Core, and meet or exceed the requirements of AASHTO M 288 Subsurface Drainage Class B with permeability greater than 0.0001 centimeters per second, and an apparent opening size less than 0.297 millimeters (greater than the No. 50 U.S. Standard Sieve).
- **Core thickness:** Greater than 5 millimeters by ASTM D5199.
- **Compressive strength of core:** Greater than 500 kilo-pascals by ASTM D1621.
- **Transmissivity with gradient at 0.1, pressure at 10 kilo-pascals:** Greater than 0.0009 meters² per second (greater than 4 gallons per minute per foot).

Notes: Discuss the roll width and length requirements for your project with manufacturers.

Sheet Drains

Manufacturers:

COMPANY	PRODUCT
TC Mirafi	Miradrain 6000

Phone: 800–445–7732
Web site: http://www.tcmirafi.com

COMPANY	PRODUCT
Contech	C-Drain 15K

Phone: 800–338–1122
Web site: http://www.contech-cpi.com

COMPANY	PRODUCT
Presto	Amerdrain 500

Phone: 800–548–3424
Web site: http://www.prestogeo.com

Price Range: $6.50 to $8.50 per square meter ($5.40 to $7.11 per square yard).

Typical Product Unit Weight: 2.3 kilogram per square meter (4.25 pounds per square yard).

Critical Physical Properties for Trail Construction:

- **Structure:** Single- or double-dimpled core.
- **Core polymer composition:** Polystyrene or polypropylene.
- **Attached geotextile:** Nonwoven on one side if core solid, on both sides if core perforated. Geotextile must meet or exceed the requirements of AASHTO M 288 Subsurface Drainage Class B with permeability greater than 0.0001 centimeters per second, and an apparent opening size less than 0.297 millimeters (greater than the No. 50 U.S. Standard Sieve).
- **Core thickness by ASTM D5199:** Greater than 10 milli-meters (greater than 0.40 inches).
- **Core compressive strength at yield by ASTM D1621:** Greater than 650 kilopascals (greater than 95 pounds per square inch).

Notes: Compare desired width with standard sheet width and consult with manufacturers for field or factory cutting. Various core thicknesses are available. For example, Presto makes a product called *Akwadrain* that has a 25-millimeter core thickness, with fabric on both sides. It has significantly greater bending strength which helps limit the amount of settling in soft soils, and reduces the amount of fill material required.

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Geogrids

Manufacturers:

COMPANY	PRODUCT
Contech	BX1100

Phone: 800–338–1122;
Web site: http://www.contech-cpi.com
or

Tensar Corp.   BX1100
Phone: 800–836–7271
Web site: http://www.tensarcorp.com

Carthage Mills   FX-3000
Phone: 800–543–4430
Web site: http://www.carthagemills.com

TenaxMS300
Phone: 800–356–8495
Web site: http://www.tenax.com

Huesker   Fortrac 35/20-20
Phone: 800–942–9418
Web site: http://www.huesker.com

TC Mirafi   Miragrid 5T
Phone: 800–445-7732
Web site: http://www.tcmirafi.com

Price Range: $2.15 to $4.75 per square meter ($1.80 to $4.00 per square yard). Low-cost products are made from polypropylene, higher cost products are made from coated polyester. Both product types are adequate for trails.

Typical Product Unit Weight: 1.75 kilograms per square meter (0.34 pounds per square yard).

Critical Physical Properties for Trail Applications:

- **Polymer type:** Polypropylene or polyester with acrylic or PVC coating.
- **Mass per unit area by ASTM D5261-92:** 175 grams per square meter (greater than 5.5 ounces per square yard).
- **Maximum aperture size:** Machine direction (MD): 25 centimeters (1 inch). Cross direction (XD): 33 centimeters (1.3 inches).
- **Wide-width strip tensile strength at 5-percent strain by ASTM D4595-86:** Machine direction (MD): 8 kilonewtons per meter (550 pounds per foot). Cross direction (XD): 6 kilonewtons per meter (410 pounds per foot).

Notes: Specify desired product widths and lengths for the project application.

Geocells

Manufacturers:

		Expanded Dimensional Properties	
		Individual Cell	Whole Sheet
COMPANY	PRODUCT	Depth x Length	Length x Width
Presto	Geoweb	100 x 200 mm	6.10 x 2.44 m
Phone: 800–548–3424		(4 x 8 in)	(20 x 8 ft)
Web site: http://www.prestogeo.com			
AGH	Envirogrid	Same	Same
Phone: 800–434–4743			
Web site: http://www.aghindustries.com			
WEBTEC			
Phone: 800–438–0027	TerraCell	Same	Same
Web site: http://www.webtechgeos.com			

Price Range: $7.50 to $11.30 per square meter ($6.30 to $9.45 per square yard.

Typical Product Unit Weight: 1.55 kilograms per square meter (2.9 pounds per square yard).

Similar Physical Properties for Listed Products:

- **Composition:** Polyethylene or high-density polyethylene
- **Geocell weight expanded:** Greater than 1.4 kilograms per square meter (greater than 45 ounces per square yard).
- **Minimum cell seam peel strength by U.S. Army Corps of Engineers Technical Report G:-86-19 Appendix A:** 800 newtons (180 pounds).
- **Expanded dimensional properties:** As specified by the designer—see dimensions listed for the products shown above.

Notes: Specify desired product widths for the project application. The 100-millimeter (4-inch) cell depth should be adequate for trails—depths from 50 to 200 millimeters (2 to 8 inches) are available. Consult manufacturers for availability of different section widths and alteration of standard section widths to fit your project needs.

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Proprietary Materials

Manufacturers:

COMPANY	PRODUCT	APPROXIMATE COST
GroundMaster	*TrailMaster*	$16 per sq m
Phone: 800–968–2930		($13.50 per sq yd)

Physical Property Description: This is a proprietary product, and no standards for testing and acceptance are available. When specifying or ordering, describe the product as follows:

TrailMaster—
- **Polypropylene sheet thickness:** Greater than 3 millimeters ($\frac{1}{8}$ inch).
- **Extruded hole diameter (nominal):** 16 millimeters ($\frac{5}{8}$ inch).
- **Percent open area (nominal):** 12 percent.
- **Space between extruded holes (nominal):** 32 millimeters ($1\frac{1}{4}$ inches).
- **Minimum product weight:** 2.8 kilograms per square meter (5.13 pounds per square yard).

Notes: Consult the manufacturer for appropriate widths and lengths of product desired prior to placing order.

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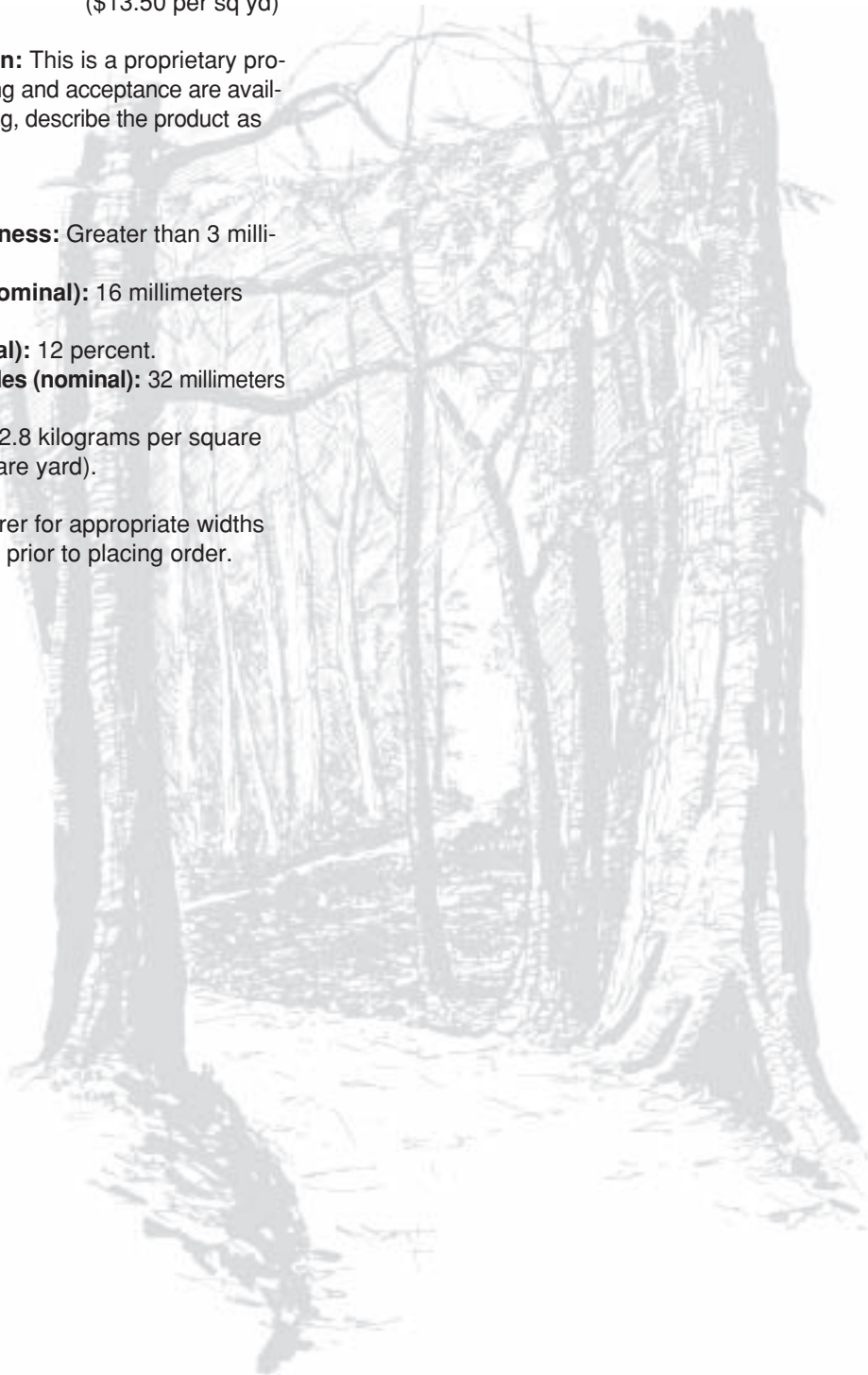
Section 5: Identification of Unsuitable Tread Fill Material

Soils from wet areas are normally not suitable for use as tread fill because they are too moisture sensitive and lose strength easily when they become wet. Avoiding unsuitable tread fill is very important since poor materials will fail when wet, and costs for excavating and hauling are high. Poor materials can be identified by several methods:

Organic Soils: Identified by musty odor when damp, and dark in color.

Other Unsuitable Tread Fill Materials: Stability of tread fill material is primarily influenced by the amount of silt or clay present. If the percentage exceeds 20 percent, the materials will likely become very unstable when wet. Rough evaluations for suitability can be done by the following methods:

Method A—Field Comparison

Make comparisons between existing trail tread materials with borrow sources. Compare the proportions of gravel, sand, and fines. Individual "fine-size" material particles are actually not visible to the naked eye and are classified as silt or clay. If the proportions of gravel, sand, and fines are similar, you can expect the borrow materials to perform as well as the existing trail tread materials. If less fines exist in the borrow source, you can expect better performance.

Method B—Laboratory Test

Take a 5-kilogram (10-pound) sample of the proposed tread fill material to a materials testing laboratory, and have them perform a washed sieve analysis test to determine the percentage of minus No. 200 material. Since the minus No. 200 represents the amount of silt or clay, if the amount exceeds 20 percent, the material is not suitable. Typical cost for this test is between $35 and $50.

Method C—Geotextile Field Test

Build a short section of a small-scale trail over a wet area with a 2-meter (6-foot) square piece of geotextile and the proposed tread fill material. The depth of tread fill should be at least 150 millimeters (6 inches), and should be saturated with water after placement to assimilate moisture contents that one would expect under the worst conditions. Evaluate the stability of the tread material by repeated load testing with your foot.

Additional Information

Industrial Fabric Association International (IFAI)

The *Geotechnical Fabrics Report, Specifier's Guide,* is published annually by IFAI. To purchase a copy of the latest *Specifier's Guide,* to subscribe to *Geotechnical Fabrics Report,* or learn about other publications, check out IFAI's web site at: *http://www.ifai.com.* Here are some other ways to contact IFAI.

<div align="center">

IFAI Resource Center
1801 County Road BW
Roseville, MN 55113–4061
Phone: 800–207–0729 or 651–222–2508
Fax: 651–631–9334

</div>

Federal Highway Administration

The Federal Highway Administration's Recreational Trails Program provides funds to the States to develop and maintain recreational trails and trail-related facilities for motorized and nonmotorized recreational trail uses. For additional information, see FHWA's Recreational Trails Program web site at: *http://www.fhwa.dot.gov/environment/rectrail.htm.*

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Library Card

<u>Great Trinity Forest Management Plan</u>

RECREATION

Managing Degraded Off-Highway Vehicle Trails in Wet, Unstable, and Sensitive Environments

United States
Department of
Agriculture

Forest
Service

**Technology &
Development
Program**

2300 Recreation
October 2002
0223-2821-MTDC

In cooperation with

United States
Department of
Transportation

**Federal Highway
Administration**

United States
Department of
the Interior

**National
Park Service**

Managing Degraded Off-Highway Vehicle Trails in Wet, Unstable, and Sensitive Environments

You can order a copy of this document using the order form on the FHWA's Recreation Trails program Web site at:
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Fill out the order form and fax it to the distributor listed on the form. If you do not have Internet access, you can send a fax request to 202–366–3409, or request by mail from:
USDOT, Federal Highway Administration
Office of Human Environment, Room 3301
400 7th St. SW.
Washington, DC 20590

Produced by:
USDA FS, Missoula Technology and Development Center
5785 Hwy. 10 West
Missoula, MT 59808-9361
Phone: 406–329–3978
Fax: 406–329–3719
E-mail: wo_mtdc_pubs@fs.fed.us

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Managing Degraded Off-Highway Vehicle Trails in Wet, Unstable, and Sensitive Environments

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2E22A68—NPS OHV Management

October 2002

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Introduction

Environmental impacts associated with the degradation of off-highway vehicle (OHV) trails have become a serious concern in many regions. Where OHV trails indiscriminately cross alpine areas, wetlands, steep slopes, and other areas with sensitive soil conditions, trails can become rutted, mucky, and eroded. Such areas are referred to as degraded trail segments. Degraded trails develop when trail use exceeds the trail's natural carrying capacity.

For land managers, degraded trails are a significant environmental problem because of their direct effects on vegetation, soils, and site hydrology. In addition, degraded trails may have indirect effects on wildlife, site esthetics, and other resource values. For trail users, degraded trails reduce the utility of trail systems and lead to a less enjoyable ride. Unfortunately, with increased use of backcountry resources by OHV enthusiasts and other trail users, the miles of degraded trails are increasing rapidly (figure 1).

Figure 1—A degraded trail in interior Alaska. Heavy use has stripped surface vegetation and exposed permafrost soils to accelerated melting, resulting in muddy, rutted trail surfaces, erosion, and deep muck holes.

This document provides land managers and trail users with an introduction to OHV trail degradation and outlines a framework for management responses. The information presented is based on work conducted by the author in southcentral and interior Alaska, but it also applies to degraded trails in other parts of the country. Some of the principles also apply to degraded foot, mountain bike, and horse trails. The document presents some fundamental concepts of soil and site characteristics, and the mechanics of trail degradation. It also offers inventory methods to document trail conditions and prepare stabilization "prescriptions." In addition, it outlines a number of management options including trail rerouting, seasonal and type-of-use restrictions, use-level restrictions, trail hardening, and trail closure.

The information provided in this report is intended to stimulate additional research and networking among trail managers, trail users, and the conservation community. Only through the cooperative efforts of a wide range of public and private trail advocates can the environmental and social conflicts associated with OHV use be resolved. We hope that future efforts will lead to the development of a widely applied set of best management practices for OHV trail management.

We have used English units of measure instead of Standard International (SI), or metric units, throughout this report. The products discussed in this report are manufactured using English measurements and most trail workers are accustomed to English rather than metric units of measure. Appendix D includes conversions from English measurements to metric.

Soil—The Stuff Under Foot, Hoof, and Wheel

Most backcountry trails are constructed on native soils. A review of some basic concepts of soil and its engineering characteristics will help explain why trails degrade, and why soils and physical site conditions are important components in trail management.

Soils 101

Soil is unconsolidated material on the Earth's surface. It is composed of mineral and organic particles, the voids surrounding the particles, and the water and air within the voids. The composition of the particles and their relationship to the voids strongly affect the physical characteristics of soil. That composition, called soil structure, describes the character of soil aggregates. These aggregates of individual soil grains form unique shapes depending on the soil's origin and the surrounding environmental conditions. The shapes of aggregates include granules, plates, prisms, columns, and blocks. The voids between the aggregates form passageways for air and gas exchange, as well as for water movement within the soil body.

The character of soil varies from place to place across the landscape. A soil's mineral and organic content, structure, moisture content, depth to bedrock, ability to support vegetation, and other characteristics vary, depending on the soil's origin and the environment in which the soil is located. As a result, individual soil types cover the Earth's surface like a mosaic. Five soil-forming factors control the character of a soil at any given location (U.S. Department of Agriculture 1993):

➣ **Parent Material** is the material in which a soil develops. Examples of mineral-based parent materials include alluvial deposits, weathered bedrock, glacial remnants, wind deposits, and marine sediments. Organic parent materials include leaf litter and decomposing wetland vegetation. The parent material influences the texture of the soil—the relative amounts of sand, silt, clay, and organic material that make up the finer components of the soil and the percentage of boulders, cobbles, and gravel that make up the larger components.

➣ **Topography** is where the soil is located on the landscape. It includes the elements of slope, aspect, elevation, and landscape position of the soil. Slope strongly influences the risk of erosion, aspect (relative sun exposure) influences daily temperature variations, and elevation influences climatic environment. Landscape position describes the soil's location on the landscape—such as: ridgeline, alluvial terrace, highly dissected upland, foot slope, floodplain, and high terrace.

➣ **Time** is the period parent materials have been subject to weathering and soil-forming processes. In general, the older the soil, the greater the chemical and physical modification of the original parent material and the more developed a soil's internal structure. Through time, soils develop distinct layers. Soil scientists generally recognize four layers: 'O' for surface organic layers, 'A' for the organic-rich surface mineral layers, 'B' for the weather-altered subsoil, and 'C' for the unaffected parent material.

➣ **Climate** indicates the effect of local weather on soil development. Climate influences chemical weathering, soil temperature, and soil moisture levels. Within a localized area, topography moderates climate to some degree.

➣ **Organisms** are the plants, animals, and humans that affect soil development. This includes effects from vegetation growth, leaf litter accumulation, soil microorganisms, burrowing animals, and human agriculture, recreation, and construction. Organisms can dramatically affect a soil's development. Vegetation enriches soils by contributing organic material and aiding in the development of internal soil structure. Unfortunately, many human activities have a disruptive effect on soil development.

Starting with raw parent material, topography, time, climate, and organisms work together to weather, mix, and transport soil. Soil is continuously evolving and modifying its capacity to support plant, animal, and human use over time.

Soil's Characteristics as a Structural Component for Trails

Unlike bedrock, asphalt or concrete, soil is an unconsolidated material composed of loosely bonded particles and the voids surrounding them. The lack of solid bonds between particles means that soils are susceptible to impacts from trail use in a number of ways. These include crushing, lateral displacement, and erosion. A soil's ability as a structural component for trails is controlled by two factors, its bearing strength (its ability to support a load without being deformed) and its cohesion (the ability to resist displacement). Those abilities are primarily controlled by two related factors: the relative size of soil particles (soil texture) and the relative water content of the soil voids (soil moisture level).

Soil texture is the relative amount of organic matter, gravel, sand, silt, and clay in a soil. In general, soil texture can be broken into two major classes:

➣ Finely textured soils—those with high percentages of organic matter, silt, and clay

➣ Coarsely textured soils—those with high percentages of sand and gravel

In general, the coarsely textured soils have good bearing capacity. This is because of their large particle size, good drainage characteristics, and low shrink-swell potential. Conversely, finely textured soils generally have poor bearing capacity because of their small particle size, poor drainage characteristics, and a tendency to shrink or swell under different moisture conditions. Both classes of soils have moderate to poor cohesion, depending on other factors such as vegetation cover and roots that help hold individual soil particles in place.

Soil moisture level measures the relative amount of water in soil pores. A soil's texture controls the percentage of pores within a soil. Surprisingly, finely textured soils have more pore space than coarsely textured soils. Finely textured soils can have up to 60 percent void space, while coarsely textured soils typically have around 40 percent.

Soil moisture can range from bone dry to totally saturated. Because water acts as a lubricant for soil particles, the relative amount of water within a soil can dramatically affect its structural stability. While coarsely textured soils tend to have good bearing strength across a wide range of moisture conditions, finely textured soils have reduced bearing capacity as moisture levels increase. At saturation, when all soil voids are filled with water, finely textured soils typically have little bearing capacity. Finely textured soils store and retain water over long periods so their bearing capacity can be low for prolonged periods.

Besides soil texture and soil moisture, other environmental and site factors contribute to a soil's structural capability and suitability for trails. These include:

➣ Soil temperature
➣ Type of surface cover
➣ Root mass
➣ Depth to bedrock
➣ Slope
➣ Landscape position

These factors largely control how well a soil will support surface traffic. These characteristics also provide insights on how soil should be managed and on the options that might be employed to increase its suitability for use. Table 1 provides some general guidelines on broad categories of trail suitability based on these factors. The table segregates site characteristics into three classes of suitability for each soil factor: poorly suited (highly sensitive), limited suitability (moderately sensitive), and generally suitable (slightly sensitive).

The information in table 1 can help trail managers identify where they may have problems with existing or planned trail routes. For example, sites with all 'generally suitable' ratings shouldn't pose any inordinate management or environmental concerns; those with 'limited suitability' ratings may require some special attention; and those with 'poorly suited' ratings may require significant attention and a high level of manage-ment. Poorly suited sites should be avoided during new trail construction. Existing trails with "poorly suited" ratings should be assessed for environmental impacts and evaluated for relocation.

Table 1—General guidelines on trail site suitability and sensitivity to impact.

Soil factor	SUITABILITY/SENSITIVITY CLASS		
	Poorly suited (highly sensitive)	Limited suitability (moderately sensitive)	Generally suitable (slightly sensitive)
Soil texture	All organic soils; soils with an organic surface layer thicker than 4 inches	Silt greater than 70 percent or clay greater than 40 percent in the soil surface layer; sand component is greater than 80 percent in the surface layer	Soils with a high percentage of gravel or rock in the sur-face layer
Soil temperature	Ice-rich permafrost is within 40 inches of the surface; soils at or near freezing	Low ice permafrost within 40 inches of the surface	Deeply frozen soils (winter activities)
Soil moisture	Poorly or very poorly drained soils; the water table is within 12 inches of the surface; water is ponded at the surface; soils are at or near saturation	Somewhat poorly drained soils; the water table is be-tween 12 and 24 inches of the surface	Well- and moderately well-drained soils; the water table is deeper than 24 inches below the surface
Type of surface cover	All wetland vegetation commu-nities; permafrost-influenced vegetation communities; alpine tundra communities		
Root mass	Fine, thin, poorly developed root mass	Root mass that is 2 to 6 inches thick, primarily fine roots	Root mass is more than 6 inches thick with a high percentage of woody roots
Soil depth	—	Less than 2 feet to bedrock	More than 2 feet to bedrock
Slope	Slopes steeper than 40 percent if the slope length is longer than 50 feet; slopes 20 to 40 percent if the slope length is longer than 100 feet	Slopes between 6 and 20 percent (with appropriate water control)	Slopes less than 6 percent (with appropriate water control)
Landscape position	North-facing aspects in some climatic conditions	Ridgelines (if shallow soils); foot and toe slopes (if wet or there are seep zones); floodplains (seasonal flood-ing); slopes (depending on percent of slope, see above)	South-facing aspects; gravel bars, terraces, and alluvial benches; outwash plains; alluvial fans (depending on slope)

How Soils Are Degraded

Trail use damages soils when the type and level of use exceed the soil's capacity to resist impact. A soil's capacity to resist impact varies depending on textural class, moisture level, and other environmental and site characteristics, but the processes by which soils are impacted are generally the same. Trail use damages soils directly by mechanical impact from surface traffic and indirectly by hydraulic modifications, soil transport, and deposition.

Direct mechanical impact has several components: abrasion, compaction, shearing, and displacement.

➣ Abrasion strips surface vegetation and roots.

➣ Compaction reduces soil voids and causes surface subsidence.

➣ Shearing is the destructive transfer of force through the soil.

➣ Displacement results in the mechanical movement of soil particles.

Indirect impacts include hydraulic modifications, such as the disruption of surface water flow, reductions in infiltration and percolation, surface ponding, and the loss of water-holding capacity. Other indirect impacts include those associated with erosion—both the loss of soil particles by wind or water erosion and deposition of transported particles. An associated impact is the hydraulic pumping that occurs when a destructive flow of water is forced through a saturated soil.

Both direct and indirect impacts degrade trail segments. The impacts generally occur in the following progression:

Abrasive loss of protecting surface vegetation and root mass (direct impact)
    ⅄
Compaction and surface subsidence (direct impact)
    ⅄
Hydraulic disruption (indirect impact)
    ⅄
Breakdown of soil structure from shearing and pumping (direct impact)
    ⅄
Soil particle erosion and deposition (indirect impact)

While most of the stages in this progression are familiar concepts, the shearing and pumping components may not be as familiar to some readers.

Shearing describes a transfer of force through a soil. When an applied force exceeds the capacity of the soil body to absorb it, a portion of the soil body can be displaced along a shear plane—that place where soil particle cohesion is weakest.

The most common example is when the passage of a wheeled vehicle forms ruts. The downward force of the wheel shears—or displaces—the soil beneath it, forcing the soil to bulge upward beside the wheel. This process is illustrated in figure 2. The shearing action destroys soil structure by crushing soil peds (natural soil aggregates) and collapsing voids. Shearing is most likely to occur on finely textured soils under moist to saturated conditions. It is uncommon in coarse soils.

**Shearing action
(soil-bearing capacity of an unconfined load)**

Ground surface

Shear force   Shear force
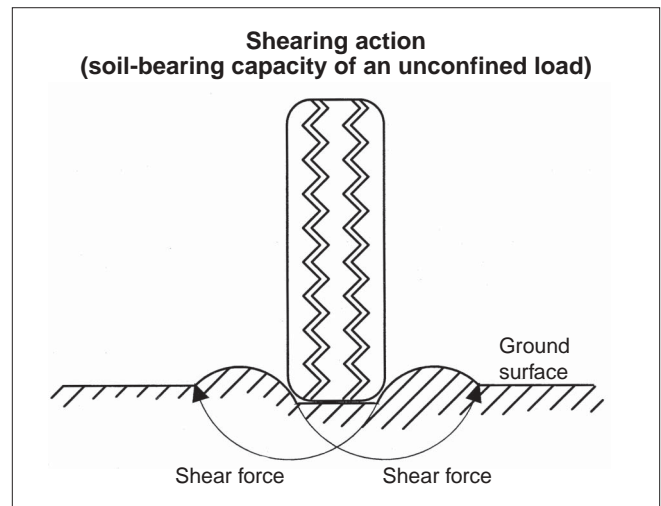
Figure 2—Diagram of shearing action.

Pumping action occurs when soils are saturated with water. Saturated soils are most common in wetlands, but may occur on other sites during spring thaw, periods of high rainfall, or where water is ponded. Pumping occurs when the downward pressure of a passing force—such as a vehicle wheel—forces water through soil voids and passages. When the pressure is released, water rushes back into the vacuum. This process is illustrated in figure 3. The force of this rapid water flow erodes internal soil structure and clogs soil voids with displaced sediment. Pumping occurs within all soils, but is most damaging to finely textured soils because of their fragile internal structure.

Shearing and pumping actions reduce soils to a structureless or "massive" condition. This condition is characterized by the loss of distinguishable soil structure and a reduction in pore space voids, and interped passages (the space between peds). An example of soil in a massive state is a dried mud clod or an adobe brick. In a massive state, soils have significantly reduced infiltration rates, percolation, water storage capacity, and gas exchange. This reduces a soil's ability to support vegetation growth, leads to surface ponding of water, and increases the soil's sensitivity to additional impacts.

**Pumping action
(soil-bearing capacity of an unconfined load)**

Direction
of motion

Ground
surface

Rebound
(release)

Compressional force
(pump)

Figure 3—Diagram of pumping action.

Surface Erosion, Surface Failure, and Trail Braiding

Trail use has a predictable path of surface impact. The degree of impact is modified only by the natural resilience of the soil and the intensity of trail use. In an ideal situation, a natural balance is maintained between soil resilience and use, and trail use occurs without significant degradation. However, on sites with wet, unstable, and sensitive soils, that equilibrium is easily upset. Even low levels of trail use can have significant environmental consequences.

Typically, trail degradation follows one of two pathways: surface erosion or surface failure. Surface erosion occurs when wind or water displaces exposed trail surfaces. This usually occurs on steep terrain or on sandy soils that are susceptible to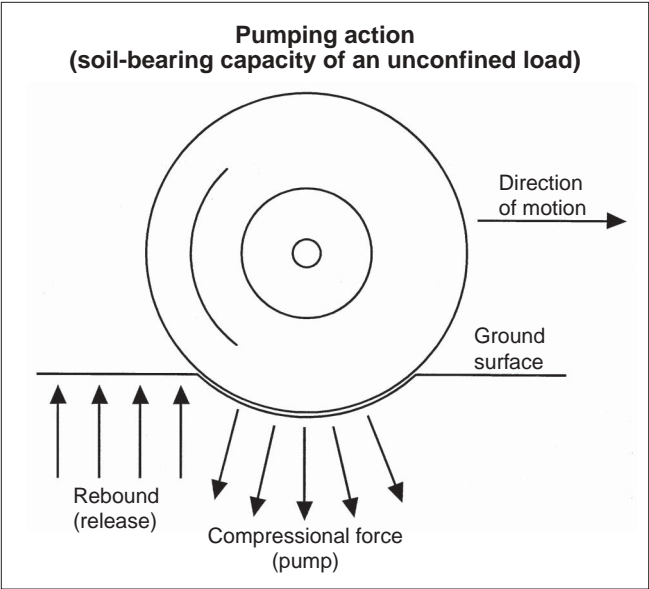 wind erosion. Surface failure occurs when trail surfaces degrade into muddy tracks with deep muck holes. This usually occurs on flat areas with organic or finely textured soils. Either pathway can lead to significant environmental impacts that are extremely difficult to stabilize or reverse. Without stabilization, a destructive cycle of degradation can begin that expands the impact to adjacent surfaces. That cycle begins with the widening of trail surfaces as users avoid degraded surfaces and expands to the development of multiple parallel trails.

The two degradation pathways are diagrammed in table 2.

Table 2—Trail degradation pathways.

Both pathways of impact begin when:
Surface vegetation and roots are stripped by surface traffic.
Exposed soil is compacted and the trail surface subsides relative to the adjacent surface.
Compaction and subsidence destroy soil structure and disrupt internal drainage patterns.
Impact follows one of two paths:

Surface erosion	**Surface failure**
Exposed surface is eroded by wind scour or	Water collects on the trail surface.
Water drains onto the trail surface.	Water pools in low areas.
Water is channeled along the trail surface.	Pooled water saturates the soil.
Water erodes the trail surface.	Shearing and pumping damage the soil structure.
Deep erosion ruts form.	Muddy sections and deep muck holes form.

The impact continues:
Trail segments develop rutted or muddy sections.
Trails widen as users avoid degraded sections.
Trail users abandon degraded sections.
New routes are pioneered on adjacent soils.
Vegetation and roots are stripped by traffic along the new route.
Soil is compacted and the soil structure is destroyed, leading to surface erosion and/or surface failure.
And so the cycle repeats itself.

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The first consequences of pioneering a trail across a virgin landscape are the stripping of surface vegetation, the abrasion of roots, and the compaction of surface soil layers. These impacts destroy soil structure, reduce water infiltration, and break bonds between soil particles. Soil particles are more vulnerable to displacement and loss from wind or water erosion. Soil compaction also leads to surface subsidence—the lowering of the trail relative to the adjacent ground surface. Trails become entrenched. This lower surface intercepts and drains water from adjacent surfaces and channels that flow along the trail. This dramatically increases the risk of water erosion on sloped areas and the pooling of water in low-lying sections. As trail surfaces degrade due to rutting or the formation of muck holes, users widen the trail and seek new routes, usually on adjacent soils where environmental conditions are identical to the original impact site. As this new route degrades, it is abandoned. A third route is pioneered, and then a fourth—until finally the area is scarred with a number of routes in various stages of use and abandonment. This condition is called trail braiding. Trail braiding significantly expands the environmental impacts of trail use. Trail braiding occurs because trail use levels repeatedly exceed the carrying capacity of soils to support that use. Figures 4a and 4b illustrate the process.

Figure 4b—Results are an adjacent degraded alignment and the development of a braided trail.

In braided trail sections, abandoned trail segments may slowly recover from impact through natural revegetation. However, the impact has usually dramatically altered the site's thermal, soil, and hydrologic characteristics. These changes affect the composition and structure of vegetation that can grow on the disturbed site. For example, a site that supported shrubs and grass before disturbance may only support sedges or other water-tolerant plants after disturbance. Abandoned routes may also recover enough to support subsequent trail use, but they are generally more sensitive to impact than virgin sites.

The impacts associated with braiding are a major concern for land managers because they dramatically increase the area of impacts associated with trail use (figure 5). Studies conducted in one area of Alaska documented that the average OHV trail had an impact area 34.6 feet wide (Connery 1984)—that's four times the width necessary for a single OHV track. Using that average width (34.6 feet), each mile of trail affects 4.2 acres. A single-track trail (8 feet wide) of the same length would affect just 0.97 acre per mile. Braided trail sections more than 200 feet wide are not uncommon within Alaska. For resource managers, the increase in area affected by braiding is significant in terms of resource destruction, habitat loss, and esthetics.

Figure 4a—Ponded water in ruts and muck holes prompt riders to pioneer new routes in adjacent undisturbed areas.

Figure 5—A braided trail in Alaska. More than a dozen separate routes have been pioneered in this section crossing a wetland. Note the wet trail conditions and numerous potholes. At this site, trail impacts affect an area more than 250 feet wide. Braiding significantly extends the area of impact by modifying vegetation cover, surface hydrology, and soil characteristics.

In Alaska, the cycle of degradation is well studied and documented (Connery 1984; Connery, Meyers, and Beck 1985; Ahlstrand and Racine 1990, 1993; and Happe, Shea, and Loya 1998). Responding to the impact has been more difficult. The problem is also compounded by rapidly expanding OHV use and increased OHV trail mileage. One study conducted by the Bureau of Land Management documented a 76-percent increase in miles of trail from the early 1970s to the late 1990s (Muenster 2001). Significant increases have also been observed in many other areas of Alaska. These increases in trail mileage and their associated environmental impacts on soil, vegetation, habitat, and water resource values have given resource managers a legitimate reason to be concerned about the impacts associated with degraded OHV trails.

Trail Management—Responding to Trail Degradation

Mlanagement Components

The task of trail management ranges from planning, designing, and constructing trails to maintaining them. In an ideal world, every trail would have a formal, well thought-out management plan and a staff dedicated to its implementation. Unfortunately, that is not the case. In Alaska, the term 'orphan trail' has been coined to describe active trails that receive no management oversight at all. Trail management should include elements from these five basic building blocks:

➣ Trail location documentation
➣ Trail condition assessment
➣ Trail improvement prescriptions
➣ Trail improvement implementation
➣ Trail maintenance and monitoring

Trail Location Documentation

Trail location documentation is plotting the location of the trail in a geographic database. A simple sketch of a trail location on a U.S. Geological Survey topographic map is better than no location data, but documenting the alignment with a mapping-grade global positioning system (GPS) unit is best. The GPS unit can record geographic coordinates of a trail alignment that can overlay digital topographic maps or be downloaded into a geographic information system (GIS). The GIS allows trail locations to be plotted over other geographic databases such as land ownership, soils, and terrain. Accurate trail location information is also critical for obtaining a legal right-of-way easement for a trail alignment.

Trail Condition Assessment

Condition assessment is an inventory of the physical character of a trail alignment. It documents conditions and problems and provides a baseline for monitoring changes over time. This assessment can be used to set priorities for trail prescription mapping (next section) and provide general information for future trail improvement work.

The assessment should evaluate the entire trail length, not just problem sites. This ensures that the assessment will provide a basis for evaluating condition trend during future monitoring efforts. Condition assessments can be conducted with manual data collection using a measuring wheel, tape measure, or odometer in the traditional "trail log" approach. The author has developed a simple alphanumeric system to classify individual trail segment conditions (table 3).

Table 3—Trail impact classes.

Impact class	Subclass	Description
A	1	Minor loss of original surface vegetation (over 80 percent remaining)
	2	Moderate loss of original surface vegetation (40 to 80 percent remaining)
B	3	Most original surface vegetation stripped away (less than 40 percent remaining)
	4	Exposed roots on trail surface
C	5	Almost total loss of root mass
	6	Only exposed mineral or organic soil at surface
	7	Erosive loss of less than 2 inches of soil, or compaction and subsidence less than 2 inches deep
D	8	Erosive loss of 2 to 8 inches of soil, or compaction and subsidence 2 to 8 inches deep
F	9	Erosive loss of 9 to 16 inches of soil, or compaction and subsidence 9 to 16 inches deep
	10	Erosive loss of more than 16 inches of soil, or compaction and subsidence more than 16 inches deep
	11	Trail segment intermittently passable during dry conditions
	12	Trail segment impassable at all times

For quick assessments, trail segments can be classified using classes A to F. For more detailed assessments, the numeric subclass designators can be used.

Trail segments with class A impacts have yet to experience significant degradation. Class B segments are generally new trails or lightly traveled routes. Segments with class C impacts display the beginnings of detrimental impacts, but have not yet been seriously degraded. Monitoring these sites should be a high priority. Segments with class D impacts display degradation due to poor site conditions or excessive use. Mitigation may be needed to stabilize impacts. Segments with class F impacts are seriously degraded trails, probably with significant environmental impacts. These sites should receive a high level of management attention. Methods to respond to the degradation of classes D and F trail segments are detailed later.

While table 3 presents a classification system for manual assessment, a much more powerful and descriptive assessment can be made by using a mapping-grade GPS receiver that attaches line, point, and area descriptors with collected trail alignment coordinates. The author has developed a trail condition mapping legend (table 4) that can be used with standard mapping-grade GPS software and equipment. The legend contains a fairly complete list of trail condition attributes, and it can be used as the starting point to develop a customized legend appropriate for any specific trail system. When the data elements in table 4 are loaded into a menu-driven GPS mapping system, they can be collected easily during trail condition mapping.

Table 4—Trail condition mapping legend (bold text identifies the more important data fields).

Feature element	Menu selection options
LINE FEATURE	
TRAIL SEGMENT	
Trail segment type (feet)	**Single track, double track, or multibraid 6 to 20, 21 to 40, 41 to 80, 81 to 160, 161 to 320, 321 to 480, wider than 480**
Trail track type	**Main, secondary, abandoned, access, cutoff, spur**
Trail surface grade (percent)	**Zero to 6, 7 to 20, 21 to 40, steeper than 40**
Side slope (percent)	Less than 20, 21 to 60, 61 to 100, steeper than 100
Trail surface	**Vegetated, native organic, wetland vegetated, floating organic, native fine mineral, mixed fines and gravel, sand, gravel, cobble, imported gravel, gravel over geotextile, wood chips, timbers/planking, corduroy, paved, porous pavement panel, rock, water crossing, other**
Trail impact rating	**None** **Loss of surface vegetation** **Exposed roots** **Less than 2 inches erosive loss or surface subsidence** **2 to 8 inches erosive loss or surface subsidence** **9 to 16 inches erosive loss or surface subsidence** **17 to 32 inches erosive loss or surface subsidence** **33 to 60 inches erosive loss or surface subsidence** **More than 60 inches erosive loss or surface subsidence**
Mud-muck index	**None, muddy, extremely muddy, muck hole, multiple muck holes, seasonally impassable, impassable at all times**
Trail drainage	**Well drained, moderately well drained, poorly drained, saturated, ponded, water running across surface**
Stone hindrance (percent)	None, less than 10, 11 to 25, 26 to 75, 76 to 100
Track width (feet)	**One to 3, 4 to 6, 7 to 12, 13 to 20, 21 to 30, 31 to 40, 41 to 60, over 60**
Vegetation stripping	**Single track, wheel track only, full width of trail**
Type of use	Multiuse, foot only, motorized only
Season of use	Multiseason, winter only, thaw season only
ROAD SEGMENT	
Road type	**Access, primary, secondary, subdivision, unimproved, other**
Road surface	Paved, gravel, dirt
Road width (feet)	8 to 12, 13 to 16, 17 to 20, 21 to 30
LINE GENERIC	
Line type	**Text entry**

Continued —>

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Table 4—continued (bold text identifies the more important data fields).

Feature element	Menu selection options
POINT FEATURE	
WATER MANAGEMENT	
Type	**Water bar, grade dip, rolling dip, round culvert, box culvert, open drain, sheet drain, check dam, ditch**
Condition	**Serviceable, poor**
Culvert size (inches)	Numeric entry
STREAM CROSSING	
Type	**Unimproved ford, improved ford, bridge, culvert**
Stream name	Text entry
Stream width (feet)	Numeric entry
Approximate flow (cubic feet per second)	Numeric entry
PHOTO POINT	
Frame/reference No.	**Numeric entry**
Bearing (degrees)	**Numeric entry**
ANCHOR POINT	
Type	**Beginning, middle, intersection, angle, end**
REFERENCE POINT	
Type	**Milepost, trailhead, trail marker, survey marker, property marker, road crossing, junction, gate or barrier, other**
Mileage	Numeric entry
POINTS OF INTEREST	
Type	Scenic vista, pullout, shelter, campsite, cabin, structure, powerline, fence, staging area
HAZARD	
Type	**Text entry**
SIGNS	
Type	Informational, directional, regulatory, warning
Text	Text entry
POINT GENERIC	
Type	**Text entry**
AREA FEATURE	
PARKING AREA	
BRAIDED IMPACT AREA	
GENERIC AREA	

Figure 6 displays a GPS plot of a complex trail system with a large number of braided trail segments. Note the highlighted trail segment at the top of the image. The 'Feature Properties' data frame to the right of the screen lists the characteristics of that trail segment as it was mapped in the field. Similar data detail can be extracted for every line segment, point, or area feature displayed on the screen. The 'Feature Properties' box shows the location, date of data acquisition, and precision of the data collected.
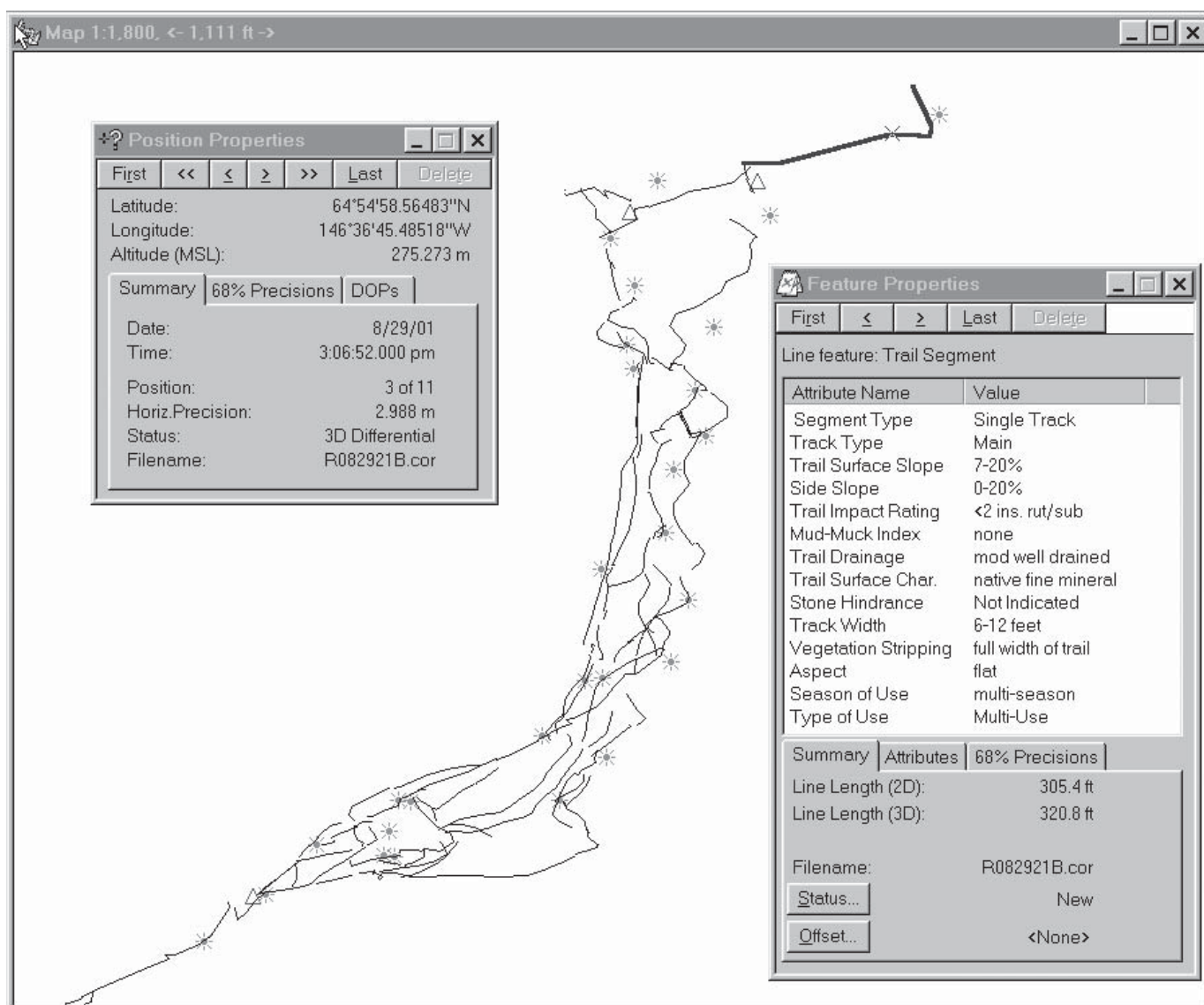
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Figure 6—This computer screen display shows the mapping legend for a complex trail system with a large number of braided trails. The feature properties (data box on the right) relate to the bolded trail segment at the top of the display.

Data collected with this level of sophistication should be downloaded into a GIS system. While a GIS requires a relatively high level of technical support, it can have tremendous payoffs for trail management. Once downloaded, the data can be subjected to a wide variety of map and tabular analysis, including overlay with other geographic information such as soils and terrain. Attribute values can be used to generate trail segment impact ratings and to identify critical problem areas. The length and area of trail segments can be calculated to help estimate mitigation and maintenance costs. When the condition inventory is incorporated into a GIS, it provides a baseline of trail conditions that can be used to plan and track monitoring efforts,

evaluate trail performance across varying soils and landscape units, and plan future work.

Based on the author's experience and some limited contract work conducted by the Bureau of Land Management in Alaska, about 8 miles of trail can be mapped per day by a two-person crew mounted on OHVs using the GPS-based system. Production rates vary depending on trail conditions, weather, access, staff experience, and equipment performance. Office support work is required in addition to the field work. Allow about twice as much time in the office as in the field to set up equipment, load data dictionaries, download data, edit data, and integrate the data into a GIS.

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Trail Improvement Prescriptions

Trail prescriptions focus on identifying locations for specific treatment applications, such as surface improvements, ditches, brush control, water management, and water-crossing structures.

The crew preparing trail prescriptions needs to be knowledgeable of the treatments available for specific trail ailments. Unlike condition mapping, which requires just a basic knowledge of field inventory technique, prescription mapping requires expertise in trail planning, construction and maintenance, and knowledge of the trail construction and maintenance resources that are available.

Prescription mapping can be greatly assisted by GPS/GIS technology. Table 5 is a prescription mapping legend developed by the author. It identifies a wide range of treatments and can be adapted readily for use on any trail systems.

Table 5—Trail prescription mapping legend (bold text identifies the more important data fields).

Feature element	Menu selection options
LINE FEATURE	
TRAIL SEGMENT	
Trail type	Active, inactive, new segment, access, water crossing, other
Surface treatment	**No treatment, light water management, heavy water management, grading/leveling, gravel cap, gravel/ geotextile, porous pavement, corduroy, turnpike, puncheon-boardwalk, abandon—no treatment, abandon with light rehabilitation, abandon with heavy rehabilitation**
Gravel cap depth (inches)	**None, 2 to 4, 5 to 8, 9 to 12, 13 to 18, deeper than 18**
Trail width (feet)	**Numeric entry**
Surface treatment priority	High, medium, low
Ditching	None, left (outbound), right (outbound), both
Ditching priority	High, medium, low
Brush control	None, left, right, both
Brushing priority	High, medium, low
Root removal	None required, required
Cut-and-fill section (percent side slope)	None, less than 15, 16 to 45, 46 to 100, more than 100
LINE GENERIC	
Type	**Text entry**
POINT FEATURES	
ANCHOR POINT	
Type	**Beginning, middle, intersection, angle, end**
REFERENCE POINT	
Type	**Milepost, trailhead, trail marker, survey marker, gate or barrier, road crossing, fence crossing, other**
Mileage	**Numeric entry**
WATER MANAGEMENT	
Type	**Water bar, grade dip, rolling dip, culvert (diameter in inches, less than 8, 9 to 16, 17 to 36, larger than 36), check dam, open drain, other**
WATER CROSSING	
Type (feet)	**Unimproved ford, improved ford, bridge (shorter than 12, 13 to 24, longer than 24)**

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Table 5—continued (bold text identifies the more important data fields).

Feature element	Menu selection options
POINT FEATURE (continued)	
PHOTO POINT	
Reference number	Numeric entry
Bearing	Numeric entry
POINT-OF-INTEREST DEVELOPMENT	
Type	Scenic vista, pullout, shelter, campsite, cabin
FIX HAZARD	
Type	**Tree removal, stump removal, rock removal, guardrail, fill hole, other**
SIGN NEEDED	
Type	Informational, directional, regulatory, warning
Text	Text entry
SIDE SLOPE FEATURE	
Type	**Switchback center point, climbing turn center point**
GRAVEL SOURCE	
TIMBER SOURCE	
STAGING AREA	
POINT GENERIC	
AREA FEATURE	
GENERIC AREA	

A prescription inventory collected with a GPS system provides an excellent basis for cost and labor estimates, but it does not have the familiar '1+00' trail log references typically associated with trail inventory work. Therefore, ground location reference points should be established before or during the inventory. Markers every one-quarter mile—or every 1,000 feet—are not too close for detailed surveys. Measuring wheels and OHV odometers are common measuring devices for establishing approximate milepost locations. Labeled flagging, lath, or metal tags should be placed at these standardized reference points. The more permanent the markers, the better.

Trail Improvement Implementation

Improvement implementation is planned trail maintenance, stabilization, or mitigation based on a trail improvement prescription. Improvement actions should be based on standard design specifications or commonly accepted management practices. Commonly accepted practices are best described in the following Federal and private publications:

Building Better Trails. 2001. International Mountain Bicycling Association, P.O. Box 7578, Boulder, CO 80306. Phone: 303–545–9011; e-mail: *info@imba.com*; Web site: *http://www.imba.com*. May be purchased both in HTML and PDF formats from the Web site or the IMBA office. 64 p. in printed book format.

Installation Guide for Porous Pavement Panels as Trail Hardening Materials for Off-Highway Vehicle Trails. 2001. Kevin G. Meyer. USDI National Park Service—Rivers, Trails, and Conservation Assistance Program Technical Note, 2525 Gambell St., Anchorage, AK 99503 (attached as appendix B).

Lightly on the Land—The SCA Trail Building and Maintenance Manual. 1996. Robert C. Birkby. The Mountaineers, 1001 SW. Klickitat Way, Seattle, WA 98134.

Off Highway Motorcycle & ATV Trails Guidelines for Design, Construction, Maintenance and User Satisfaction. 2d Ed. 1994. Joe Wernex. American Motorcyclist Association, 13515 Yarmouth Dr., Pickerington, OH 43147. Phone: 614–856–1900; fax: 614–856–1920, e-mail: *ama@ama-cycle.org*; Web site: *http://www.ama-cycle.org*.

Trail Building and Maintenance. 2d Ed. 1981. Robert D. Proudman and Reuben Rajala. Appalachian Mountain Club, 5 Joy St., Boston, MA 02108.

Trail Construction and Maintenance Notebook. 2000. Woody Hesselbarth and Brian Vachowski. Tech. Rep. 0023–2839– MTDC. United States Department of Agriculture, Forest Service, Missoula Technology and Development Center, 5785 Hwy. 10 West, Missoula, MT 59808–9361.

Wetland Trail Design and Construction. 2001. Robert T. Steinholtz and Brian Vachowski. Tech. Rep. 0123–2833–MTDC. United States Department of Agriculture, Forest Service, Missoula Technology and Development Center, 5785 Hwy. 10 West, Missoula, MT 59808–9361.

In addition to these references, supplementary information is available from the Missoula Technology and Development Center. Call 406–329–3978 to request the latest list of recreation publications and videos. Many of these are available through the Federal Highway Administration's Recreational Trails Program. To obtain a list of publications and an order form, go to Web site: *http://www.fhwa.dot.gov/environment/ trailpub.htm*.

Each of these documents provides valuable information on trail design, construction methods, maintenance, or general trail management. While some may be regional in nature or focus on specific types of trails, their basic concepts can be adapted to OHV trails.

Trail Maintenance and Monitoring

Each trail alignment should receive regular maintenance at least once a year, preferably early in the season of use. Primary activities should include maintaining water-control structures, ditches, and culverts, and clearing fallen timber.

Periodic inspections also should be made of bridges, especially after spring breakup or floods. Maintenance crews also should report on problem areas and maintenance concerns. In many cases, periodic, systematic maintenance can head off major trail degradation.

Monitoring to detect changes in trail conditions, including a complete condition assessment, should be conducted about every 5 years, depending on levels of use and a trail's soil and terrain characteristics. This frequency could be increased if significant environmental values are at risk, but enough time should pass between assessments to filter out changes due to seasonal effects, weather effects, or the subjectivity of inventory crew personnel. The same inventory classification system should be employed during each monitoring with key components such as trail surface character, trail impact rating, trail drainage, mud-muck index, and track width recorded from identical menu selection options.

Management Response to Severely Degraded Trails

Managing severely degraded trails presents a formidable challenge to resource managers. Severely degraded trails tax traditional trail management techniques and sometimes force managers to investigate and test innovative management methods, refining them for local conditions. No single set of responses can meet every situation, but a framework can help guide the process.

The trail degradation issue must be addressed on several fronts. The National Off-Highway Vehicle Conservation Council (NOHVCC), a nonprofit OHV advocacy group, uses an approach they call the Four Es. They are:

➢ Education ➢ Engineering
➢ Evaluation ➢ Enforcement

Education is needed to teach users about responsible riding and appropriate environmental ethics. In addition, resource managers and technicians need to be educated about effective trail management practices. Evaluation is necessary to develop methods to document use, assess impact, and evaluate mitigation methods. Engineering is necessary to develop trail improvement techniques and equipment modifications to reduce impacts. Enforcement is necessary to manage use within acceptable impact limits. In many locales, enforcement isn't a viable option. In those areas, enforcement may be implemented as "encouragement," encouraging users to conduct their activities in a sustainable manner. This might best be achieved

by providing trail location maps that direct users to sustainable trails and trail signs that encourage appropriate use.

I would also add a fifth E: 'Enculturation' (the process of modifying human behavior over time). Enculturation can only be accomplished by the steady application of education, appropriate evaluation techniques, progressive engineering, appropriate enforcement, and encouragement.

The five Es show how broadly the issue of degraded trails must be addressed. Unfortunately, this report addresses a only a few of the five Es. It is intended as a tool to help educate trail managers and users about OHV trail degradation. In addition, the section on trail condition inventory presents an important evaluation component, and the following section identifies engineering solutions within a range of management options. These options include:

➤ Trail rerouting
➤ Seasonal or type-of-use restrictions
➤ Controlled use (traffic volume restrictions)
➤ Trail hardening
➤ Trail closure

By evaluating these options and developing a forum with users, advocacy groups, and the environmental community, trail managers can resolve many of the conflicts between degraded trails and environmental resources.

Trail Rerouting

Few OHV trails are planned trails where a full range of environmental considerations was carefully weighed before construction. In fact, few trails are specifically constructed for OHV use. Most OHV trails developed as individual riders followed game or foot trails or passed through natural corridors to remote fishing, hunting, or cabin sites. In Alaska, many OHV trails develop along routes that originally served as dogsled or snowmobile trails.

Because of the unplanned nature of OHV trails, many of them cross soils and sites poorly suited for the level of use occurring on them today. For example, a trail that originally developed from a game trail may not be suitable as a primary access route into a heavily used recreation area. A winter route across snow-covered wetlands doesn't necessarily provide a good alignment for a summer OHV route.

When numerous segments of a trail have been significantly degraded by the level of use, trail managers need to ask the following questions:

➤ Do opportunities exist to reroute the trail onto better soils and terrain?

➤ If yes, what is the cost of stabilizing the existing route compared to constructing a new trail alignment and rehabilitating the old one?

In some cases, moving a trail or segment may be an effective method of responding to trail degradation. For example, moving a trail from a foot slope to a side slope may significantly reduce trail wetness. Moving a trail from an open wetland to an adjacent woodland may stop trail braiding. Figure 7 shows an example where rerouting should be considered.
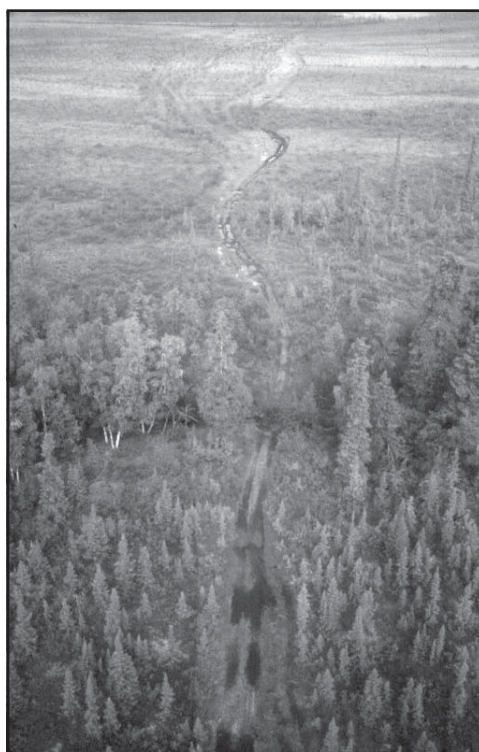

Figure 7—A heavily used OHV trail in Alaska crosses two distinct soil types. In the foreground, the trail passes through a mixed forest ecosystem where the soils support use along a single track. In the background, the trail crosses degraded wetland soils where users have created a braided trail. Managers should consider rerouting the trail to stay within the forest system.

A rerouting assessment should follow this process:

➤ Obtain and evaluate aerial photography of the trail alignment.

➤ Obtain soils data for the area surrounding the trail. Soil survey reports are available from the USDA Natural Resources Conservation Service.

➤ Conduct a site visit. Take available aerial photography and soils data with you. Visit the site during the primary season

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of use. Evaluate the trail conditions on the ground to identify relationships between vegetation communities, terrain, soil conditions, and trail performance. Table 1 may be of some assistance. Use aerial photographs to identify adjacent areas that might support trail use. Identify alternative trail routes on aerial photographs and flag those routes on the ground.

➢ Identify the long-term benefits of the new route compared to continued use of the existing route.

➢ Develop a trail design for the alternative route. Develop a detailed construction plan. Identify any stabilization or reclamation work that is needed on the abandoned trail alignment. Identify methods to redirect use onto the new alignment using barriers, markers, or signs.

Decisionmakers and environmental groups may object to constructing new alignments where existing trails have failed, so it is important to have photos documenting the difference between trail segments on degraded sites and trail segments on more suitable sites. Illustrate the sustainability of the proposed new location to build consensus for the reroute option.

Seasonal or Type-of-Use Restrictions

Seasonal-use restrictions are another option for responding to trail degradation. Because soils are most sensitive to impact when they are wet, restricting use of sensitive trails during spring breakup or periods of high rainfall may significantly reduce trail degradation. Also designating winter-season trails that cross wetlands as 'WINTER ROUTES ONLY' would significantly reduce impacts on sites that are extremely sensitive to impact by motorized vehicles during summer months.

Type-of-use restrictions limit the kind of equipment allowed on trails. For example, restricting gross vehicle weight to less than 1,500 pounds could significantly reduce the size of equipment operating on a trail. This would allow managers to build trails to a much lower design specification than when weight is unlimited.

In general, the potential of trail activities to create impacts ranges from slight to heavy as shown in table 6.

Reducing the types of use would lessen the potential for impact. Successfully restricting trail use requires user cooperation and enforcement. Signs, gates, and barriers aren't enough to discourage some users, so public education and development of alternative routes on more resilient trails are needed to encourage compliance.

Table 6—Activities that have the potential to impact trails.

Impact	Use	
Generally slight ∨ **to** ∨ **Potentially heavy**	**WINTER, WITH FROZEN GROUND AND ADEQUATE SNOW COVER:**	
	Nonmotorized (Minimum snow cover 6 inches)	**Motorized** (Minimum snow cover 12 inches)
	Skiing/snowshoeing	Snowmobiling
	Dog sledding	
	SUMMER, WELL-THAWED GROUND:	
	Nonmotorized Hiking	**Motorized** Light, tracked vehicles
	Mountain biking	Motorcycle riding
	Horseback riding	OHV riding (less than 1,500 pounds gross vehicle weight)
		Unlimited off-highway vehicle use

Controlled Use (Traffic Volume Restrictions)

Controlled use is another management option when responding to trail degradation. Trail degradation occurs when use exceeds the ability of the trail surface to resist impact. Controlling the level of use can be a powerful tool in reducing impacts. Determining the appropriate level of use can be difficult, especially since a trail's resistance to impact can change with weather and type of use. Good decisions require knowledge of existing trail conditions, patterns and levels of use, and trail condition trends. If trail conditions are stable under existing loads, no volume restrictions may be necessary. If trail conditions are deteriorating, traffic volume may have to be decreased or trail surfaces may need to be modified to support the increased use.

Managing trails through controlled use is complicated because there may not be a linear relationship between use levels and impact. Typically, after a certain level of impact is reached, trails will continue to degrade without any further use. This is clearly the case when vegetation stripping exposes soils to erosion. Finding the balance between appropriate levels of use and acceptable impacts is a resource management art form, ideally backed up with good monitoring of the level of use and resource damage.

Controlled use also requires an authorized and determined enforcement presence. This may not be readily available. But where it is, monitoring impact and setting the allowable use may be a good management approach to controlling degradation problems.

Trail Hardening

Another management option is trail hardening. Trail hardening is a technique of modifying trail surfaces so they will support use without unacceptable environmental impacts to vegetation, soils, hydrology, habitat, or other resource values. Trail hardening should be considered under the following conditions:

➢ Existing trail impacts are causing or are projected to cause unacceptable onsite or offsite impacts, and

➢ More suitable alternative trail locations are not available, or

➢ Alternative trail locations are not environmentally acceptable or economically feasible.

Trail hardening provides the following benefits:

➢ Defines a single trail alignment for vehicle travel.

➢ Stabilizes surface soil conditions along the hardened trail section.

➢ Provides a stable, durable trail surface for OHV traffic.

➢ Halts trail widening and the development of braided trail sections.

➢ Allows formerly used trail alignments to naturally stabilize and revegetate.

➢ May provide for vegetation growth (or regrowth) within the hardened trail surface that helps to reduce visual impacts, maximizing site stability and increasing site productivity.

Trail hardening seeks to improve trail surfaces by one of three methods:

➢ Replacing or capping unsuitable surface soils.

➢ Reinforcing or augmenting existing soil structure.

➢ Providing a 'wear and carry' surface over unsuitable soils.

The goal of trail hardening is to reinforce soils so they will support a specified level of use under all environmental conditions. Because of the range of trail-hardening methods available, a trail manager must select a method that provides maximum utility for the investment in time, labor, and cost. Utility includes site stabilization, resource protection, and suitability for use as a surface for OHV traffic (figure 8).

The following section introduces a number of trail-hardening techniques.
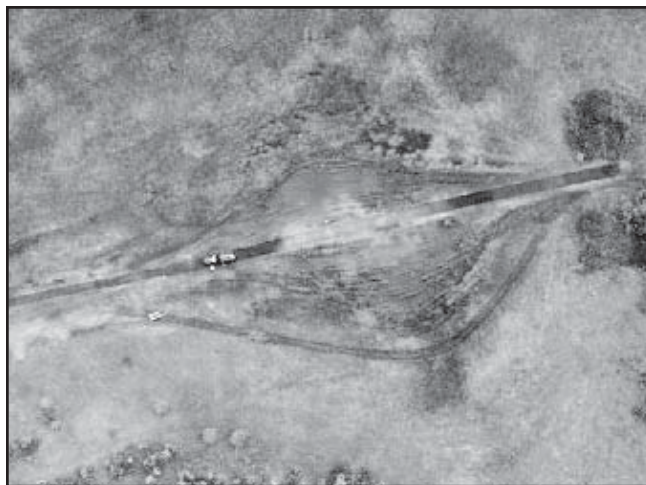

Figure 8—This aerial image shows a recently installed section of hardened trail crossing a wetland in southcentral Alaska. The new trail alignment defines a single route of travel that will prevent the continued development of braided trails.

Replacing or Capping Unsuitable Soils—Replacing unsuitable soils is the most intensive, trail-hardening technique. Problem soils are excavated and removed until a subbase of competent subsoils or gravel has been exposed. High-quality material is placed over the subbase to bring the trail surface up to the trail's original level. This process is appropriate for trails with a suitable subbase close to the surface and a convenient source of high-quality fill. The work generally requires heavy equipment. It is most appropriate near trailheads and along highways where heavy equipment can be used to good advantage.

Where a suitable subbase is not close to the surface or excavation work needs to be minimized, geotextile fabrics may be used to provide a base for surface capping. The use of geotextile materials extends the application of capping to many areas where removal of substandard surface soils is impractical.

Geotextiles, also known as construction fabrics, are widely used in roadways, drains, embankments, and landfills. They are constructed of long-lasting synthetic fibers bonded by weaving, heat, extrusion, or molding. They come in a wide variety of types including fabrics, sheets, or three-dimensional materials. They can be pervious or impervious to water passage.

Geotextiles provide four important functions in road and trail surface construction:

➢ Separation ➢ Reinforcement
➢ Stabilization ➢ Drainage

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These functions are illustrated in figures 9a, 9b, and 9c. Geotextiles work as separation fabrics when they are placed between gravel caps and underlying soils to prevent the materials from mixing. The geotextile serves to maintain the original thickness and function of the gravel cap as a load-bearing layer. Geotextiles increase soil stabilization by maintaining the load transfer capability of the gravel cap. This increases effective bearing capacity and prevents subsoil pumping. Geotextiles reinforce soils by providing a structure to bond the gravel cap and underlying soils. The geotextile fabric locks the two materials
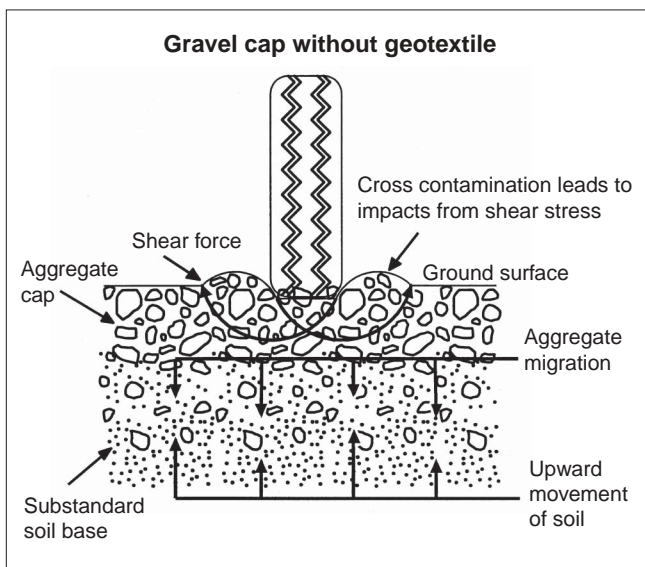

Gravel cap with geotextile

Shear force contained within gravel cap

Ground surface

Aggregate carries load

Increased stabilization

Improved drainage

Improved drainage

Separation

Geotextile acts as a soil reinforcement layer

Distributed load

The addition of a geotextile creates a broad base that distributes the load, increasing bearing strength and reducing pumping action.

Figure 9c—Gravel cap with geotextile. Using a geotextile enhances trail performance through separation, stabilization, reinforcement, and drainage.

Gravel cap without geotextile

Cross contamination leads to impacts from shear stress

Shear force

Aggregate cap

Ground surface

Aggregate migration

Substandard soil base

Upward movement of soil

Figure 9a—Gravel cap without geotextile. The aggregate cap will lose strength as the gravel is contaminated by the subbase.

together and allows the soil to receive a load across a broader footprint. Geotextiles also help maintain the drainage characteristics of the gravel cap. In addition to use in trail tread, geotextiles can have important applications in erosion control, drainage interception (sheet drains), and ditch liners.

Site conditions such as soil texture, moisture, depth to foundation materials, and the type of use indicate when a geotextile fabric should be used. Because gravel is difficult and expensive to deliver onsite, the use of a separation fabric makes good economic sense to protect the function of the gravel cap. The use of a geotextile fabric requires adequate capping (a minimum of 6 inches) and regular maintenance to maintain the cap. Regular maintenance prevents the geotextile fabric from being exposed at the surface.

The National Park Service experimented with the use of geotextile and gravel placement during the summer of 1999 on degraded trail segments of a former mining road connecting two administrative sites in the Yukon-Charley Rivers National Preserve (Meyer 1999a). About 678 feet of geotextile with a 4- to 6-inch gravel cap was installed over soils in areas that crossed melted permafrost soils. Using this technique, the road alignment was reclaimed as an OHV trail.

Gravel cap with geotextile

Aggregate cap

Ground surface

Drainage

Drainage

Separation

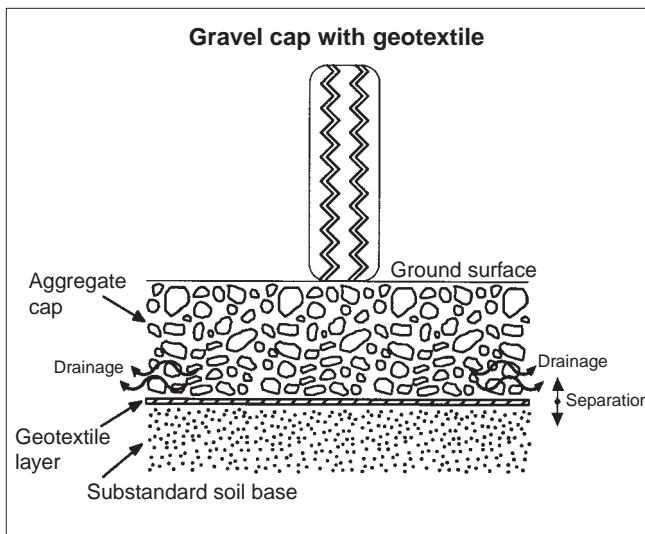Geotextile layer

Substandard soil base

Figure 9b—Gravel cap with geotextile. The geotextile layer prevents the migration and contamination of the surface gravel cap by underlying poor-quality soils.
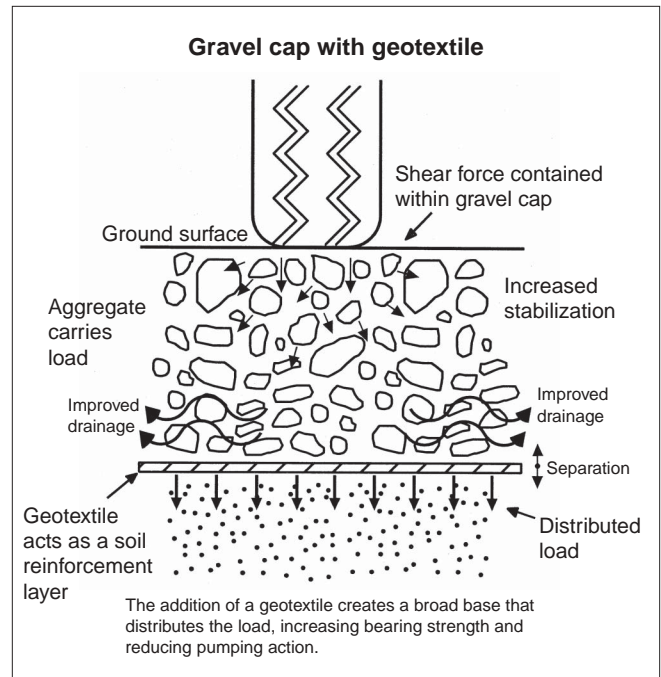
Geotextile and gravel placement is relatively simple. The Yukon-Charley approach was adapted from Forest Service methods (Monlux and Vachowski 1995, figure 10). This technique provides a rim structure to minimize the loss of cap material (figures 11 and 12). A local source of suitable gravel was identified. One-half-cubic-yard belly dump trailers, loaded by a skid-steer loader and towed by 4x4 OHVs, transported gravel to trail construction sites.

Figure 11—The author installing woven geotextile around a rim log in the geotextile gravel-capping test installation at the Yukon-Charley Rivers National Preserve in Alaska. The rim log held the gravel cap on the installation.

Adapted geotextile installation

Geotextile

Gravel fill
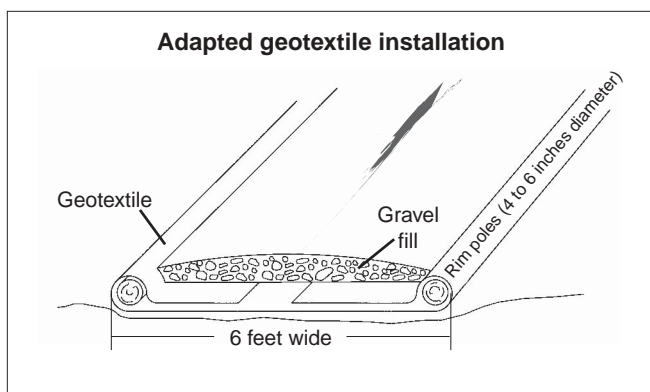
Rim poles (4 to 6 inches diameter)

6 feet wide

Figure 10—Adapted geotextile installation design.

About 45 labor days and 80 cubic yards of gravel were required to construct 678 linear feet of 6-foot-wide trail, roughly 45 work hours per 100 feet of hardened trail. Construction efficiency dropped considerably when construction sites were more than one-quarter mile from the gravel source because of the small size of the transport vehicles and the round-trip travel time. The loaded trailers, weighing about 2,000 pounds gross vehicle weight, also seriously degraded marginal trail segments along the haul route. Future operations at the site will use larger haul vehicles operating over frozen soils during the winter months.

The geotextile used on the project was AMOCO 2000, a light-grade woven synthetic fabric. The material cost about 5 cents per square foot, quite inexpensive, considering all other costs. Overall construction costs for the project were estimated at $3.60 per square foot using a labor rate of $18 per hour.

Cellular Confinement Systems—Cellular Confinement Systems (CCS) are three-dimensional, web-like materials (figure 13) that provide structural integrity for materials compacted within the cell. They are engineered so cell walls limit the transfer of shear forces within the soil. Employed worldwide for a wide variety of uses, cellular confinement systems are a well-accepted soil engineering tool (Ron Abbott 2000). In Alaska, these systems have been used with success on military runways and remote radar sites, Arctic tank farms, construction sites, and boat ramps (Joseph Neubauer 2000). The systems also have been

Figure 12—A geotextile and gravel-cap installation over permafrost-degraded soils in Yukon-Charley Rivers National Preserve in Alaska. Use of geotextile and a gravel cap on this trail allowed the National Park Service to construct a 6-foot-wide OHV trail over a 3- to 4-foot-deep muck hole.

used when constructing shallow-water fords in the contiguous 48 States (Forest Service 1987).

A cellular confinement system consists of a surface-aggregate wear surface, the cell membrane, fill material, and an optional separation fabric (depending on site characteristics). Fill material is usually imported gravel, but onsite material can be used in

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Figure 13—A cellular confinement system being installed on an experimental trail in southcentral Alaska. Four-inch-deep cells were formed by expanding the cellular product accordion style, then backfilling and compacting with a suitable fill material—in this case, sandy gravel. The sides of the installation were confined by a 6-inch-deep trench.

some circumstances (the use of onsite fill will be covered later). Installation of the system is labor intensive. The smallest cell commercially available is 4 inches deep. A minimum of 6 inches of fill material is required to fill the cells and provide a 2-inch wear surface, about 1 cubic yard of loose material per 6 linear feet of a 6-foot-wide trail. While the cell material alone costs about 70 to 90 cents per square foot, installation costs include the costs of any separation fabric, the fill, cap material, transportation of materials, cell panel connectors, and excavation of a trench or the construction of a curb or rim to confine the materials.

Test installations of cellular confinement systems for trail use in the contiguous 48 States have shown mixed results (Jonathan Kempff 2000). While the systems provided excellent structural reinforcement for soils, maintaining the surface wear cap to protect the cell membrane has been difficult. Without adequate curbing, capping material tends to erode from the cell surface. This is particularly true on sloped surfaces. With the loss of capping material, the cell membrane becomes exposed to damage by trail users. Although such damage usually doesn't significantly affect the cell's strength, exposed cells are unsightly and create a tripping hazard.

A somewhat similar problem occurred in the Bureau of Land Management's White Mountains District in Alaska. The agency reported mixed to poor results using cellular confinement systems on roadways in the Fairbanks area (Randy Goodwin 2001). Cellular confinement systems were used to cap four culvert installations on the Nome Creek road. The systems were installed in 50- to 200-foot segments to provide a stable

fill road surface. Spring melt of overflow ice (aufeis), that typically plugs the culverts, scoured fill material out of the web cells each year. Replacing the fill without damaging the cell structure was difficult and time consuming.

Also in Alaska, about 900 feet of cellular confinement systems, with recycled asphalt fill and cap, were installed in 2000 on an access trail in the Turnagain Pass area by the Forest Service (Doug Blanc 2001). Based on the success of that installation, the Forest Service is planning another 3-mile installation adjacent to a visitor center. Both trails were designed to meet the requirements of the Americans With Disabilities Act and are not representative of remote OHV trails. A more representative installation is a 20-foot test installation at Palmer Hay Flats State Game Refuge (figure 13). Since its installation in August 2000, the trail surface has been performing well, but the capping material has begun to show signs of erosion (Colleen Matt 2001).

Cellular confinement systems are manufactured under a variety of trade names, including Geoweb, Envirogrid, and TerraCell.

➢ Geoweb is available from Presto Plastic Co., phone: 800–548–3424.

➢ Envirogrid is available from AGH, phone: 713–552–1749.

➢ TerraCell is available from WEBTEC, phone: 800–438–0027.

Reinforcing or Augmenting Soil Structure—Reinforcing or augmenting existing soil structure is a method that adds material to existing soil to improve its engineering characteristics. Unlike excavating and replacing substandard soils, this method works with the native in situ soil material. The two major types of material are soil binders and structural additives.

Binding agents come in two forms: chemical binders and physical binders.

*Chemical Binders—*The EMC SQUARED system is an example of a chemical binder. EMC SQUARED is a concentrated liquid stabilizer formulated to increase the density, cementation, moisture resistance, frost-heave resistance, bearing strength, shear strength, and stability of compacted earth materials. The highly concentrated product is diluted in water and applied as soil materials are mixed and compacted. The product is activated by biological catalyst fractions. According to the manufacturer, it is an environmentally friendly product. The system is supposedly effective with a wide range of aggregate and recycled materials, as well as clay and silt soils.

The primary binder in the EMC SQUARED system is Road Oyl, which has been used extensively as an aggregate binder for resin pavement mixtures. Road Oyl has demonstrated considerable success on urban and accessible trails for the

Forest Service, National Park Service, and other governmental and private organizations. Paul Sandgren, superintendent of the south unit of the Kettle Moraine State Park in southeastern Wisconsin, reports good success with Road Oyl in binding aggregate-capped mountain bike trails. The park's south unit, which receives heavy mountain bike use from surrounding urban areas, found annual applications of the binder worked well in reducing the displacement of a surface cap of $\frac{3}{4}$-inch crushed limestone (Paul Sandgren 2001).

Test applications of chemical binders in Alaska have proved disappointing. The municipality of Anchorage experimented with the use of a chemical binder on an urban access trail with poor results. The material failed to set up properly. In areas where the material set up, the surface was very slick. Whether the problem was caused by climate or improper installation was never resolved (Dave Gardener 2001). Denali National Park and Preserve has also experimented with a variety of chemical binders as dust suppressants on a gravel road that serves as the primary access for the park. To date, results have been disappointing (Ken Karle 2000)

Chemical binders such as Road Oyl have the greatest potential application in urban areas and at trailheads where high-quality gravel or recycled materials are available. They have yet to be tested on degraded OHV trails in remote locations where unsuitable soil materials, high moisture levels, inability to use heavy equipment, and severe climatic conditions would present challenges for this technique.

The EMC SQUARED system and Road Oyl are available from Soil Stabilization Products Company, Inc., of Merced, CA. Phone: 209–383–3296 or 800–523–9992. Other chemical binders available on the market include:

➢ **Stabilizer** (4832 East Indian School Rd., Phoenix, AZ 85018. Phone: 800–336–2468).

➢ **Soil-Sement** (Midwest Industrial Supply, Inc., P.O. Box 8431, Canton, OH 44711. Phone: 800–321–0699).

➢ **Pennzsuppress D** (John Snedden, National Sales Manager, Pennzoil Products Co., 100 Pennzoil Dr., Johnstown, PA 15909).

Physical Binders—Fine-textured native soil is an example of a physical binder. It can be used where trails are constructed with coarsely textured aggregate or washed gravel. Soil material containing high sand- and silt-sized fractions is used to fill voids between gravel- and cobble-sized material. The fine materials help "bed" the larger material, reducing displacement, improving the quality of the travel surface, and helping vegetation to become established.

Structural Additives—Another method of augmenting an existing soil structure is to add a physical component to the soil body. This can be as an internal structural member or as a surface feature.

Internal Structural Member—The use of cellular confinement systems to reinforce sandy soils is an example of adding a physical component to an existing soil structure. The original soil is excavated and used as fill and cap material. The cells of the cellular confinement system add a structural component to the sand that prevents shear force transfer and soil failure. This method was tested by the U.S. Army Corps of Engineers (Webster 1984; Purinton and Harrison 1994) and applied during Operation Desert Storm to construct sand roads capable of carrying heavy military traffic. The technique has also been applied by an American oil company to build roads through the Algerian Sahara Desert (Presto 1991). Using a cellular confinement system would be an excellent method to stabilize trails that cross sandy soils.

Another method used by the Forest Service (Kempff 2000) and recommended by the American Motorcyclist Association (Wernex 1994) is to embed concrete blocks in the body of the soil. The concrete block, installed with the block walls in a vertical position, provides a hardened wear surface. The open cell structure of the block prevents shear force from being transferred. This method may have applications where blocks can be readily transported to degraded trail sites, but has limited application in remote locations. Blocks are available that are specially designed for OHV trails. They are not as thick as normal construction blocks, and have a different grid pattern.

Surface Feature—The geosynthetics industry has developed a class of materials known as 'turf reinforcement' materials. These products are designed for installation at or near the surface to reinforce the surface vegetation mat. The Park Service experimented with one of these materials in a series of test plots established as part of an OHV trail mitigation study conducted in the Wrangell-St. Elias National Park and Preserve in Alaska. In 1996, the Park Service installed four 40-foot test sections of a combination of a drainage mat (Polynet) with a turf reinforcement mat (Pyramat) over moderately degraded OHV trails. Polynet is a $\frac{1}{8}$-inch-thick polyvinyl chloride (PVC) material, resembling expanded metal decking. Pyramat is a $\frac{3}{4}$-inch-thick, finely woven polypropylene product in a pyramid-shaped microweave pattern (figure 14).

The manufacturer had extensively tested Pyramat as a soil-reinforcement product. The company had documented significant increases in resistance to erosion and shear stress after vegetation regrowth (Synthetic Industries 1999). The National Park Service tested both turf reinforcements to see whether they would support existing roots and cushion soil bodies from direct impact. Polynet provided a wear surface, while the open weave of Pyramat allowed for active plant growth and eventually was integrated into the soil surface layer.

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Figure 14—Polynet over Pyramat was used in this National Park Service installation to test the addition of a synthetic turf reinforcement mat. The Polynet, with its more durable wear surface, was installed over the less durable Pyramat.

The Park Service field tests were encouraging because the materials appeared to protect the underlying soils from impact. They stabilized degradation and provided a durable wear surface for OHV use. Vegetation regrowth on the sites increased from 54-percent cover at installation to 79.5 percent 3 years later (figure 15). On sites with a high percentage of sedge and cotton grass, the materials were well integrated into the root mass by the end of the second year.

Figure 15—A Park Service Polynet/Pyramat test installation after 3 years in a wetland area with a high percentage of sedge. By the third year, sedge had become well established and its roots well entwined with the Pyramat matting.

The products worked fairly well to stabilize trail degradation, but were difficult to install and maintain. They had a poor appearance. The material installation cost of the two products was $4 per square foot. It took 26 hours to install 100 linear feet of a 6-foot-wide trail. The full results of the test are detailed in the report, *All-Terrain Vehicle (ATV) Trail Mitigation Study: Comparison of Natural and Geosynthetic Materials for Surface Hardening* (Allen and others 2000).

Pyramat has also been used to reinforce foot trails and provide erosion control at a portage on Jim Creek, a tributary of the Knik River in the Matanuska Valley near Palmer, AK. Nancy Moore, who works for the Alaska Center for the Environment, coordinated the installation of a 90-foot-long by 8-foot-wide strip of Pyramat at the site in the summer of 2000. The mat was laid on the soil surface, capped with pit-run gravel and topsoil, and seeded to reestablish vegetation. According to Moore, the installation was successful in stemming erosion and improving trail conditions (Moore 2001).

Appendix A identifies the attributes of the Polynet/Pyramat combination and compares the combination with other products tested by the Park Service. While this combination of products may have utility in other applications, it is not considered suitable for hardening OHV trails because of the difficulty of installation and the limited durability of the wear surface.

Providing a Wear-and-Carry Surface Over Unsuitable Soils—The final method of trail hardening is to provide a wear-and-carry surface over unsuitable soils. Typically, this is accomplished by installing a semirigid structural component on the soil surface that provides a durable wear surface while distributing weight over a broad soil area. In this manner, the material "carries" the weight of the load, rather than directly transferring it to the underlying soil.

The methods of wear-and-carry, trail-hardening techniques for OHV trails discussed in this document include:

- Corduroy
- Wood matrix
- Puncheon
- Porous pavement panels
- Surface matting

These methods are expensive and labor intensive. It is not practical to use this method to harden the entire length of a trail. It should only be used to harden those segments that cannot be rerouted to more suitable locations or managed to reduce impacts.

Much of the following discussion is drawn from the author's personal experience with trail hardening tests conducted in Alaska. This experience includes a formal study conducted in Wrangell-St. Elias National Park and Preserve, mentioned in

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a previous section (Allen and others 2000), data obtained from other test installations, independent research, and conversations with other professionals.

Corduroy—Corduroy has been commonly used to harden trails in Alaska. Many of the first wagon trails in the State were constructed as corduroy roads. It is not uncommon to see corduroy being excavated during roadwork today. In traditional road construction, the corduroy logs were covered with soil or a gravel cap to provide a smooth and durable road surface. Burying the poles beneath the surface cap also served to preserve them. This was especially true when the poles remained water-saturated under acidic soil conditions.

For most trail applications, corduroy is not covered with a surface cap. This is primarily due to the scarcity of quality cap material and the expense of hauling the material to installation sites. When corduroy is exposed to the air with frequent wet/dry cycles, its longevity is significantly shorter than if it was buried. Fastening the individual poles together is another challenge. Poles can be secured by weaving them with line, spiking them to sill or rail logs, or threading them with rope or cable. Corduroy provides a suitable, if somewhat rough, surface for OHV and foot traffic. Also, woven or threaded corduroy floats on water so it does not provide a stable surface for ponded areas.

The Park Service tested corduroy as one trail-hardening technique in the Wrangell-St. Elias study (Allen 2000). Although corduroy was somewhat labor intensive to install, the expense of installation was mitigated by the low cost of materials. The Wrangell-St. Elias study identified a material installation cost of about $1.75 per square foot. About 25 hours were required to install each 100-foot section of 6-foot-wide trail (figure 16).

Corduroy may also have an environmental cost if trees are harvested in sparsely timbered areas. Three to four poles are required for every linear foot of 6-foot-wide trail. The management tradeoff of harvesting trees to mitigate trail impacts needs to be evaluated for each installation site. Appropriate thinning methods can mitigate impacts of timber harvesting. Harvesting poles offsite can also mitigate impacts.

Appendix A has more detailed information about the benefits and drawbacks of corduroy. Corduroy is considered a suitable trail-hardening material for relatively short sections of trail when timber is available locally.

Wood Matrix—Wood matrix was another trail-hardening method tested by the Park Service in the Wrangell-St. Elias study (figure 17). The wood matrix was a wooden grid structure constructed of rough-cut, 2- by 4-inch timbers that were notched and fitted to form an 8- by 8-inch open grid. The surface of the grid formed the wear surface. The interlocked timbers carried and distributed the load across the soil surface. The technique was adapted from an approach developed in Britain (Shae 2000).

Figure 16—Spruce pole corduroy laid across permafrost soils in Alaska. These poles were imported to the site and secured by weaving them with three strands of $\frac{3}{8}$-inch nylon line.
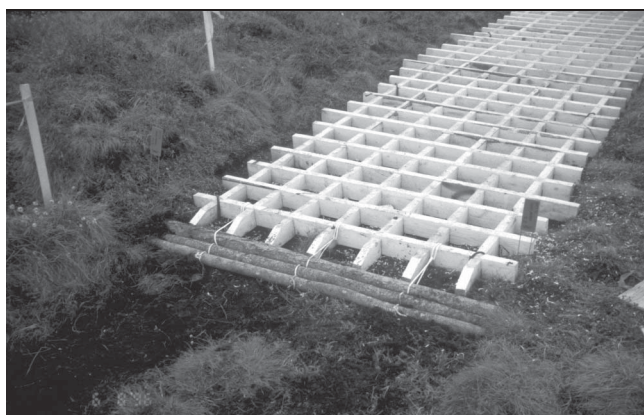

Figure 17—Wood matrix after installation in the Wrangell-St. Elias National Park and Preserve in Alaska. The wood matrix provided a suitable surface for OHVs, but had several characteristics that limited its suitability for future field applications.

The grid formed a rigid unit that had excellent load transfer characteristics, but was too inflexible to conform well to terrain. Although raw materials were cheap, preparing and fitting the joints was very labor intensive. The green, untreated lumber warped, was difficult to fit together in the field, and was subject

to breaking at the joints. It was also subject to rot and showed visible signs of deterioration within the first year.

The installation cost for the wood matrix was $2.90 per square foot. About 70 hours were required to install a 100-foot section.

Additional information on the suitability of wood matrix for trail hardening is included in appendix A. Because a wood matrix installation entrapped wildlife in one case, it was removed from the Wrangell's test plots during the second season of the study. That concern and other factors of the material limit its suitability for future trail-hardening applications.

Puncheon—Constructing puncheon (a type of elevated board-walk) for wet and muddy footpaths has been a standard construction technique for many years. Recently, its use in providing a hardened trail surface for ATVs has been pioneered by John Coila, an Alaska homesteader in the Kachemak Bay area of southcentral Alaska. Coila developed an installation similar to a standard Forest Service design called puncheon with decking (figure 18). Coila used locally available beetle-killed spruce and a portable bandsaw mill to produce the decking onsite.

Typically, Coila cuts timber adjacent to the trail from standing or recently fallen, beetle-killed spruce trees. Coila's slab-plank design uses two size classes of beetle-killed timber. Smaller diameter timber provides sills and stringers (figure 19). Larger diameter timber provides logs for planking. Sill timbers are 12 feet long and stringer timbers are 24 feet long. The minimum top diameter of logs used for sills and stringers is 7 to 8 inches. Bark is not typically stripped off the logs, nor are the sill or stringer logs milled in any fashion. The plank log diameter is controlled by the size the mill can accommodate. Plank logs are cut to 6-foot lengths to ease handling and are milled into 2-inch-thick slabs. Planks are not square edged. All round-faced slabs are discarded. Each plank provides an average of 1 linear foot of boardwalk (figure 20).

Coila estimates the expense of the installations at about $5 per linear foot, with a construction rate of 50 to 100 feet a day for a three-person crew when timber is close at hand. Installations have been in active service for longer than 15 years with the occasional replacement of a surface plank. An installation guide for the technique has been prepared and is available from the author (Meyer 2001a).

Porous Pavement Panels—Porous pavement panels (PPP) are three-dimensional, structural geotextiles designed to provide a durable wear surface and a load distribution system for driveways, parking areas, fire and utility access lanes, golf cart paths, and approaches to monuments, statues, and fountains. The panels are intended to be installed over a prepared subbase and filled with soil. They are designed to support grass growth and provide a reinforced turf surface for light or

intermittent heavy traffic. In contrast to asphalt or concrete pavements, these porous pavement systems reduce surface runoff, increase infiltration, resist erosion, and enhance ground-water recharge.

The standard industrial installation technique is modified for hardening OHV trails. After surface leveling, the panels are installed directly over the existing trail surface. The grid cells are not backfilled unless fill material is readily available. After installation, the panel's surface provides a tread surface for vehicles, and the panel's structure distributes their weight. The open structure of the panels allows vegetation to grow through the panel after installation. On extremely muddy or boggy sites, a supplemental geotextile layer may be placed beneath the panels to increase flotation. Polynet PN3000, an open-grid drainage mat, has been used for that purpose in a number of test installations in Alaska.

One advantage of the panel system is the light weight of the panels (about 2 pounds per square foot). The panels do not add any significant weight load to wetland surfaces and have little impact on surface hydrology. Their use can dramatically reduce the need for culverts or other water transfer structures along the trail.
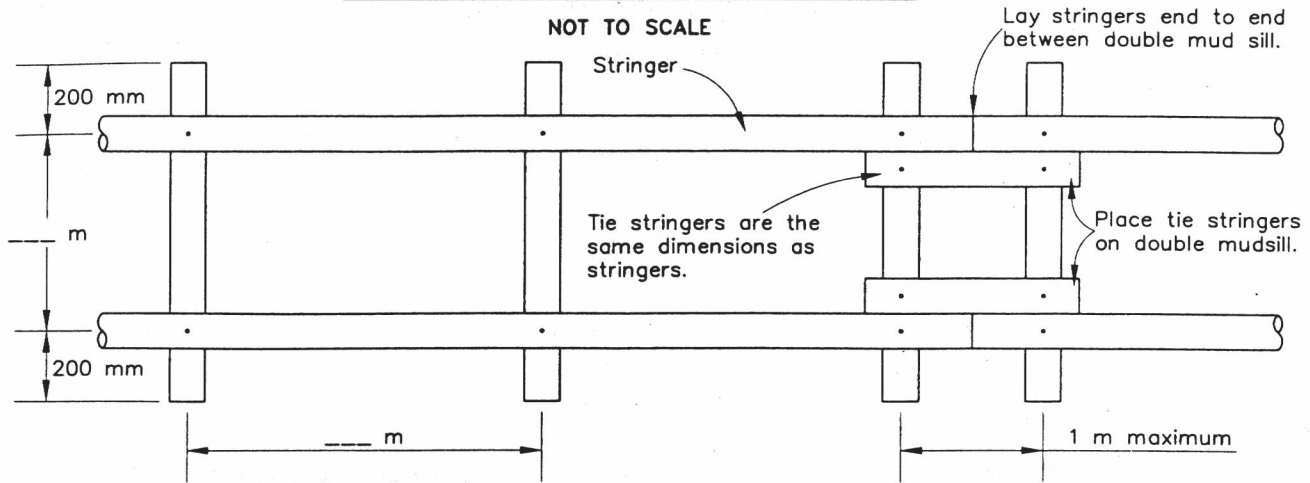
Two porous pavement panel products have been the subjects of extensive field testing in Alaska. They are GeoBlock (figure 21) and SolGrid (figure 22).

GeoBlock is a commercially developed porous pavement system manufactured by Presto Products of Appleton, WI. GeoBlock has been on the market, in one form or another, since the early 1990s and was specifically tested in two earlier configurations by the Park Service in the Wrangell-St. Elias National Park and Preserve. Its primary industrial applications are emergency vehicle lanes, light service roads, and auxiliary parking areas.
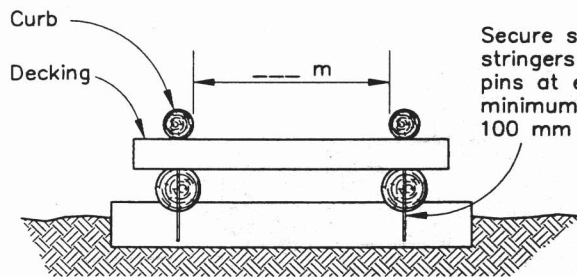
SolGrid is a commercial porous pavement system developed by SolPlastics, of Montreal, Canada. SolGrid is a newer product. It has a unique configuration that makes it suitable for irregular terrain and sloped areas. Its primary industrial applications are walkways, bikeways, golf cart paths, and driveways.

Both products are partially recycled polyethylene plastic panels about 39 inches long, 19 inches wide, and 2 inches thick. Geo-Block has also been manufactured as a $1\frac{1}{4}$-inch-thick panel. The panels are stabilized with carbon black to help them resist degradation by ultraviolet light. Both GeoBlock and SolGrid are constructed with an open grid surface and interlocking edges. The GeoBlock products have a 3- by 3-inch-tall vertical grid reinforced by a base sheet perforated with $2\frac{1}{4}$-inch-diameter holes on a $3\frac{3}{4}$-inch spacing. About 44 percent of the base is open. The GeoBlock products form a rigid panel with good weight transfer between panels.
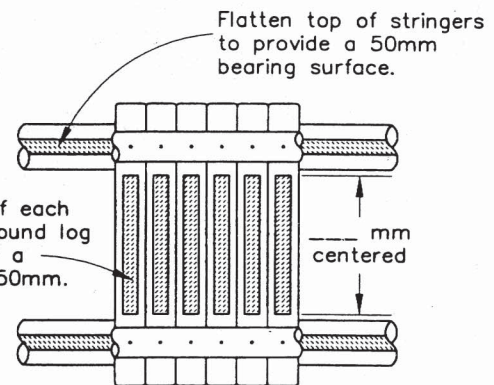
PUNCHEON WITH DECKING

NOT TO SCALE

Stringer

Lay stringers end to end between double mud sill.

200 mm

___ m

200 mm

Tie stringers are the same dimensions as stringers.

Place tie stringers on double mudsill.

___ m

1 m maximum
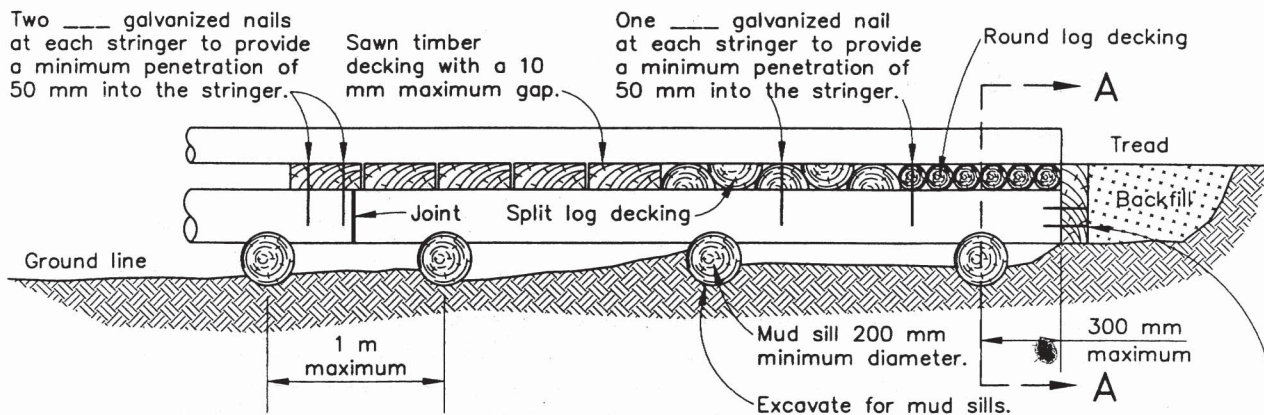
MUD SILL AND STRINGER LAYOUT

Curb

Decking

___ m

Secure stringers and tie stringers with 9 mm drift pins at each sill with a minimum penetration of 100 mm into the sill.

SECTION A-A

Flatten top of stringers to provide a 50mm bearing surface.

Flatten top of each split log or round log deck member a minimum of 50mm.

___ mm centered

PLAN VIEW

Two ___ galvanized nails at each stringer to provide a minimum penetration of 50 mm into the stringer.

Sawn timber decking with a 10 mm maximum gap.

One ___ galvanized nail at each stringer to provide a minimum penetration of 50 mm into the stringer.

Round log decking

A

Tread

Backfill

Joint   Split log decking

Ground line

1 m maximum

Mud sill 200 mm minimum diameter.

Excavate for mud sills.

300 mm maximum

A

Bulkhead:
Secure with a minimum of two galvanized spikes with a minimum penetration of 50 mm into the stringer.

SECTION VIEW

MEMBER	TYPE	SPECIES	SIZE (mm)	TREATMENT TYPE	MINIMUM RETENTION (kg/m3)
Stringer					
Deck					
Curb					
Bulkhead					

6/96   932-2

Figure 18—Forest Service Standard Drawing 932-2 of a puncheon with decking boardwalk trail. This design is similar to the one developed by an Alaskan homesteader to provide hardened trails for OHVs.

Figure 19—Rough layout of the sill and stringer timbers for puncheon trail construction over a wetland area in southcentral Alaska. Stringers are laid with tops meeting tops and butts meeting butts.

Figure 21—A GeoBlock panel. Note the edge tabs used to connect the panels and transfer loads between them.

Figure 20—A finished puncheon trail. Note the placement of the plank taper to accommodate the curves along the trail.

Figure 22—Two SolGrid panels. Note the U-shaped flex connectors between panel subsections.

The SolGrid product has a $2\frac{1}{2}$- by $2\frac{1}{2}$-inch-tall vertical grid pattern with an 8- by 8-inch subpanel. When assembled, subpanels form 16- by 16-inch weight-transfer panels. Flexible U-shaped connectors join the subpanels. There is no base sheet. About 85 percent of the grid surface is open for vegetation regrowth. Weight transfer between panels is poor because of the integrated flexible connectors. This can be mitigated somewhat by the use of supplemental geosynthetics underneath the panel. Polynet–PN3000 has been used for that purpose in Alaska and has demonstrated some benefit. The flexibility
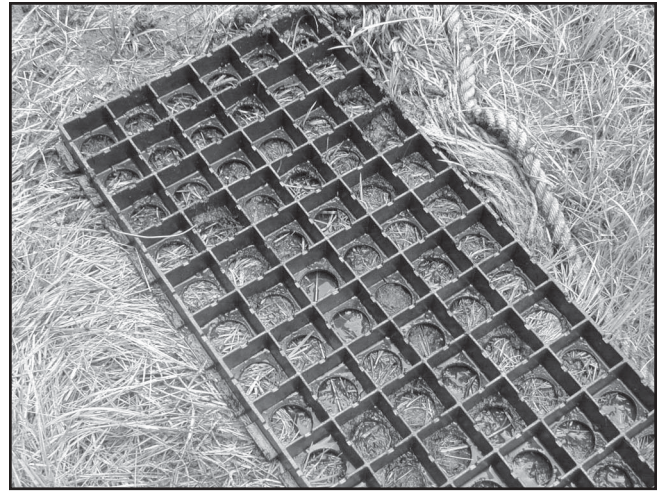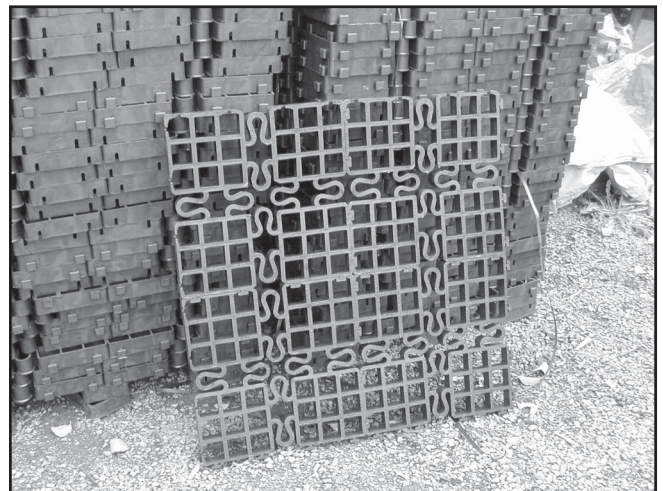
of the SolGrid panels increases their utility on irregular surfaces and on slopes. It also provides an integrated buffer for thermal expansion and contraction.

In 1996, earlier configurations of GeoBlock $1\frac{1}{4}$- and 2-inch panels were tested by the Park Service in the Wrangell-St. Elias trail mitigation study. The test demonstrated that the panels perform very well as trail-hardening materials. They provided a suitable wear surface for foot and OHV use and were easy to install. In addition, they readily facilitate vegetation regrowth.

Vegetation cover along two hardened trail segments increased on average from 70 to 90 percent and from 48.5 to 77.5 percent respectively, within the 4-year study period.

In 1996, the total installation costs for 100 feet of 6-foot-wide trail were:

1¼-inch GeoBlock
- $6.67 per square foot
- Installation, 32 hours
- Panel costs with shipping, $3.14 per square foot

2-inch GeoBlock
- $8 per square foot
- Installation, 36 hours
- Panel costs with shipping, $4.50 per square foot

Since 1996, GeoBlock panel costs have fallen to about $2.15 per square foot for the 2-inch panel, depending on volume. Presto no longer manufactures the 1¼-inch GeoBlock.

SolGrid costs about $1.60 per square foot, depending on volume. In some areas, SolGrid would require the use of a supplemental geotextile, such as Polynet PN-3000. This would add 15 to 25 cents per square foot to installation costs.

Both products have been tested in Alaska on OHV trails during 2000, 2001, and 2002. In 2000, two 100-foot test sections were installed on a dedicated recreation OHV trail in the Forest Service Starrigaven Recreation Area near Sitka. Several test sections of GeoBlock and one section of SolGrid were installed in cooperation with the Alaska Department of Fish and Game at the Palmer Hay Flats State Game Refuge near Palmer (figures 23 and 24). The Forest Service reports that the installations were more economical than the standard gravel cap placement and may be applied more widely in the future (LaPalme 2001).

The 2000 test project on the Palmer Hay Flats Game Refuge was successful enough for the department to install an 800-foot section in 2001. That installation included a 600-foot-long shallow underwater section that was supported by a base layer of geogrid and a gravel cap infill to ballast the installation to the pond floor. Also in 2001, the Bureau of Land Management sponsored test installations in the White Mountains National Recreation Area north of Fairbanks, AK, and the Tangle Lakes Archeological District west of Paxson, AK. More than 400 feet of hardened trail was installed at those two sites. In addition, a 300-foot test section was installed in the Caribou Lakes area on the lower Kenai Peninsula in Alaska. Average material costs ranged from $3 to $3.50 per square foot. Among the four sites, trail surfaces were constructed in 4.8-, 6.5-, and 8-foot-wide configurations. Labor requirements varied from 6.5 to 14 hours per 100 square feet, depending on site conditions, logistics, and layout configurations.

In the contiguous 48 States, GeoBlock was tested on the Wambaw Cycle Trail in the Francis Marion National Forest near

Charleston, SC. Sections of the trail had extensive trail braiding due to wet soils. Fifty-five feet of GeoBlock was installed with a clay-sand fill and a 2-inch cap over a geofabric layer. The installation completely stabilized the soils at the site. More than 3,500 passes had been made over the installation by enduro-type motorcycles within the first 3 months of installation. According to the project manager, not one vehicle has ventured
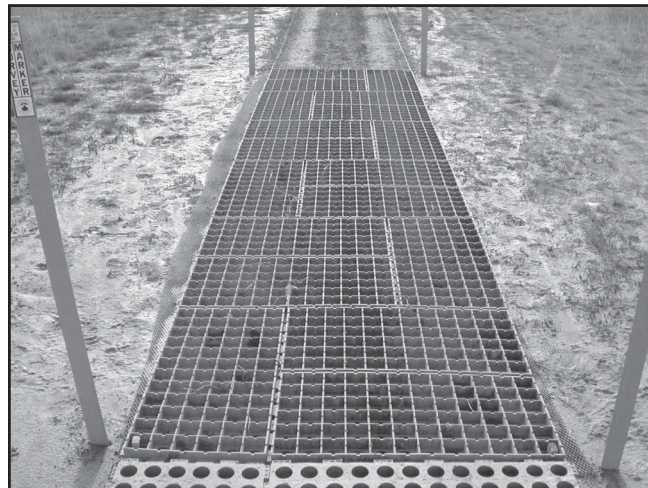

Figure 23—Test installation of 2-inch GeoBlock at the Palmer Hay Flats State Game Refuge in Alaska. This configuration of panels provided a 4.8-foot-wide trail. Note the interlocking tabs along the panel edges. These tabs transfer weight between panels. In this test, GeoBlock was installed over Polynet PN-3000.
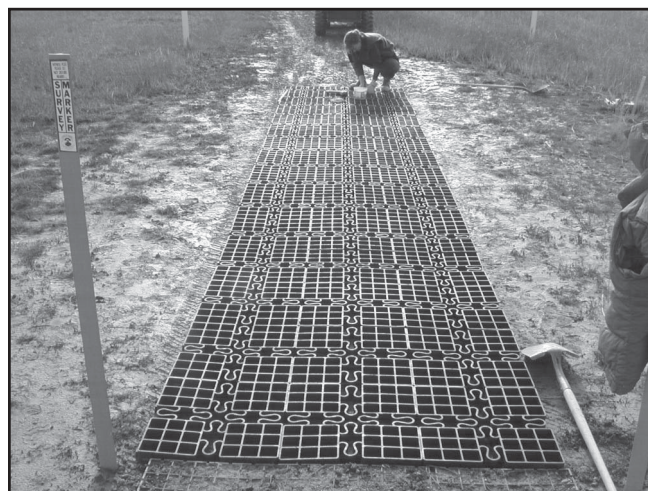

Figure 24—Test installation of SolGrid at the Palmer Hay Flats State Game Refuge in Alaska. Note the U-shaped flex joints between sub-panel sections. The SolGrid was tested without Polynet PN-3000 to test the characteristics of the product when installed on a soft, silty substrate.

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off of the hardened trail to further impact the wetland site. Except for minor rutting of the surface cap, there has been no noticeable wear to the surface of the GeoBlock panels (Parrish 2001).

Appendix A provides an evaluation of the two products. Geo-Block is highly suitable for use as a trail-hardening material. The $1\frac{1}{4}$-inch product, if available, would be suitable for most installation sites, while the 2-inch product could be used for extremely degraded segments, for crossing large ponded areas, and possibly for shallow water fords. SolGrid, which is still undergoing field tests, is suitable for irregular terrain and sloped areas, but is not as suitable for extreme conditions because of its limited ability to transfer lateral loads.

GeoBlock is available from Presto Plastics, Inc., P.O. Box 2399, Appleton, WI 54913. Phone: 800–548–3424; Web site: *http://www.prestogeo.com*

SolGrid is available from SolPlastics, 1501 des Futailles St., Montreal, PQ, Canada H1N3P. Phone: 888–765–7527; Web site: *http://www.solplastics.com*

Appendix B provides an installation guide for these products.

Matting—Matting is another method of wear-and-carry trail hardening. Metal matting was used extensively during World War II to reinforce soft soils during airport construction on tropical islands and at remote sites in Alaska. Some of those installations are still in place. The military stopped stocking metal matting in the 1950s and it is no longer manufactured. Its availability as a surplus material is very poor; therefore, it is not considered a viable material for trail hardening.

Matting available in the commercial market today is typically plastic decking or industrial antifatigue matting made from PVC or rubber. Plastic decking costs too much for trail hardening and is not discussed further. Rubber and PVC matting are somewhat more cost effective and are readily available. In contrast to the rigid porous pavement systems, matting is generally thinner and more flexible. It drapes across the terrain and provides an excellent wear surface, but has a limited ability to transfer lateral loads.

PVC Matting—Safety Deck was a commercially available PVC mat tested in the Wrangell-St. Elias mitigation study. Safety Deck is a high-density, semirigid, open-grid PVC mat that is $\frac{3}{4}$-inch thick. It was supplied in 20-inch-square tiles that were laced together with parachute cord (figure 25). Safety Deck was installed on moderately impacted trail surfaces so the need to transfer lateral loads wasn't too extreme. In this less demanding condition, Safety Deck provided an excellent surface for all forms of use. However, it was expensive to procure and time consuming to install. Safety Deck had good vegetation regrowth values with an increase from 69 to 91 percent mean cover over the 4-year study period.
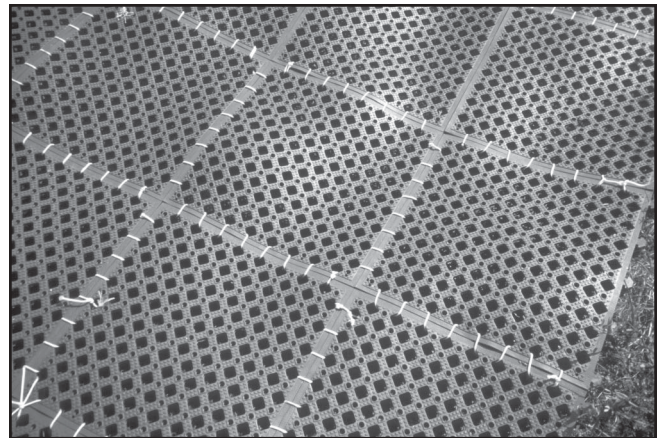

Figure 25—Safety Deck installed across a tundra surface in Wrangell-St. Elias National Park and Preserve in Alaska. Individual 20- by 20-inch tiles were lashed together with parachute cord and fishnet line. This time-consuming task drove up installation costs. The material performed very well on moderately degraded trails and provided an excellent surface for most uses.

Safety Deck was the most expensive material tested in the Wrangell-St. Elias study. Costs were $7.50 per square foot, including shipping. Forty-three labor hours were required to install a 100-foot-long, 6-foot-wide section of trail, for a total cost of $5,274 per 100 feet.

Appendix A shows the positive attributes of PVC Safety Deck. Although Safety Deck is a strong performer for moderately impacted sites, its high cost limits its use for most OHV trail-hardening applications. It may have excellent application on foot or horse trails where the volume of material is much reduced, or in providing a surface for accessible trails where the costs might be better justified.

Safety Deck is no longer commercially available. It was originally purchased from The Mat Factory, Inc., of Costa Mesa, CA, phone: 800–628–7626. The company carries a similar product called Dundee Grass Retention & Erosion Control Mat. That product sells for about $5.33 per square foot. Other PVC matting products may also be available.

Rubber Matting—Rubber antifatigue matting is commonly available in discount and hardware supply stores. Rubber mats are typically available in 3- by 3-foot panels, are $\frac{3}{4}$-inch thick and have an interlocking system along their edge (figure 26).

Omni Grease-Proof Anti-fatigue Mat (manufactured by Akro Corp. of Canton, OH) and Anti-fatigue Mat (manufactured by Royal Floor Mats of South Gate, CA) were tested in a preliminary field trial in the spring of 2000 by the National Park Service and the Alaska Department of Fish and Game at the Palmer Hay Flats State Game Refuge. The mats protected the soil surface and conformed well to surface terrain, but provided

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Figure 26—A section of rubber antifatigue mat undergoing preliminary field trials at the Palmer Hay Flats State Game Refuge in Alaska. The large panels install quickly, but the rubber's flexibility limits the panels' ability to transfer lateral loads.

no lateral load transfer. The wheel track was noticeably lower after 10 passes by an OHV on a silty substrate. The low rigidity of the rubber products and their inability to transfer load across the mat's surface limit their application for all but the lightest of impact areas.

A typical rubber mat sells for about $3.20 per square foot. Estimated installation time would be about 14 hours per 100 linear feet of 6-foot-wide trail.

Appendix A identifies a number of positive attributes of the rubber matting. Rubber matting is not suitable for trail-hardening applications on degraded trails because of its extremely low ability to transfer lateral load. Rubber matting would not prevent shear impacts on wet, finely textured soils. The material may have some limited applications before sites become degraded or could provide a temporary wear surface for special events.

Cost Comparisons for Trail-Hardening Techniques—Table 7 compares installation materials and labor costs for the trail-hardening methods discussed. The costs and hours of labor were developed for data in the Wrangell-St. Elias OHV mitigation study and other Park Service projects. These figures are rough estimates to assist in project scoping. Actual cost and the hours of labor depend on site conditions, logistics, and project design.

The test installations were small scale. Larger projects would benefit from volume discounts on materials and labor efficiencies. This is especially true when considering shipping costs of raw materials. The unit cost of shipping large quantities of bulky materials, such as the porous pavement products, can be much less than the cost of shipping small quantities.

Another important consideration is the cost of labor. The figures presented use an $18 per hour labor rate. This represents the cost of a typical government wage-grade seasonal maintenance worker in Alaska. The installation of trail-hardening materials is well suited for summer field crews, such as fire crews, Student Conservation Association crews, or volunteer crews. The work is relatively simple and doesn't require extensive use of power equipment. Fire crews filling in between fire calls or seeking early season training would be excellent sources of labor. The availability of cheaper labor could significantly reduce installation costs.

Table 7—Materials and labor costs of different trail-hardening methods.

Material	Cost per square foot ($)	Cost per 100 linear feet[1] ($)	Hours to install per 100 linear feet[1]	Labor costs per 100 linear feet[1] at $18 per hour	Installation cost per square foot ($)	Installation cost per 100 linear feet[1] ($)
Corduroy	1.00	600	25	450	1.75	1,050
Wood matrix	0.80	480	70	1,260	2.90	1,740
Onsite puncheon	0.83	500	24	432	1.55	932
Gravel/geotextile	2.25+[2]	1,350+[2]	45	810	3.60+[2]	2,160+[2]
GeoBlock, 1¼ inch	2.75	1,650	38	684	3.89	2,334
GeoBlock, 2 inch	3.50	2,100	40	720	4.70	2,820
SolGrid	2.25	1,350	40	720	3.45	2,070
PVC matting	7.50	4,500	43	774	8.79	5,274
Rubber matting	3.50	2,100	14	252	3.92	2,352

[1] Trails are 6 feet wide.   [2] Depends on gravel source and haul distance.

Trail Closure

The final management option to be discussed is trail closure. As a last resort, resource managers may close a trail to protect threatened resources. This would halt direct trail impacts, but might not halt secondary impacts, such as erosion and sedimentation. A trail identified for closure needs to be assessed and stabilized or reclaimed as necessary.

Closing a trail is seldom popular with trail users. Before the action is taken, the proposed closure should be discussed at a public forum. Alternatives to the closure—such as reroute options, seasonal or type-of-use restrictions, controlled use, trail hardening, or other surface improvements—should be addressed and evaluated. Agency budgetary and workforce limitations that may restrict implementation of alternatives should be discussed. User groups may offer to accept some of the responsibility of maintaining or implementing necessary trail improvements to avoid losing access.

In the contiguous 48 States, user advocacy groups such as the American Motorcyclist Association and National Off-Highway Vehicle Conservation Council have often been able to help facilitate projects that protect trail access while assuring resource protection. These on-the-ground projects have rallied a large response from volunteer groups and individuals who develop a certain "ownership" of the trail resources they are working to protect. Often the energy generated by a resource conflict has been harnessed by land management agencies to generate support for work that has prevented trail closure.

Status of Research

Research on the response to trail degradation issues is badly needed in all four aspects of OHV management: education, evaluation, engineering, and enforcement. In Alaska, the National Park Service's Rivers, Trails, and Conservation Assistance (RTCA) program is involved in research on several aspects of the trail degradation issue, including documentation of trail conditions, development of prescriptions, and trail hardening. The RTCA, in cooperation with a number of agencies, is conducting research on the use of porous pavement systems and is interested in investigating new products as they become available.

The RTCA program is also actively seeking information from other OHV research efforts with the hope of adapting proven techniques to the Alaska environment. In addition to conducting new investigations, the RTCA program is documenting past trials, experiments, tests, and temporary fixes. A wealth of information is available from those who have worked in the field through the years. Unfortunately, there has been a limited forum to document that information, exchange ideas, and share experiences. One of the goals of the Alaska RTCA program is to create that forum by conducting research, documenting work on the ground, and distributing information.

Appendix C lists projects the Alaska RTCA program was involved with during 2000, 2001, and 2002. Information on those projects is available for review. The RTCA staff hopes that the project list will grow longer, project reports will flourish, and the information generated will improve management response to trail degradation. The RTCA program invites all interested parties to contribute to that process.

Summary

Management of degraded OHV trails presents a significant challenge to resource managers. Degraded trails are already a serious problem in many parts of the country, and the mileage of degraded trails increases year by year. The degradation is fueled by an increase in OHVs and the limited number of areas that can sustain increased levels of use. The Specialty Vehicle Institute of America is a national nonprofit trade association representing manufacturers of all-terrain vehicles. According to the institute, the ATV industry has experienced double-digit growth for the past 5 years (Yager 2000).

The increased use of OHVs to provide access to the backcountry is having a dramatic effect on many trail systems. This is especially true in Alaska and other States with sensitive trail environments.

Simple observation of backcountry trails provides somber testimony to the conflict that is arising from the use of these vehicles across permafrost, wet or steep terrain, or other sensitive areas. It is well documented that a few passes can begin a pattern of degradation that is difficult—if not impossible—to stop. Increasingly, environmental observers are voicing concern over the expansion of OHV impacts: extended trail systems, degraded trail surfaces, and braided trail sections. Recently, concerns about secondary impacts have been voiced. These impacts include the effects of sediment on water quality, destruction of fish habitat, and threats to irreplaceable archeological values.

Responding to these impacts requires understanding the sensitive nature of onsite resources, particularly the soil. It requires understanding the dynamics of impact—how sites are affected and the patterns of degradation. It also requires the development of management components, such as documentation of baseline trail conditions and prescriptions for trail stabilization and recovery. Most importantly, it requires the development of alternative management options, such as trail rerouting, seasonal or type-of-use restrictions, use limitations, trail hardening, and trail closure.

This document provides an introduction to these topics. In college terms, it is 'Degraded Trails 101.' Unfortunately, there is no 'Degraded Trails 102' that answers all of the questions and solves all of the problems. At best, this document will stimulate resource managers who are struggling to respond to this issue in their own areas of responsibility. At worst, it will document some of the challenges faced by their contemporaries. In either case, the information is provided in the hope that it contributes to resolving the problems of trail degradation.

The author would appreciate receiving information from fellow trail managers on their experiences with managing degraded trails. Please send comments on management elements described in this document and descriptions of your field experiences—your successes and failures. Your contributions will bring us a little closer to developing a set of best management practices for OHVs that protect environmental values and access for OHV users.

The final photo (figure 27) shows Park Service geologist Danny Rosenkrans standing at the beginning of a 40-foot test installation of 2-inch GeoBlock installed in 1996 on the Reeve Field Trail in the Wrangell-St. Elias National Park and Preserve. The trail is unprotected in front of the installation and beyond it. The hardened trail section is supporting more than 90-percent vegetation cover with no detrimental impacts to the sensitive permafrost soils at the site. This is impressive, considering that the protected trail section had just received heavy OHV use. Unprotected sites farther down the trail were impassable. While all attempts to harden trails will not be as successful as this one, the photo clearly documents that options are available to address the problems of trail degradation.

Figure 27—A hardened, protected section of trail 4 years after installation.

Recommendations

The following list of recommendations for research, funding, and interagency coordination would advance the responses to trail degradation.

Research

➣ Conduct watershedwide trail system evaluations on representative areas to develop demonstrations of management approaches to trail degradation issues.

➣ Conduct large-scale installation tests of selected trail-hardening methods to develop efficient installation methods and strategies to reduce costs.

➣ Conduct additional tests of trail-hardening materials to explore uses of new products or adapt existing products to new uses.

➣ Conduct tests on the use of sheet drains in soil surface capping applications.

➣ Test the use of trail-hardening materials on slopes.

➣ Develop methods of constructing shallow-water fords and low-cost bridges.

➣ Conduct change-detection mapping at selected sites, using historic aerial photography to document the pattern of trail development and impacts over time.

➣ Conduct a wetland impact study to document species composition changes with impact and recovery rates and patterns.

➣ Develop relocation case sites where trails could be relocated from sensitive to more resilient sites.

➣ Investigate offsite and secondary impacts of degraded trails.

➣ Document the number of OHV vehicles purchased and used in each State, the patterns of use, and present and future socioeconomic effects.

Funding

➣ Develop funding sources to sponsor research and test installations.

➣ Identify grant programs, including Federal, recreation, and transportation programs.

➣ Develop volunteer labor pools to assist with installations.

➣ Explore section 404 of the Clean Water Act as a possible revenue source for wetlands mitigation.

Interagency Coordination

➣ Conduct statewide workshops on trail management.

➣ Develop work groups including representatives of Federal, State, and local governments and OHV users to address OHV impacts.

➣ Establish networks of interested parties.

➣ Establish Web sites to host trail-related 'Technical Notes.'

➣ Increase coordination among Federal and State agencies involved in trail management.

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# Appendix A—Subjective Evaluation of Off-Highway Vehicle Trail Treatment Options for Alaska

| Evaluation factors	Polynet/ Pyramat	Wood matrix	1¼- and 2-inch GeoBlock	SolGrid	PVC mat	Rubber matting	Woven corduroy	Onsite material-puncheon	Gravel/ geo-textile	GeoWeb
Ability to stabilize trail degradation	Fair	Good	Very good	Good	Very good	Poor	Excellent	Very good	Good	Good
Ability to promote trail regeneration	Fair	Good	Very good	Very good	Good	Poor	Poor	Fair	Very poor	Very poor
Suitability for vegetation regrowth	Fair	Good	Very good	Very good	Fair	Fair	Poor	Poor	Very poor	Very poor
General quality of traffic surface:										
• For OHV use	Fair	Fair	Good	Good	Excellent	Excellent	Good	Good	Good	Good
• For foot traffic	Poor	Poor	Fair	Fair	Excellent	Excellent	Fair	Good	Good	Good
• For heavy track vehicles	Poor	Good	Fair	Fair	Good	Good	Fair	Very poor	Good	Good
• For horses along trail	Poor	Very poor	Poor	Poor	Good	Good	Poor	Very poor	Good	Good
• For large wildlife crossing	Fair	Very poor	Fair	Fair	Good	Good	Fair	Very poor	Good	Good
Slipperiness of surface when wet	Fair	Good	Good	Good	Good	Good	Fair	Fair	Good	Good
Ability to provide level surface	Poor	Good	Good	Fair	Fair	Fair	Good	Good	Good	Good
Ability to conform to terrain	Fair	Poor	Fair	Very good	Excellent	Excellent	Good	Good	Good	Good
Suitability for installation on slopes	Fair	Good	Fair	Excellent	Excellent	Good	Fair	Fair	Fair-Poor	Poor
Ability to facilitate trail curves	Poor	Poor	Good	Good	Very good	Good	Very poor	Good	Fair	Poor
Ability to install over center hump	Good	Good	Fair	Good	Good	Good	Fair	Good	Good	Good
Ease of installation	Poor	Very poor	Good	Excellent	Fair	Very Good	Poor	Good	Fair	Poor
Ease of installation over existing vegetation	Poor	Good	Good	Good	Fair	Fair	Good	Good	Fair	Poor
Ease of transport to installation site	Excellent	Poor	Good	Good	Fair	Fair	Poor	Excellent	Fair-poor	Fair-poor
Weight of material/surface area	Low	Heavy	Low	Low	Low	Low	Heavy	Heavy	Heavy	Heavy
Susceptibility to displacement	High	Low	Low	Low	Low	Low	Low	Low	Low	Very low
Natural appearance	Poor	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair
General esthetics of installation	Poor	Fair	Good	Good	Good	Good	Good	Good	Fair	Fair
Visual "contrast" on installation	Moderate	Moderate	Moderate	Moderate	High	High	Mod	High	High	high
Visual "contrast" after revegetation	Good	Good	Good	Good	Fair	Fair	High	High	High	High
Public perception	Poor	Poor	Fair	Fair	Good	Good	Good	Good	Good	Good

Evaluation factors	Polynet/ Pyramat	Wood matrix	1¼- and 2-inch GeoBlock	SolGrid	PVC mat	Rubber matting	Woven corduroy	Onsite material-puncheon	Gravel/ geo-textile	GeoWeb
Negative effect on permafrost	None	None	None	None	None	None	None	None	None	None
Suitability for under-water application	Poor	Poor	Good	Poor	Fair	Poor	Poor	Fair	Fair	Poor
Longevity of product	Fair	Poor	Good	Good	Good	Good	Fair	Fair	Good	Good
Strength of material	Poor	Fair	Excellent	Excellent	Excellent	Fair	Good	Good	Fair	Good
Transfer of lateral load	Poor	Excellent	Very good	Poor	Fair	Poor	Good	Excellent	Good	Good
Maintenance requirements	High	High	Low	Low	Low	Medium	Medium	Medium	Medium	Low
"Environmental" cost of material	Low	Low	Low	Low	Low	Low	High	Low	Low	Low
Installation labor time	High	High	Low	Very low	High	Low	Medium	Low	High	High
Cost of material	Low	Low	Medium-high	Medium	High	Low	Low	Low	Medium-high	Medium-high
Suitable for use: L-M-H impacted areas	Light	Heavy	Heavy	Moderate	Moderate	Light	Heavy	Heavy	Heavy	Heavy
Overall suitability for use	Poor	Poor	Very good	Good	Good	Poor	Conditional	Site dependent	Good	Conditional
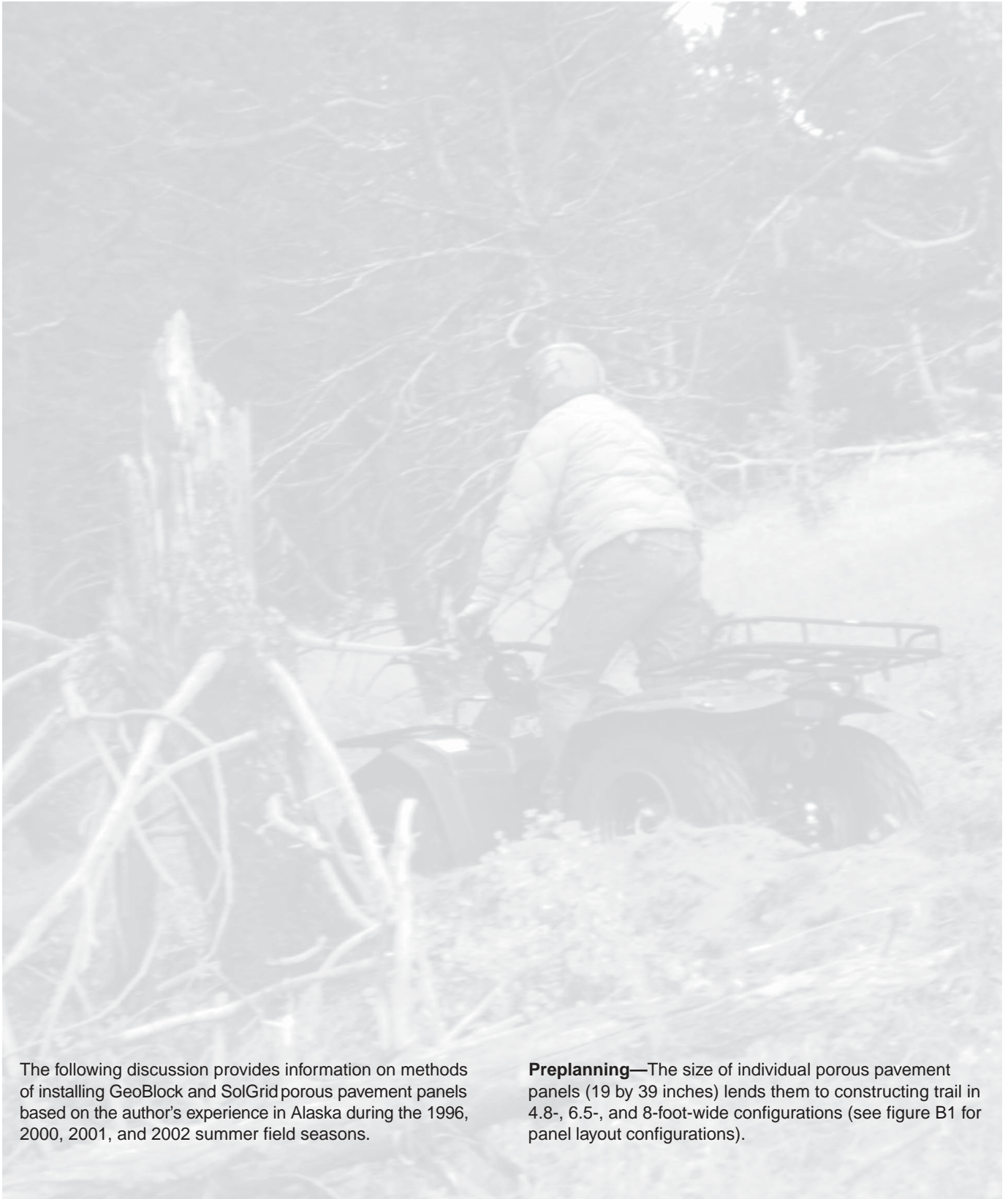
The following discussion provides information on methods of installing GeoBlock and SolGrid porous pavement panels based on the author's experience in Alaska during the 1996, 2000, 2001, and 2002 summer field seasons.

Preplanning—The size of individual porous pavement panels (19 by 39 inches) lends them to constructing trail in 4.8-, 6.5-, and 8-foot-wide configurations (see figure B1 for panel layout configurations).
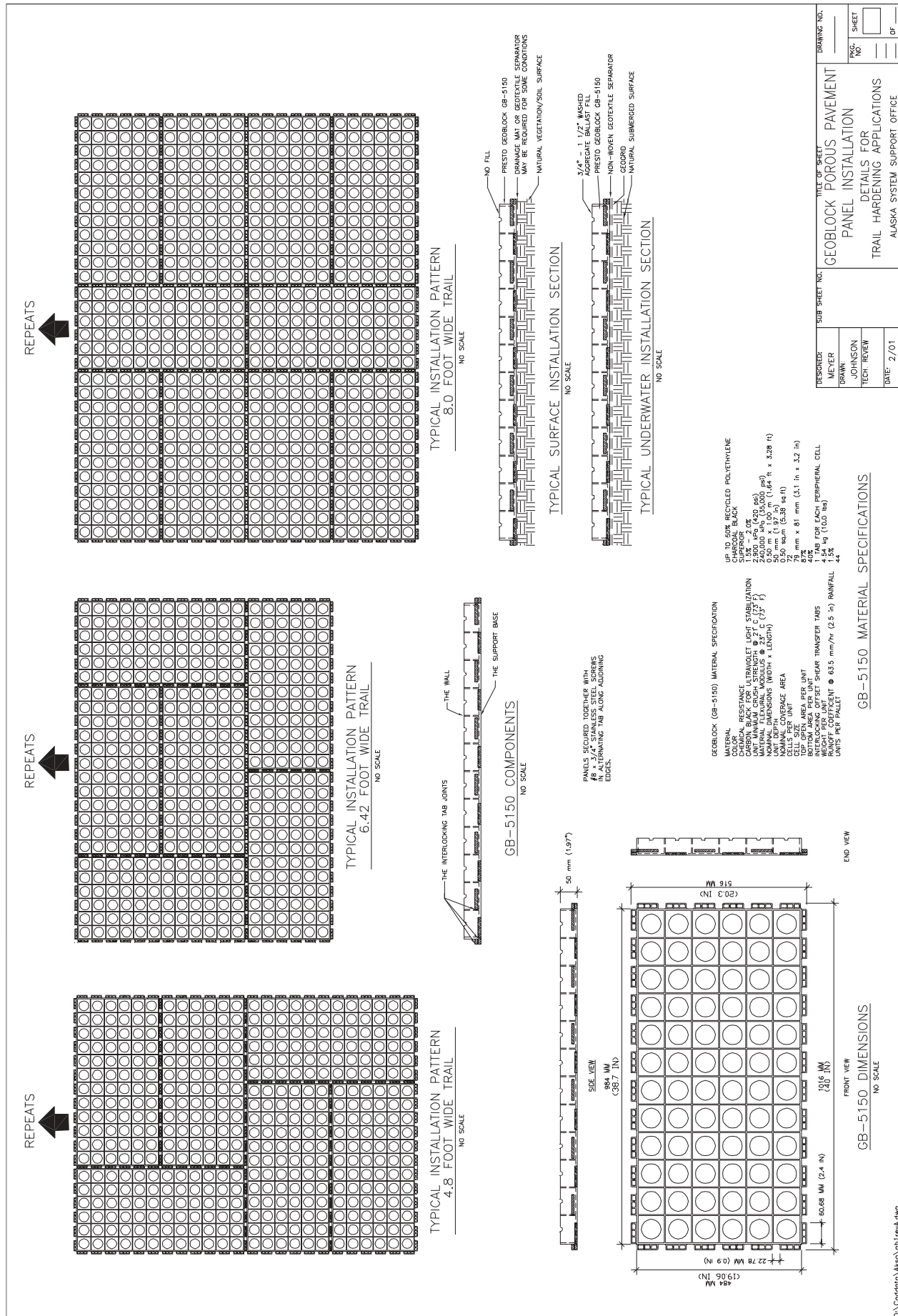
Figure B1—Typical panel layouts.

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Table B1 provides information for ordering material, based on typical installation configurations.

Table B1—Material layout specifications. (All prices depend on volume and are subject to change.)

PANELS	Dollars per square foot	Dollars per panel	Square feet per panel	Panels per pallet	Square feet per pallet
GeoBlock, 2 inch	2.15	11.57	5.38	44	236.72
SolGrid	1.53	7.83	5.12	78	399.36

	Linear feet per pallet at 4.8 feet wide	Dollars per linear foot at 4.8 feet wide	Linear feet per pallet at 6.4 feet wide	Dollars per linear foot at 6.4 feet wide	Linear feet per pallet at 8 feet wide	Dollars per linear foot at 8 feet wide
GeoBlock, 2 inch	49.11	10.37	36.87	13.81	29.48	17.27
SolGrid	83.20	7.34	62.40	9.79	49.92	12.23

18 panels per 20 linear feet at 4.8 feet wide • 24 panels per 19 linear feet at 6.4 feet wide • 30 panels per 19 linear feet at 8 feet wide

UNDERLAYMENT	Dollars per square foot	Dollars per roll	Roll size in feet	Linear feet per roll, 4.8 feet wide	Linear feet per roll, 6.4 feet wide	Linear feet per roll, 8 feet wide
Polynet PN-3000	0.32	1,527	14.4 x 300	600	600	450
Geogrid, Tensar 1100	0.25	540	13.1 x 164	328	328	164
Geogrid, Tensar 1200	0.40	854	13.1 x 164	328	328	164
Nonwoven geotextile 4545, 4-ounce	0.06	265	12.5 x 360	720	640	540
Nonwoven geotextile 4551, 6-ounce	0.08	360	15 x 300	600	560	500
Nonwoven geotextile 4553, 8-ounce	0.08	360	15 x 300	600	560	500

SCREWS
14 screws per linear foot for 4.8 feet wide
18 screws per linear foot for 6.4 feet wide
28 screws per linear foot for 8 feet wide

CABLE TIES About 100 ties per 100 feet of trail

GRAVEL
Requires 1 cubic yard of gravel per 14 linear feet at 4.8 feet wide
Requires 1 cubic yard of gravel per 10.5 linear feet at 6.4 feet wide
Requires 1 cubic yard of gravel per 8.5 linear feet at 8 feet wide

A typical installation requires the following:

Supplies
- $\frac{3}{4}$- to 1-inch No. 8 or 10 Phillips-head screws, galvanized or stainless steel (No. 8, 1-inch truss-head screws are generally the least expensive.)
- Quik Drive screws (TRSD34S) 2,500 screws per box (for use with Quik Drive system)
- Zip ties, 11-inch, 120-pound test (Catamount L-11-120-0-C or equivalent)
- One $\frac{1}{2}$-inch sheet of CDX plywood to help join panel sections (cut down to 24 inches wide and 1 foot longer than the installation width)
- $\frac{3}{4}$-inch CDX or all-weather plywood for joints (cut into 8-inch-wide strips the width of the installation)
- One 2 by 4 by 8 piece of lumber
- One 2 by 6 by 8 piece of lumber

Equipment
- At least two 400 cc or larger ATVs for transporting workers and equipment
- At least one flatbed or large-box ATV trailer for hauling panels
- At least one small-tub ATV trailer for hauling equipment and supplies
- Miscellaneous straps and tiedowns for trailers
- 5-gallon gas can
- Chain saw with chain oil and mix gas, or a portable circular saw for cutting panels
- Gas-powered weed trimmer with blade option
- Shovels, pulaskis, and rakes
- At least three portable drill drivers with extra battery packs (18 volts recommended)
- One Quik Drive automatic screw gun (modified No. PHD18R with head for $\frac{3}{4}$- to 1-inch screws)
- Utility knife
- Leatherman tool for clearing screw jams
- Tool belts, knee pads, drill holsters, and waterproof tool storage containers
- 100-meter tape measure, lath, flagging, marker pens
- First-aid kit, communications equipment, water, sunscreen, insect repellent, rain gear, and similar items

Labor
- Calculate 3 to 6 hours per 100 square feet for onsite installation. The actual time will depend on site conditions, logistics, and installation design.
- Ideal crew size, two to four teams of three; one supervisor, one runner

Here is an example of the supplies and labor needed for a 4,800-square-foot installation, 6.5 feet wide by 800 feet long:

- About 850 GeoBlock panels
- About 140 SolGrid panels
- Four boxes of Quik Drive screws (TRSD34S, 2,500 screws

per box)
- 2,000 screws
- 1,500 zip ties Catamount, L-11-120-0-C
- 5 days labor with an eight-person crew

Supplemental geotextiles and membranes are required in some locations to increase the flotation of installations in extremely muddy conditions, to support installations over long expanses of weak ground, or to help contain fill material. Table B2 lists the most commonly used materials and their purpose.

Table B2—Supplemental geotextiles and membranes.

Type of material	Application
Open-cell drainage mat	Reduces size of openings, increases flotation on extremely muddy sites
Nonwoven separation fabric	Eliminates openings, provides separation layer when filling cells
Geogrid	Provides lateral support of panels across ponded areas

The author has used Polynet PN-3000 (or equivalent) as a suitable open-cell drainage mat. It decreases the size of openings to less than $\frac{1}{4}$ inch and also reduces the total opening by roughly 30 percent. This increases the flotation of the panels on extremely muddy sites and still allows for vegetation regrowth. A nonwoven separation fabric in an 8-ounce material weight can be used to completely eliminate openings when flotation needs to be maximized. Nonwoven fabric delays vegetation regrowth unless cells are filled with a growth medium. Vegetation regrowth helps anchor and stabilize the installation, integrate it into the environment, and improve site productivity. Tensar BX 1100 (or equivalent) has been used as a geogrid underlayment for installations longer than 100 feet in ponded areas. The geogrid provides a lateral membrane that helps prevent joint failure. Because the panels are neutrally buoyant and will float just below the surface in pooled areas, they should be filled with aggregate as a ballast when the trail crosses long ponded sections. A separation fabric should be used to contain the ballast gravel within the cells. In many cases, cells do not have to be filled because the grid cell provides an adequate traffic surface for most applications. Fill can increase regrowth in some cases, help integrate the installation, and provide a buffer for thermal contraction and expansion of the panels. High-quality fill is not required because the cell walls carry the load. Any readily available growth medium can be used. Gravel fill may also be necessary where tracked vehicles or

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snow machines with cleats will operate on panel surfaces. The gravel will help protect the soft plastic grid cell walls from crushing and abrasion.

Site Preparation—New trail locations should be cleared of trees, shrubs, rocks, and large tree roots. Tussocks and thick clumps of grass should be sheared off at ground level. It is generally not necessary to strip the site to mineral soil because vegetation growth through the open cells is desirable. For exist- ing trails, the surface should be leveled to the extent practicable and center humps between wheel tracks and along trail edges should be roughly level to the depth of wheel ruts. Potholes should be filled to the extent that is practical. The installations handle variations in terrain *along* the course of the trail better than *across* the trail. An undulating surface is okay, but there shouldn't be more than a 4-inch variation *across* the surface. The smoother and more nearly level the surface, the cleaner the installation will look and the better the panels will be able to transfer load from one to another. Simple handtools such as shovels and grubbing tools (such as pulaskis) can be used for site preparation. Small backhoes, bulldozers, and/or tillers and weed trimmers may have application at some sites.

Staging—After the pallets of panels have been delivered to the trailhead, they can be broken down and shuttled to the staging areas with ATVs and small ATV trailers. Using double-axle ATV trailers to haul larger loads will increase the efficiency of shuttle operations and minimize trail impacts between the trailhead and staging areas. Machines that are 400 cc or larger are recommended for these operations.

Staging areas should be located along the identified alignment every 500 feet or so. Trail conditions may require that the trail be hardened before heavy loads can be shuttled to distant staging areas. If so, only stage enough panels to construct trail to the next staging area. Stock the staging areas as the trail extends to them. The staging areas should be relatively level and large enough to accommodate stacked panels and assembly areas. An area 20 by 30 feet is usually adequate. If a helicopter will be used to carry the panels, be sure to site the staging areas with clear approaches and leave extra room for drop zones.

Subsection Assembly—It helps to assemble panels into subsections before installing them. Stack panels neatly to the outside of the trail corridor, leaving room to assemble subsec- tions on the trail side of the staging area. With the GeoBlock panels *upside down* on a flat, level surface, assemble the panels (refer to figure B1 for the panel layout configurations). For a 4.8- or 6.5-foot-wide trail, six panels will form a subunit. For an 8-foot-wide trail, 10 panels will form a subunit. Assembling the panels upside down places the edge tabs closer to the surface, making it easier to screw the panels together.

Either screw the panels together using individual screws or use a automatic-feed screw gun. A Quik Drive No. PHD18R (figure B2) with Quik Drive $\frac{3}{4}$-inch TRSD34S screw strips has been used successfully in Alaska. The Quik Drive gun has limited capability to countersink screws, so the panels must be upside down when using this tool. The tool must be slightly modified to allow it to countersink an additional $\frac{1}{8}$ inch. To do this, grind off the small raised area on the base collar to increase the depth of drive. Screws should be driven through the center of the overlapping tabs between panels (figure B3). It is not usually necessary to place screws in every tab, but tabs should be fastened in adjacent pairs to pin the panels. At a minimum, a pair of tabs should be fastened on each side
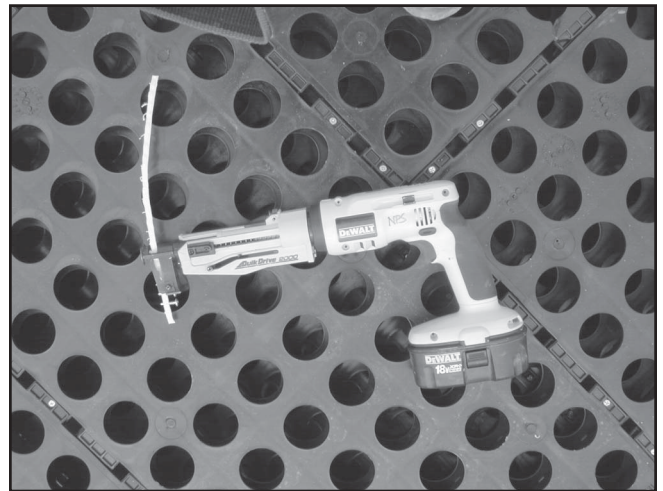

Figure B2—The Quik Drive automatic-feed screw gun speeds assembly of the panel subsections.
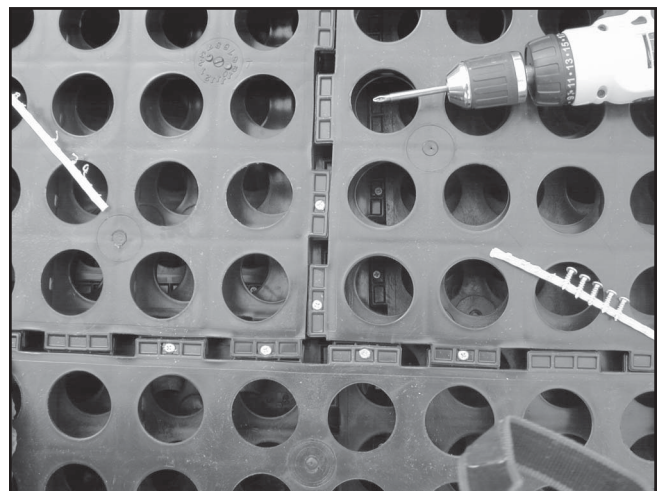

Figure B3—Illustration of the tab-fastening screw pattern at panel joints.

of a joint and along the outside edge. Along interior joints, screw a pair of tabs together along every 6 inches of the panel's length.

Subsections should be assembled on top of each other so that the underlying panels provide a pattern for consistent assembly and a smooth and level base for constructing subsections. Repeat the same panel pattern with each successive layer (figure B4).
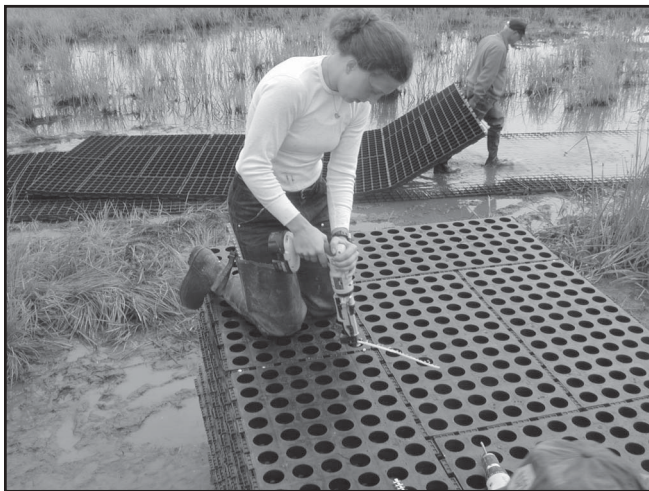

Figure B4—Assembling the subsections with the Quik Drive drill system. Using this tool and a standard 18-volt cordless drill, two people can assemble 32 six-panel subsections in $1\frac{1}{2}$ hours. In the background, a worker drags a three-section assembly along an installed trail segment.

Three-Section Assembly—Once a good stock of subsections is stockpiled, they can be assembled into three-section units. On an adjacent smooth surface, join three or more of the subsections together. Leave them upside down and use the same screw pattern along the joint as in the subsection assembly. Make sure that the subsections are oriented so that the panel pattern repeats itself in the proper sequence. This should be automatic if the subsections are placed in the same orientation as they were constructed. Again, assemble the three-section units one section on top of another until all the available subsections have been assembled into full three-section units.

Expansion Sections—Because unfilled GeoBlock panels tend to expand and contract under changing temperatures (up to 12 inches per 100 feet were documented in Alaska with a temperature variation of –20 °F to 90 °F), expansion sections are required whenever installations longer than 40 feet are placed in an exposed location. This includes areas where the panels are to be placed directly on soil or vegetation that is not shaded by overhead vegetation, where the panels are not bal-

lasted with gravel or filled with soil, and sites where vegetation regrowth cannot be expected to provide adequate shading during the first year of installation.

To construct the expansion sections, assemble sections of SolGrid panels the same width as the GeoBlock subsections. The SolGrid panels interconnect with a slot and tab joint system (figure B5). Carefully lay out the panels so all of the tabs are aligned along the leading and right edges. This will take a few minutes to work out. Carefully repeat the pattern with subsequent sections. Lock the joints together with screws by screwing through the panel sidewall in the cell between the tabs. Stockpile enough SolGrid subsections to place one between every three three-section GeoBlock units (about every 40 feet).

Figure B5—Two SolGrid panels. Note the slot and tab fasteners along the edges and the intergrated U-shaped expansion components.

Trail Panel Layout—Any required underlayment should be placed along the trail alignment before skidding the assembled panels into place. This may include a drainage net, nonwoven geotextile, and/or geogrid. Once those materials (if any) are in place, the assembled three-section units are flipped over and skidded into place. Temporarily place a 2-foot-wide piece of $\frac{1}{2}$-inch CDX plywood at the joint to help the tabs along the joint match (figure B6). Starting at one edge, "zip" the tabs into place. One worker at the far end of the new section can assist by shifting the panel from one side to another and applying pressure as required.

Once the panels match, they are fastened together through the overlapping tabs from the top, using a standard cordless drill gun with a $2\frac{1}{2}$-inch-long No. 2 Phillips bit (figure B7).
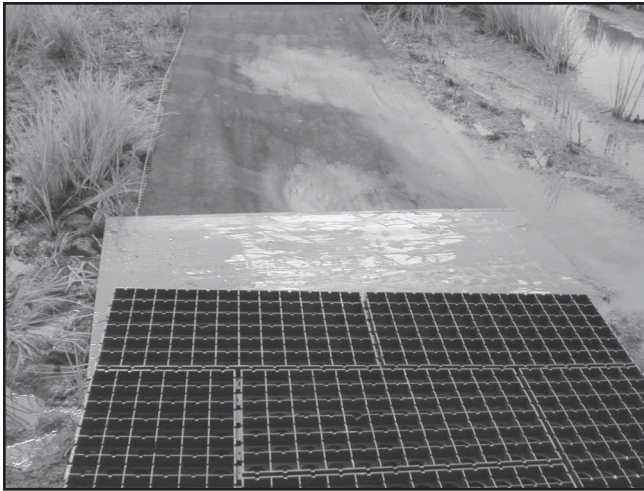
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Figure B6—A $\frac{1}{2}$-inch sheet of CDX plywood should be placed at section joints to provide a flat surface to help join the panels.

Figure B7—Joining the sections using a screw gun. Note the underlying plywood.

Additional assembled sections are then skidded into place and fastened. More screws and cable ties are used to reinforce panel joints along the outside edges and anywhere additional strain might be encountered, such as areas where the terrain is irregular. Cable ties are also used to connect panels to the underlying Polynet.

Expansion Joint Connections—Expansion joint sections are fitted between every three full GeoBlock sections. Because the SolGrid panels do not provide the same degree of load transfer as the GeoBlock panels, a geotextile underlayment such as Polynet or a geogrid should be placed beneath the expansion joint section extending 1 to 2 feet beneath the adjoining GeoBlock sections.

Trim the end tabs of the GeoBlock and SolGrid panels where the panel sections join. Butt the panel sections together and screw the panels together through the cell sidewalls. Screw from both sides to secure the joint. Use cable ties to further reinforce the joint.

An alternative expansion joint can be provided by leaving a 3- to 4-inch space between three-section assemblies. An 8- to 12-inch-wide piece of $\frac{3}{4}$-inch plywood can be attached under one panel edge and allowed to slide under the other panel if the gap needs to be reinforced.

Facilitating Curves—The size and configuration of the panels do not lend themselves to the construction of smooth radius curves. Curves must be facilitated with angular turns (figure B8). Fortunately, a wide range of angles can be constructed.

Angles are constructed by overlapping full three-section assemblies. The end edge tabs of the lower panel are trimmed off with a chain saw or other cutting tool. The overlying panel section is laid over the end of the first section and is carefully aligned in the new trail direction. A 2 by 4 is placed between the two panels to provide clearance for the saw blade, and the top panel is cut off parallel with the joint. A chain saw or other cutting tool can easily make the cut. Be careful not to cut into any screws! Eleven-inch-long, 120-pound-test zip ties (Catamount L-11-120-0-C or equivalent) are used to join the panel edges. Then place an 8-inch-wide strip of $\frac{3}{4}$-inch CDX plywood equally beneath each panel edge and screw through the base plate to further secure the joint (figure B9).

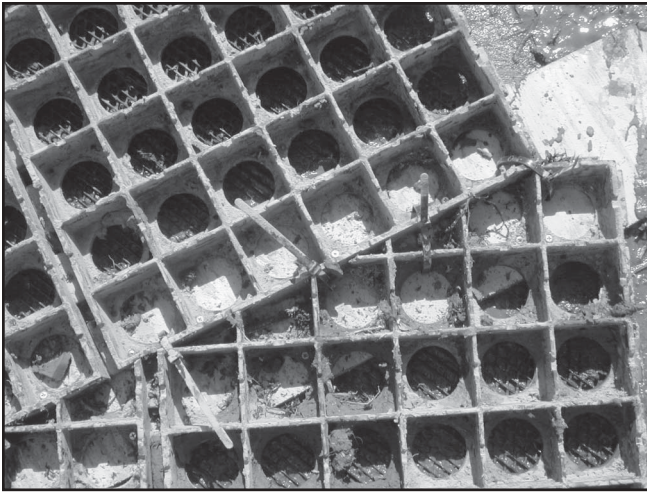Figure B8—Angular cuts in the panel sections help form the turns in the trail.

Figure B9—Corner joint showing cut, underlying plywood, and cable ties. Note the screws through the panel's plastic baseplate that secure the panels to the plywood.

Finish—Use cable ties to connect panels to underlying Polynet or geogrid geotextile about every 3 feet along both sides of the installation. Place fill in cells as available or specified. No other anchoring is required.

Maintenance and Monitoring—Inspect the installation on a regular basis during the first season of use and annually thereafter. Reinforce joints with screws and cable ties as necessary. If joints separate, place an 8-inch-wide strip of $\frac{3}{4}$-inch CDX plywood beneath them and secure with screws through the baseplate. If joints buckle and overlap, cut away the overlapping panel section and reattach it using cable ties, screws, and underlying plywood.

Material Sources

GeoBlock
    Presto Products Co.
    Geosystem Products
    P.O. Box 2399
    Appleton, WI 54913–2399
    Phone: 800–548–3424 or 920–738–1118
    Fax: 920–738–1222
    E-mail: info@prestogeo.com
    Web site: *http://www.prestogeo.com*

SolGrid
    Sol Plastics, LP
    1501 des Futailles Str.
    Montreal, PQ, Canada HIN3P1
    Phone: 888–SOL–PLAS or 514–254–8525
    Fax: 514–254–6325
    Web site: *http://www.solplastics.com*

Ecogrid
    Pro-Seal Products, Inc.
    16541 Redmond Way, Suite C
    Redmond, WA 98052–4463
    Phone: 800–349–7325
    Fax: 425–821–1006
    Web site: *http://www.prosealproducts.com*

Polynet and geogrid
    Any geotextile supply business

Appendix C—National Park Service Rivers, Trails, and Conservation Assistance Program Cooperative Research on Trail Hardening for Degraded Trails in Alaska

Locations Undergoing Field Tests of Trail-Hardening Systems

Wrangell-St. Elias National Park and Preserve—Three 40-foot test plots installed in 1996 of: corduroy, wood matrix, $1\frac{1}{4}$- and 2-inch GeoBlock, PVC matting, and a combination of two drainage mats. Detailed monitoring on thermal effect, revegetation, cost, and structural performance. Final report available (Allen 2000).

Palmer Hay Flats State Game Refuge—Four 20-foot test plots of $6\frac{1}{2}$-foot-wide GeoBlock in a variety of configurations along with one 20-foot test plot of SolGrid and one 20-foot test plot of Geoweb on a estuarine area that provides ATV access to a waterfowl hunting area. One 60-foot test plot of GeoBlock was installed as a shallow-water ford in the same location. Installed fall 2000. Ongoing monitoring.

Nine-hundred-foot installation of GeoBlock with a 600-foot shallow-water ford. Installed 2001. Contact refuge manager Colleen Matt, Alaska Department of Fish and Game (Phone: 907–267–2189).

Tongass National Forest, Sitka—Test of 100 feet of 2-inch GeoBlock and 100 feet of SolGrid on the Starrigavan Valley Recreation Area dedicated ATV trail system near Sitka, AK. Installed December 2000. Contact recreation planner Ann Marie LaPalme, Sitka Ranger District (Phone: 907–747–4209).

Tangle Lakes Archeological District—100-foot installation of 8-foot-wide GeoBlock and 100 feet of 8-foot-wide SolGrid on degraded OHV trails to protect cultural resources. Bureau of Land Management, Glenallen District. Installed August 2001. Contact John Jangala (Phone: 907–822–3217).

White Mountains National Recreation Area—200-foot test installation of $6\frac{1}{2}$-foot-wide GeoBlock and SolGrid on an alpine OHV trail. Installed July 2001. Bureau of Land Management, Fairbanks, AK. Contact outdoor recreation planner Randy Goodwin (Phone: 907–474–2369).

General State lands, Homer, AK—300-foot installation of 4.8-foot-wide GeoBlock and SolGrid in test installation on degraded recreational OHV trails. Installed October 2001. Contact Homer Soil and Water Conservation District (Phone: 907–235–8177).

Glenallen District, Bureau of Land Management—1,000-foot demonstration installation of 8-foot-wide GeoBlock and Solgrid with partial gravel fill on degraded OHV trail segments along the Middle Fork trail, mile 169, Richardson Highway. Installed July 2002. Contact Rod Holbrook, trail coordinator, Glenallen District, Bureau of Land Management (Phone: 907–822–3217).

Kodiak, AK—700-foot installation of $6\frac{1}{2}$-foot-wide GeoBlock on the Summit Lake trail. Installed August 2002. Contact Sam Christian, Kodiak Soil and Water Conservation District (Phone: 907–486–9451).

Nancy Lake State Recreation Area—65-foot installation of $6\frac{1}{2}$-foot-wide GeoBlock on the multiuse Red Shirt Lake trail. Installed June 2002. Contact John Wilber (Phone: 907–495–6211).

General State lands, Homer, AK—Proposed $2\frac{1}{2}$-mile, 6-foot-wide puncheon OHV trail for the Caribou Lake trail. Tentative installation date is summer 2003. Contact Lindsay Winkler, Homer Soil and Water Conservation District (Phone: 907–235–8177, ext. 5).

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Appendix D—Metric Conversions

To convert from this unit	To this unit	Multiply by
inch	millimeter	25.4*
inch	centimeter	2.54*
foot	meter	0.3048*
yard	meter	0.9144*
mile	kilometer	1.6
millimeter	inch	0.039
centimeter	inch	0.394
centimeter	foot	0.0328
meter	foot	3.28
meter	yard	1.09
kilometer	mile	0.62
acre	hectare (square hectometer)	0.405
square kilometer	square mile	0.386*
hectare (square hectometer)	acre	2.47
ounce (avoirdupois)	gram	28.35
pound (avoirdupois)	kilogram	0.45
ton (2,000 pounds)	kilogram	907.18
ton (2,000 pounds)	megagram (metric ton)	0.9
gram	ounce (avoirdupois)	0.035
kilogram	pound (avoirdupois)	2.2
megagram	ton (2,000 pounds)	1.102
ounce (U.S. liquid)	milliliter	30
cup (inch-pound system)	milliliter	247
cup (inch-pound system)	liter	0.24
gallon (inch-pound system)	liter	3.8
quart (inch-pound system)	liter	0.95
pint (inch-pound system)	liter	0.47
milliliter	ounce (U.S. liquid)	0.034
liter	gallon	0.264
liter	quart	1.057
degrees Fahrenheit	degrees Celsius	(°F – 32) ÷ 1.8
degrees Celsius	degrees Fahrenheit	(°C x 1.8) + 32

*These items are exact conversion factors for the units—the others give approximate conversions.

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About the Author

Kevin G. Meyer is an environmental specialist/soil scientist for the National Park Service in Anchorage, AK. He earned a bachelor's degree in soil science from the University of Wisconsin-Madison in 1976 and a master's degree in forestry from Colorado State University in 1985. Meyer has been a working professional for the Department of the Interior in Alaska since 1977. He has churned through a multitude of muck holes in his quest to formulate effective management responses to degraded trail issues and is an avid promoter of research and development of best management practices for OHV trails.

About the National Park Service Rivers, Trails, and Conservation Assistance Program—The Rivers, Trails, and Conservation Assistance (RTCA) program is a branch of the National Park Service that helps State, local, and nonprofit organizations develop, protect, or enhance river and trail systems and open space in the United States. The program's work has helped local communities establish organizations for trail advocacy and planning, map trails to help establish dedicated easements, and develop community-led trail plans. The RTCA also provides technical assistance in trail design, construction, and maintenance. To locate a RTCA contact in your area, visit: *http://www.ncrc.nps.gov/programs/rtca/index.html*

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