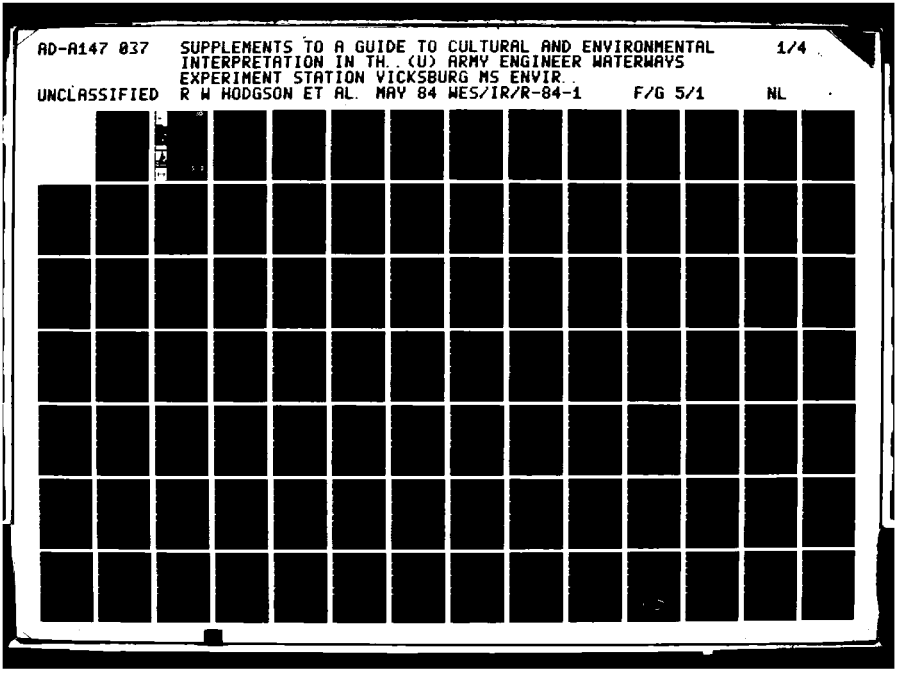
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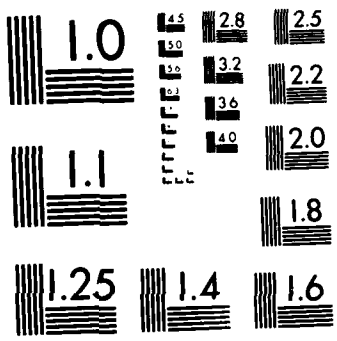

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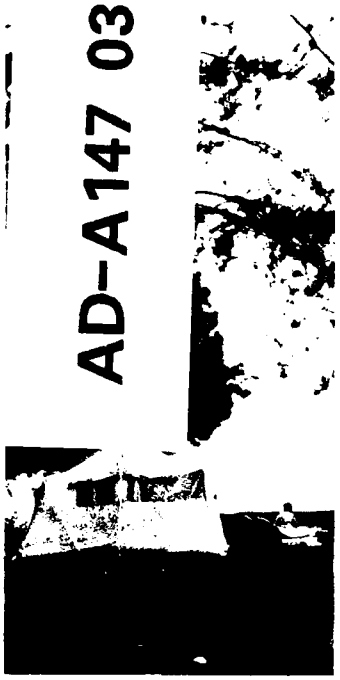

ENVIRONMENTAL LABORATORY

RECREATION RESEARCH PROGRAM

INSTRUCTION REPORT R-84-1

SUPPLEMENTS TO A GUIDE TO CULTURAL AND ENVIRONMENTAL INTERPRETATION IN THE U.S. ARMY CORPS OF ENGINEERS

Environmental Laboratory
U.S. Army Engineer Waterways Experiment Station
P.O. Box 631, Vicksburg, Miss. 39180

May 1984
Final Report

Approved For Public Release; Distribution Unlimited

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Nine reports were prepared to supplement the Recreation Research Program publication entitled "A Guide To Cultural and Environmental Interpretation in the U.S. Army Corps of Engineers" (NTIS No. AD 104-250). "A Guide to Cultural and Environmental Interpretation in the U.S. Army Corps of Engineers" provides general guidelines for planning, implementing, and evaluating interpretation services and selecting interpretation personnel at Corps water resources development projects. These supplements provide guidance on the following inter pretation techniques:

(Continued)

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A. Goal Analysis and Performance Objectives
B. Interpretation Planning
C. Evaluating Interpretation
D. Audience Analysis Techniques
E. Interpretation for Management
F. Selected Interpretive Writing Guidelines
G. Design Guidelines for Bulletin Boards, Amphitheaters, and Self-Guided Trails
H. Audiovisual Presentations (simple and complex)
I. Colleges and Universities Offering Coursework in Interpretation .

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PREFACE

This series of supplements to "A Guide to Cultural and Environmental Interpretation in the U.S. Army Corps of Engineers" (Instruction Report R-81-1) presents additional information for planning, implementing, and evaluating interpretive services at Corps recreation areas.

The supplements were prepared by various authors, who are listed in the Table of Contents. These supplements were compiled by Ms. Janet Akers Fritschen, Michigan State University, under an Intergovernmental Personnel Act (IPA) agreement with the U.S. Army Engineer Waterways Experiment Station (WES).

The Recreation Research Program would like to express appreciation to the following persons for review of and comments on earlier drafts of these supplements: Mr. Clyde Redmon, Lower Mississippi Valley Division; Mr. Donald Dunwoody, Missouri River Division; Ms. Barbara Watkins, Clinton Lake, Kansas City District; Mr. Charles Stone, North Atlantic Division; Mr. George Hardison and Mr. Lester Wadzinski, Rock Island District; Ms. Peg O'Brien, Coralville Lake, Rock Island District; Ms. Libby Hopkins, New England Division; Ms. Charlotte Weeks, Ball Mountain Lake, New England Division; Mr. John Tyger, North Pacific Division; Ms. Becky Bernson, Portland District; Mr. Sherman Gee, Ohio River Division; Ms. Paige Cruz, Huntington District; Mr. Gerald Purvis, South Atlantic Division; Mr. Jim Stanfield, Mobile District; Mr. John Van Der Venter, Lake Okeechobee and Waterway, Jacksonville District; Mr. Mark King, Southwestern Division; and Mr. Bill Allbright, Little Rock District.

During the conduct of this study, Ms. Fritschen, Environmental Laboratory (EL), WES, was Project Monitor and compiler of the supplements. The study was supervised by Mr. William J. Hansen, Chief, Resources Analysis Group, and Dr. Conrad J. Kirby, Chief, Environmental Resources Division, EL. Dr. Adolph J. Anderson (EL) was Manager of the Recreation Research Program. Dr. John Harrison was Chief, EL.

Commander and Director of WES during preparation of this report was COL Tilford C. Creel, CE. Technical Director was Mr. F.R. Brown. Ms. Nancy Tessaro, DAEN-CWO-R, was Technical Monitor.

CONTENTS

	Page
PREFACE	1
INTRODUCTION	3
CONVERSION FACTORS, U.S. CUSTOMARY TO METRIC (SI) UNITS OF MEASUREMENT	4
GOAL ANALYSIS AND PERFORMANCE OBJECTIVES by Ronald W. Hodgson	5
INTERPRETATION PLANNING by Joseph W. Roggenbuck and Janet Akers Fritschen	33
EVALUATING INTERPRETATION by Ronald W. Hodgson and Janet Akers Fritschen	55
AUDIENCE ANALYSIS TECHNIQUES by Maureen McDonough	87
INTERPRETATION FOR MANAGEMENT by Janet Akers Fritschen	135
SELECTED INTERPRETIVE WRITING GUIDELINES by Ronald W. Hodgson and Janet Akers Fritschen	169
DESIGN GUIDELINES FOR BULLETIN BOARDS, AMPHITHEATERS, AND SELF-GUIDED TRAILS by Dennis Propst and Janet Akers Fritschen	191
AUDIOVISUAL PRESENTATIONS	
A Guide to the Use of Audiovisuals in Interpretive Programming by Thomas W. Fleeger	229
Multi-image Audiovisual Presentations by Robert Clark	263
COLLEGES AND UNIVERSITIES OFFERING COURSEWORK IN INTERPRETATION by Dennis Propst	311

SUPPLEMENTS TO A GUIDE TO CULTURAL AND ENVIRONMENTAL INTERPRETATION IN THE U.S. ARMY CORPS OF ENGINEERS

INTRODUCTION

"A Guide to Cultural and Environmental Interpretation in the U.S. Army Corps of Engineers," Instruction Report R-81-1, was published in August 1981 and was designed to provide general guidelines for planning, implementing, and evaluating interpretation services and selecting personnel for interpretation duties. To expand on the information presented in Instruction Report R-81-1, the following nine supplements were prepared.

Topics for the supplements were, for the most part, based on the results of a 1981 survey of Corps personnel with interpretation duties. Data were collected on the current duties of these personnel, their training and experience, and information and training needs. Other contacts between the principal investigator and Corps field personnel also influenced the selection of the supplement topics.

In five of the supplements, specific instructions are provided for implementing the procedures described in the original report. These supplements are:

"Goal Analysis and Performance Objectives"

"Evaluating Interpretation"

"Audience Analysis Techniques"

"Design Guidelines for Bulletin Boards, Amphitheaters, and Self-Guided Trails."

"Audiovisual Presentations"

The remaining four supplements contain material beyond the scope of the original publication.

These supplements are:

"Interpretation Planning"

"Interpretation for Management"

"Selected Interpretive Writing Guidelines"

"Colleges and Universities Offering Coursework in Interpretation"

CONVERSION FACTORS, U.S. CUSTOMARY TO METRIC (SI) UNITS OF MEASUREMENT

U.S. customary units of measurement used in this report can be converted to metric (SI) units as follows:

Multiply	By	To Obtain
feet	0.3048	metres
gallons (U.S. liquid)	3.785412	cubic decimetres
inches	25.4	millimetres
inches per second	25.4	millimetres per second
miles (U.S. statute)	1.609347	kilometres
square feet	0.09290304	square metres
yards	0.9144	metres

GOAL ANALYSIS AND PERFORMANCE OBJECTIVES

A Supplement to

A GUIDE TO CULTURAL AND ENVIRONMENTAL INTERPRETATION IN THE U. S. ARMY CORPS OF ENGINEERS

Abstract

Clear and precise performance objectives are necessary for effective program planning and evaluation. This supplement contains procedures to use in developing performance objectives for interpretation from policy and theme level goals. The supplement is written for self-instruction and contains a number of illustrations and exercises.

GOAL ANALYSIS AND PERFORMANCE OBJECTIVES*

A Guide to Cultural and Environmental Interpretation in the U.S. Army Corps of Engineers

INTRODUCTION

This supplement describes a set of practical procedures to generate performance objectives from policy or theme level goals. It includes recommendations for the use of performance objectives, with examples. Anyone who must prepare interpretation or public relations communications** will find this supplement useful, especially where failure to influence the audience may have important consequences.

The supplement is intended to be used in self-instruction. Therefore, the writing style is more conversational than is typical of most instruction manuals. Small exercises and teaching questions are used to help the readers check their comprehension. Many examples are included because the best way to learn how to write and use performance objectives seems to be to read many and to practice writing them.

How to Use the Supplement

Instruction presented herein elaborates on the "Interpretive Objectives" element of "A Guide to Cultural and Environmental Interpretation in the U.S. Army Corps of Engineers" (Propst and Roggenbuck 1981). Users should read the Propst and Roggenbuck report before using this supplement.

The supplement is introduced by a section that defines performance goals, places them in the context of interpretation, and establishes their relationship to policy and theme level goals. This is followed by a description of the performance analysis process, the goal analysis process, and the procedures for writing performance objectives. The final section describes uses of performance objectives.

Whenever you are planning a talk, a visitor center, a pamphlet, or the interpretation program for an entire project, you should habitually do a goal analysis and write performance objectives. You will find it becomes easier to write useful objectives as you gain practice. The process, which seems complex at first, soon becomes second nature. You may want to re-read this supplement from time to time as you gain experience or to refer to one of the books about goal analysis and objective writing referenced at the end of this supplement.

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* This supplement was written by Dr. Ronald W. Hodgson, California State University, Chico, Calif., under an Intergovernmental Personnel Act Agreement with the U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.

** The Corps communicates with visitors in an attempt to influence their beliefs, attitudes, and behaviors. The communication may be directed toward increasing visitor enjoyment, developing in the visitor an appreciation of the natural and cultural environment, increasing visitor safety, decreasing resource damage, or decreasing misunderstandings of Corps practices. However, as with all communication, the visitor holds the ultimate control—he or she may accept or reject all or part of the message.

Goals and Objectives

Goals and objectives exist at several levels of abstraction. The most abstract are *policy level goals* that set overall direction and priority. These are very general statements that provide minimum guidance for program development and evaluation. For example:

> Utilize and care for natural resources in the combination best serving the present and future needs of the United States and its people. (Department of Defense 1965)

Theme level goals are more specific and numerous. They relate to individual projects, problems, and audiences. Many theme level goals might be written for a single policy level goal. The above multiple-use goal will be expressed differently from project to project, depending on the particular mix of resources and users. Two examples of theme level goals are:

a. Minimize damage from off-highway vehicles (OHV) to vegetation and soils. (Off-highway vehicle operators will confine use to designated areas and roads.)

b. Enhance reproductive success of bald eagles nesting near the reservoir. (Boaters will avoid portions of the lake used by the eagles during the nesting period.)

The goals in parentheses are *performance goals.* They are theme level goals written in terms of the expected or desired visitor behavior. Instructions will be given on how to write performance goals.

Program level objectives or *performance objectives** are specific descriptions of the desired effects interpretation will have on the ways visitors think, feel, and behave toward the resource, agency, and each other. There will be several performance objectives for each theme level goal. Objectives written at this level can be used to direct the development of interpretation messages and to evaluate the effectivenesss of interpretation programs. Two examples of performance objectives are:

a. When eagle breeding areas are posted, fewer than four boats will enter the posted areas during any 7-day week.

b. Given a flannel board and illustrations of plants and animals at the various trophic levels, 80 percent of the seventh grade students completing the environmental education programs will organize the illustrations into a food chain from the primary producers to the eagle, making one or no errors by the end of the second attempt.

Note that performance objectives are written in terms of specific, measurable behaviors that the visitor will perform to demonstrate that he or she has achieved the objective. The conditions under which the performance is to be observed and the minimum acceptable level of quality are also stated. Performance objectives are measurable and they state the criteria by which success can be judged.

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* In order to be more consistent with the literature on educational goal analysis and objective writing, program level goals will be called performance objectives in this supplement.

Writing performance goals. Abstract policy level goals must be refined to performance goals, then to performance objectives before they can be used to prepare interpretation programs or to develop evaluation methods. Perhaps the most difficult part of learning to write and use performance goals and objectives in interpretation is to think in terms of desired outcomes instead of methods. Typically, when asked to describe a goal for an interpretation program, an interpreter will say something like "to describe how electricity is generated by water-powered turbines." The problem with such goal statements is that they focus on what the interpreter is going to do rather than on what should be achieved by the interpretation. They focus on methods instead of effects.

A description of how electricity is generated is not an end in itself. If it were, the goal could be achieved even if no visitors heard or read the description. This appears ridiculous because we interpret to have an effect on the visitor. We might describe how electricity is generated so visitors will understand the role of hydroelectric dams in providing a commodity they value, so that their attitudes will be more positive toward hydroelectric projects.

Interpretation goals are always stated in terms of the effect we want to have on the visitor. Goals specify what the visitor will *do as a result* of what the interpreter does. Several examples are listed below. Select those that describe the goal in terms of the effect on the visitor.

a. To provoke* the visitor to learn more about the role of the Mississippi River in the War.

b. To reveal the relationship between diversity and stability in ecosystems.

c. The visitor will understand the concept of liquifaction.

d. Boaters will obey water safety rules.

If you selected *c* and *d*, you are correct. Both describe how *the visitor* will respond to interpretation. Statements *a* and *b* describe what the interpreter will do to the visitor. There is no way one can use such goals to judge whether or not interpretation is effective. Can you answer the question, "How can you tell when a visitor has been provoked—and why do you want to provoke them anyway?" Somebody important is likely to ask that question.

Statements *a* and *b* can be revised to be performance goals by focusing on what the visitor will do if attempts at provocation and revelation are successful. Try to write a performance goal for statements *a* and *b* before reading further.

Statement *a* might be rewritten in terms of visitor-oriented performance goals thus:

- The visitor will want to learn more about ...
- The visitor will be curious about ...
- The visitor will develop an interest in ...

---

* "To provoke" has a special meaning in interpretation. It *does not* mean "to anger, exasperate, or vex" as the word does in common usage. In interpretation literature "to provoke" means to stimulate, arouse, or create an interest within the receiver that motivates him or her to continue to pursue the subject on their own after interpretation ends.

Each of these describes how the visitor will respond to the interpretation. Each comes closer to communicating what the interpreter wants to achieve than does the very abstract term, "provoke." Performance goals written this way will be easier to explain to those who review interpretation plans than the statement that you wish to "provoke" visitors to the project.

A performance goal dealing with revelation might be written like this:

> ... the visitor will discover (without being directly told) the relationship between diversity and stability in ecosystems.

Notice again that performance goals are free of methodology. Goals say nothing about how the desired effects are to be achieved. Performance goals express the intended consequences of interpretation. In fact, unless you happen to be dealing with an unusually homogeneous group of users, you will have to use several different methods to achieve each goal. Visitors have different backgrounds, interests, and motivations. No one approach is best for all visitors to whom the goal applies (Miller and Steinberg 1975).

Notice, also, that goals are relatively general statements about desired visitor behavior. The behaviors described (i.e., to discover, to be curious, to understand, to obey) really are not measurable. At this level of abstraction, you cannot tell exactly whether the visitors are performing as they should to achieve the goal.

To this point we have discussed and illustrated the first rule in writing performance goals and objectives for interpretation: performance goals are always written in terms of the desired visitor response to interpretation. Performance goals are simple, declarative statements beginning, "The visitor (boater, camper, etc.) will..." followed by a verb describing the kind of thought, feeling, or action we want to stimulate in the visitor. Examples of these kinds of statements are found throughout the following sections.

Kinds of goals. There are three classes of interpretation goals: (a) goals that deal with how people perceive and think about the world, (b) goals that deal with how people feel about things relative to other things (attitudes and values), and (c) goals that deal strictly with overt behaviors.

We may want to cause visitors to think of a woodland community as an interlocking set of functions (niches) that exchange energy, matter, and information instead of as a haphazard collection of organisms. This represents a major change in perception and *thinking*. Or we may wish to increase the value of wetlands in visitors' eyes relative to other uses of the lands. This would represent a change in how people *feel*. Finally, we may desire something as simple as to cause the visitors to direct questions to a specific person. We might achieve that goal by placing a sign stating "information" on the person's desk. This is a change in *behavior*.

Not all interpretation is aimed at changing the visitor. In some cases, visitors may already behave as desired, hold the values and attitudes we wish them to hold, and use appropriate intellectual skills. In these cases, the goal of interpretation would be reinforcement.

Reinforcement occurs when a behavior is rewarded or punished. Behaviors which are rewarded tend to be repeated while behaviors which are punished tend to be abandoned. Communications, especially interpersonal communications, which

praise or recognize people who behave appropriately are effective rewards (Bettinghaus 1980).

Performance and Goal Analyses

The next two sections of this supplement describe how to reduce policy and theme level goals to performance objectives. First, a *performance analysis* is conducted to determine the differences between "what is" and "what ought to be." This enables the interpreter to write performance goals from theme level goals. These performance goals are then analyzed (*goal analysis*) to generate measurable visitor behaviors which, in turn, are used to develop performance objectives. The process is diagramed below (Figure 1). How to write performance objectives is discussed beginning on page 17.

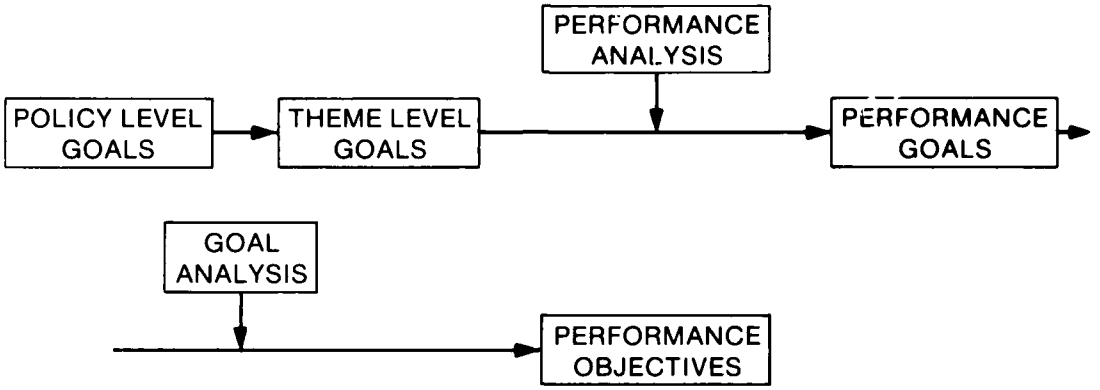

Figure 1: The process required to reduce general policy level goals to specific performance objectives.

PERFORMANCE ANALYSIS

A performance analysis identifies the visitor's thoughts, feelings, and behaviors that are to be changed or reinforced. It is composed of a series of steps:

- Problem definition.
- Identification of behavioral causes.
- Description of appropriate behavior.
- Description of current behavior.
- Determination of reasons for behavioral differences.

A performance analysis is best conducted by a team. Any single individual is unlikely to be sufficiently familiar with all dimensions of the problem. The perspectives of a variety of specialists will contribute to a more complete analysis.

Problem Definition

In some cases, the problem may already be defined. National and regional environmental problems are well defined by the Corps of Engineers and other resource agencies. At the project level, resource management, maintenance, and

operations branches can all state problems that can be traced to visitor behavior.

To begin the performance analysis, first state the problem in a few short, declarative sentences. At this point, simply get the problem statement on paper; do not attempt to state why the problem occurs. The following are examples.

- There are too many boating accidents on the lake.
- Some parts of the lake are overcrowded.
- Many oaks are dying in the campground.
- The *E. coli* count is too high along the lakeshore below the overflow campground.
- A number of Indian mounds have been destroyed in the area.

Identification of Behavioral Causes

Next, determine the human behaviors that either cause the problem or could alleviate the problem. This is done by working backwards to trace the events that resulted in the problem. The expertise of other team members will be helpful.

This stage of problem identification may require special studies by researchers or the advice of consultants to describe the causes of the problem. Sometimes problems that at first seem to be the result of visitor behavior are not. Others that are can be more easily corrected using an alternative other than interpretation. These illustrations may clarify the process:

a. Routine water analysis identifies unacceptable concentrations of *E. coli* along portions of the lakeshore. Contaminated water is traced to an outfall draining a parking lot used for overflow camping. A failure of sewer lines or septic tanks is suspected but inspection shows all sewage systems to be operating properly. Further investigation discovers several recreational vehicle (RV) owners dumping holding tanks into storm drains. The pollution is a result of inappropriate behavior that interpretation might help solve.

b. Oaks in many campsites are found to be dying. Nearly all are scarred by axe cuts, lantern burns, nails, and wires. It is thought these injuries are contributing to the demise of the trees. However, closer analysis determines that many campsites contain oaks that are as badly damaged and yet are not dying. A more detailed study determines the cause of death to be interruption of drainage during campsite upgrading in all but a few cases. Visitor behavior did not cause the problem, so interpretation cannot correct it.

c. One park experienced a rash of vandalism. Sinks were repeatedly torn from the walls in women's rest rooms. Investigations eventually determined that the sinks were broken when mothers washed their children's hair and larger children leaned too heavily on the sink. A communication campaign might have been directed toward preventing hair washing, but it was both simpler and more effective to build the sinks into counters that could support the childrens' weight.

Careless or incomplete analysis of the above examples might have led to inaccurate goals and ineffective or unnecessary interpretation. In other cases, opportunities to use interpretation to solve important problems might have been missed.

Two cautions must be remembered in performance analysis:

a. Interpretation can contribute to problem solutions only when visitor behavior causes the problem or might help correct it.

b. It is unwise to jump to conclusions about behavioral causes of problems. Each problem should be carefully analyzed to identify behavioral causes, if any exist.

Once you have determined that a change in human behavior will contribute to the solution of the problem, find out if an important number of people who must change can be reached by your interpretation. If not, and if you cannot find ways to communicate with those people, interpretation (by your organization at least) cannot help solve the problem. For example:

> A number of Indian mounds were destroyed in Mississippi and Louisiana by farmers leveling land to grow beans. The mounds were on private land but held some archeological interest. Interpretation might be used to increase the relative value of archeology to the point that land owners would not destroy the mounds before adequate study had been done. However, unless land owners are among the interpreter's audience, the message could have little effect.

Use-estimation surveys and planning studies describe project users. Look at these first to determine whether your target group is in your present audience. If that information is not available, it should be collected as part of an audience analysis. Interpreters should consider the kinds of information they need about project visitors and make an effort to have that data collected in use-estimation surveys and other similar studies.

Description of Appropriate Behavior

If a behavioral change is desirable in a population you can reasonably expect to reach, your next task is to identify the kinds of changes required. Describe what a visitor does when behaving appropriately. Sometimes this is easy. Safe boating practices are already described in many sources. Special practices unique to the project may be obvious. Even in these cases, however, you should consider the special conditions of your own setting and describe carefully what the safe boater does and does not do on your lake. A single description is unlikely to cover all types of boaters. A safe sailboater needs different skills and knowledge than a safe ski boat operator does.

Occasionally appropriate behavior cannot be adequately described by the members of the performance analysis team. It may be necessary to consult experts to conduct a task analysis.

Task Analysis

In a task analysis (Magar 1972), one describes what a competent performer does when he or she is performing the task correctly. A task analysis is most useful with skill-oriented pursuits, such as boating or winter survival. However, it is also useful in more general situations, such as describing what an environmentally competent citizen does and does not do , what a scientifically literate individual does and does not do, or what an effective interpreter does or does not do. To do a task analysis:

a. Identify several people who are judged to be competent at what ever the subject is. A process of peer nomination is useful. To identify competent sailboaters, first ask a sample of sailboaters to name the most competent sailboaters they know. Contact these and ask the same question and so on until names come up again and again.

b. Have several competent people describe and demonstrate what they do and what they avoid when they are performing correctly. Make a careful description.

c. Ask what the consequences are of not behaving as recommended. Note those behaviors which are:

—essential (very serious consequences for failure)

—important (failure seriously impairs the quality of results)

—desirable (add to the general quality of the results)

d. Discuss your descriptions with the panel of competent performers. Have the panel members resolve differences in their descriptions or demonstrations of correct behaviors.

Description of Current Behavior

Ultimately you will attempt to influence all relevant visitors to perform similar to competent performers. To determine what behaviors are to be changed, you need a description of current visitor behavior to compare with the appropriate behavior. Interpretation will be directed toward (a) changing current visitor behaviors that do not correspond to the behavior of competent performers and (b) reinforcing correct behaviors.

A description of current visitor behavior should be generated empirically. Beware of stereotypes. For example, all users of self-contained camping vehicles do not use their own showers and toilets in preference to facilities provided by the park. All conservation groups do not practice minimum impact camping. All teenagers do not play loud music and stay up late drinking.

Current user behaviors can be described from citation and accident investigation records, by observing visitor behavior directly, through interviews with a sample of users, and by observing traces of visitor behavior such as lantern scars on trees, litter, and fires built outside of fire rings. In many cases, it will be necessary to develop special data collection procedures to describe current visitor behavior, especially when the behaviors are not directly observable or when the problem lies with lack of knowledge or motivation.

Since visitors are not homogeneous, there may be many reasons for inappropriate behaviors. A tree may be cut down in a campgound by a novice camper who thought that was the right way to collect firewood or by a resident of the local community who vandalizes the park to get even with the government for some perceived wrong. The behaviors are identical, though interpretation to change these behaviors will be different.

Determination of Reasons for Behavioral Differences

Once you have described both appropriate and current behaviors, you must determine why a difference exists. The reasons behind failure to behave

appropriately must also be discovered empirically. Here too, conventional wisdom and stereotypes can be dangerous.

You must know the reasons for a failure before you can decide what kind of communication strategy to use. Visitors may be doing things wrong because they:

a. Do not know the proper behavior—It does no good to launch a campaign to motivate people to boat safely if they do not know safe from unsafe boating practices.

b. Lack the necessary skills and knowledge to behave appropriately—It does no good to urge snowmobilers to check the safety of ice before crossing if they do not know how to make such evaluations.

c. Are motivated to do wrong or are not motivated to do right—It does no good to describe fire safety in the woods to an arsonist bent on revenge against the government.

d. Lack the opportunity to behave in the desired ways—It does no good to discourage people from hanging lanterns on trees if they have no other place to hang them.

Knowledge and motivation. Feelings and thought processes are not directly observable. They are measured and described by indicator behaviors. The best way to learn if boaters know safe boating practices is to ask them to describe, select, perform, identify, or otherwise distinguish between safe and unsafe behavior. The best way to learn the extent to which boaters are motivated to follow safe boating practices is to ask them—in interviews with violators, for example.

Be aware that measurement of motivations, attitudes, and even knowledge of facts is subject to error and misinterpretation by untrained evaluators. You may need the assistance of applied behavioral scientists to make an adequate assessment of the reasons why visitors fail to perform as desired.

Opportunity. You should be able to identify behavioral discrepancies resulting from lack of opportunity. If people are parking outside of paved parking areas when they are filled to capacity, it will do no good to develop an interpretation message on proper parking practices. Keep in mind that perceived opportunity is not the same as actual opportunity. Even if alternative parking is available, it may not be used if drivers do not know about it or consider it too far from the site, unprotected (leaving their vehicles open to vandalism), or as having some other undesirable characteristic.

The temptation to short cut in a performance analysis is great. Most field interpreters and resource managers are not well trained in social, educational, or psychological measurement techniques. The cost of professional assistance is modest but may appear too high for limited budgets. Even where the resources and skills are available, clearance from the Office of Management and Budget is sometimes required and the process of acquiring it can be discouraging.

Nevertheless, interpretation cannot be used effectively to change visitor behavior until one knows current behavior, appropriate behavior, and the reason for the differences. Time and money spent on analysis are small compared to that spent on developing and delivering interpretation. The best possible analysis can prevent unnecessary or ineffective programs from using resources better used elsewhere.

In most cases, interpreters will have to settle for less than the best evaluation. However, be alert for opportunities to use data collected for other purposes, such as use-estimation surveys, accident investigation reports, and other studies. You may also be able to include questions in current or future studies that are to be conducted for other purposes. Finally, the information you gather in conversation with users is better than no information at all. However, you need to be aware of and take steps to avoid the biases that can be introduced by the nonrepresentativeness of the sample.

WRITING A PERFORMANCE GOAL

Once a performance analysis is completed and the pertinent information is known, performance goals can be written. While doing so, keep in mind that:

a. A performance goal is always stated in terms of the desired visitor response to interpretation. It is free of methods. Instead, it describes how the visitor will think, feel, or behave. The choice of goals is based on a performance analysis, which reveals the differences between appropriate and actual visitor behavior and the reasons why those differences exist.

b. A goal is always written in the form, "the visitor (camper, boater, etc.) will..." followed by an appropriate verb describing the desired thought, feeling, or behavior.

The goals should be written down on separate cards or sheets of paper. This is best done by each team member working individually, but could be done by one member delegated to synthesize the results.

The goals are then distributed to all team members, who evaluate each goal to be sure it meets the criteria described earlier. Discussion of the goals may lead to identification of other problems or inadequate analysis, requiring that the relevant steps in the performance analysis be reworked. When the performance goals are acceptable to the team members and other reviewers, the team can proceed to develop measurable performance objectives.

Several goal statements for interpretation are listed below. Which are properly stated?

a. Boaters will know the Coast Guard equipment requirements for the boat they are using.

b. Boater safety messages will be incorporated into all campfire programs.

c. Visitors will understand the concept of liquifaction.

d. Fishermen will be able to tell the difference between the Muskellunge and the Northern Pike.

e. To explain the role of the Corps of Engineers in flood control on the Mississippi River.

f. To persuade visitors to build fires only in the fire grates provided at the campsites.

If you selected *a*, *c*, and *d*, you are correct. Why are *b*, *e*, and *f* not properly stated? Answer that question to yourself before reading further.

Examples *b*, *e*, and *f* are improperly stated because they describe what the interpreter will do, not what the visitor will do.

GOAL ANALYSIS

Through a process of goal analysis, performance objectives will be developed from each performance goal. Measurable performance objectives contain a statement of an observable behavior that indicates interpretation has had the intended effect. In some cases, these are *terminal behaviors*, such as wearing life preservers or limiting the number of passengers to the boat's safe capacity. However, especially when dealing with goals involving thinking or feeling, the observable behavior will be an *indicator behavior*. Examples of indicator behaviors include answers to test questions, choices made among alternatives in an experimental setting, and scores on attitude scales.

Indicator behaviors have two important limitations. First, they imperfectly represent the concept they measure, and, second, they are only a sample of the possible behaviors indicating achievement of the goal. Indicator behaviors are not themselves the desired outcomes of interpretation. They are the measurable responses that show the desired effect has been achieved. Indicator behaviors are analogous to mercury rising in a thermometer tube. The rising mercury is not temperature; rather it is an indicator of temperature.

Thoughts and feelings, like temperature, cannot be observed directly. One cannot see "understanding" in a visitor nor feel "provocation" or "knowledge." Visitor behaviors associated with these effects can be observed, however. Goal analysis is the process of identifying valid and reliable indicator behaviors for the unobservable effects specified in interpretation goals.

Procedure

Educators use goal analysis and performance objectives to guide instruction and testing. The following goal analysis procedures are based on recommendations by Pipe (1975). Several other useful sources are listed among the references for this supplement.

Although goal analysis can be done by an interpreter working alone, success will likely be increased by working with at least one other person. Goal analysis is a reiterative process of creatively generating ways to measure the goal concept. Measures are then critically evaluated, inspected for weaknesses, modified, rejected, and redone until an acceptable set of indicator behaviors is defined. A goal analysis is composed of the following steps.

Step 1. Write down the goal and display it prominently. Make sure the goal statement:

- Describes the effect you want to have on the visitor. *Do not* describe what you will do; *do* describe what the visitor will do as a result of what you do.
- Describes only one of the effects you want to have. You may want to have several effects but each should be stated as a separate goal.
- Is stated using verbs expressing visitor action. For example, write "will know" *not* "will be informed."

Several plausible interpretation goals for Corps projects are listed below as illustrations. As a result of the interpretation program, visitors will:

a. Know the fishing regulations which apply in the waters of both states surrounding the reservoir.

b. Understand the second law of thermal dynamics as it applies to a pump storage system.

c. Develop a more positive attitude toward a civilian or military career with the U. S. Army.

d. Value estuarine habitat for its contribution to ocean productivity in relation to its potential as building sites.

e. Feel motivated to pursue a career in civil engineering.

f. Consider less used areas of the lake when choosing a recreation area in the future (as opposed to making a habitual choice).

g. Know the characteristics of alternative boating resources in the region.

h. Comprehend the effects of increased pesticide concentrations in plankton-eating fish on reproductive success of osprey and eagles.

i. Be aware of the dangers of escaped fire when using campfires in the woods.

j. Prefer minimum impact camping.

k. Accept responsibility for the prevention of vandalism and theft of government property.

Each of these goals might have come from a performance analysis which revealed not only what visitors did wrong, but also why. Goals *f* and *g* relate to the same problem: visitors overconcentrate in some areas while other areas are underused. The performance analysis presumably discovered that some visitors simply did not know what alternatives were available (goal *g*) and other visitors knew but chose the crowded areas out of habit without thinking about using less crowded alternatives (goal *f*).

Step 2. As a group, the team members should think of as many ways as possible to know when the visitor is thinking or feeling the way the goal describes. What visitor behavior indicates the desired response? What visitor behaviors can be used to sort a group of visitors into those who have met the goal and those who have not? Remember, work on only one goal at a time.

At this stage, creativity is important. Do not automatically reject any measure that comes to mind. Write it down. You can cross it out later; even seemingly foolish ideas may prove fruitful.

This story is told about Navy ship officers engaged in a brainstorming exercise. Various emergency situations were considered. One question addressed was, "What would you do if a mine were sighted too close to the ship to avoid it by maneuvering?" One of the creative solutions suggested was to arrange all the men on that side of the ship and have them huff and puff and blow the mine away. A foolish solution, of course, but later, when the ship actually encountered a mine in that situation, high pressured streams of water from fire hoses were used to push the mine away from the ship. The idea for the fire hoses evolved out of the foolish suggestion in the brainstorming session.

Work at making your list for about 30 min. Allow one idea to suggest others. Write everything down that comes to mind. Remember, each behavioral statement begins with an action verb. Some examples are listed below for the performance goal, "Accept responsibility for the prevention of vandalism and theft of government property." The visitor:

a. Reports any vandalism or theft to the rangers.

b. Makes detailed notes describing people and vehicles of people seen vandalizing or stealing.

c. Serves as witness in court actions against violators.

d. Does not vandalize or steal.

e. Stops others who are vandalizing or stealing.

f. Supervises children.

g. Teaches children not to vandalize or steal.

h. Teaches children how to report others seen vandalizing or stealing.

i. Supervises other people's children.

j. Watches other campers' equipment when it is left unattended.

k. Supports more active law enforcement in project recreation areas.

l. Accepts restrictions that help rangers keep track of who is using the area.

Step 3. At the end of about 30 min, the list will be long and most members will be out of ideas. Now, go over the list with a skeptical view. Are the actions described really what you would expect from a visitor who "accepts responsibility?" Are the actions specific enough to measure? Can you tell when a visitor is doing the behavior you describe? Have you been exact enough so you could give the behavior description to another person (a ranger in the field) and expect the ranger to reliably tell the difference between "responsibility acceptors" and "responsibility nonacceptors?"

Mark the example behavior descriptions that fail such a test. Actions *k* and *l* in the list are just as general and unobservable as "accepts responsibility." If these are to be kept on the list, they must be reduced to observable behaviors. Action *j* relates to other campers' equipment rather than government property. It may not be safe for campers to attempt to stop vandals or thieves (item *e*). Most items can be written more specifically. Instead of saying "makes detailed notes," item *b*, list the things you want notes of (license numbers, car colors, sex, age, hair color, skin color, clothing, direction headed when leaving, unusual marks on car or individual, etc.).

Step 4. When the list has been culled and refined, select the 10 best indicators. The best indicator behaviors are those which most completely describe the goal behavior, seem most important, and can be observed readily.

During the process of working together to evaluate and refine each indicator behavior, group interaction often generates new and improved concepts. The group leader should make certain the group does not become so task oriented that creativity is sacrificed to meeting a time table. Neither should the leader allow the group to continue to pursue a tangent after it is clearly not producing improvements.

Step 5. When the group has reached consensus, the surviving indicator behaviors should be listed in approximate order from "best" to "least" under a statement of the goal. The group should then take some time to consider the question, "If we observe a visitor doing these things, will we accept that as proof the visitor accepts responsibility for the prevention of vandalism and theft of government property?" If the answer is "yes," the team can proceed to write *performance objectives.* If the answer is "no," the team must return to Step 2 and continue the process, probably after some loose group discussion of what "accepts responsibility" really means. It may be necessary, in a few particularly trying cases, to go on to another goal and return to the problem goal later.

Results. The results of the goal analysis will not be perfect. People get better at goal analysis with practice. As you gain more experience with the problem and more feedback about the effects of interpretation, you will want to reanalyze some goals. Realistically, a formal reanalysis may occur only every several years. However, reevaluation of goals and objectives should be a continuous part of interpretation planning and operations.

Conditions change, problems change, visitors change, and so must interpretation. If your interpretation is effective, it will change how visitors think, feel, and behave until, for many kinds of problems, the differences between actual and desired thoughts, feelings, and behaviors will be insignificant. At this point, interpretation efforts can shift to reinforcement. *Goals and objectives are always approximations, subject to revision as one learns more or as conditions change.*

Summary of Steps in Goal Analysis

A summary of the steps in goal analysis is listed below:

Step 1. Write down the performance goal: "The visitor (camper, boater, etc.) will ..."

Step 2. List as many visitor behaviors as possible that would demonstrate that the visitor achieved the goal.

Step 3. Evaluate the behaviors listed in step 2. Are they observable? Do they really represent the goal?

Step 4. Select the 10 best indicator behaviors.

Step 5. Rank the behaviors listed from "best" to "least." Proceed to write performance objectives for each goal.

Exercises

From the list below, select the verbs that describe measurable behaviors:

understand	underline	comprehend
list	point out	ask questions
draw	consider	read
know	feel motivated	sort
appreciate	wear	name
select	carry	rank order
mark	report	identify
compute	extinguish	value

If you selected "understand," "know," "appreciate," "consider," "feel motivated,"

"comprehend," or "value," how would you know when someone did one of these? If you cannot actually sense (see, hear, etc.) someone doing these things, they are not observable behaviors.

HOW TO WRITE PERFORMANCE OBJECTIVES

Performance objectives state exactly what effect you want your interpretation to have on the visitor. They tell precisely who will do what, how well, and under what conditions. Well-written performance objectives have at least these three components:

- Measurable behavior—A statement of what the visitor will do as a result of the interpretation in terms of specific, observable actions.
- Criteria—A description of the minimum performance quantity or quality required before the behavior is consid[illegible]ed good enough.
- Conditions—A list of resources t[illegible]isitors will need to perform satisfactorily, what resources the v[illegible]ors will not have, and any other important limitations.

The work sheet in Figure 2 will help you to organize these components prior to developing the performance objective.

Two examples of performance objectives follow. These are two of the objectives that guided the development of this part of the supplement. You are the audience, the one expected to perform the measurable behaviors as a result of these instructions.

> ***Example:*** Given three written examples of performance objectives, 85 percent of the supplement readers will correctly select those which: (1) state expected behaviors in measurable terms, (2) state minimum acceptable performance criteria, and (3) state conditions required for performance.

> ***Example:*** Given a written example of a performance objective, 85 percent of supplement readers will correctly underline the words describing minimum acceptable performance criteria on the first attempt and 95 percent will do so by the third attempt.

Do you recognize the verbs that describe the behavior you will perform to demonstrate that you have met the objectives? What can you do to show an instructor that you recognize the verbs?

One performance goal of this supplement is that the reader will differentiate among adequately and less adequately stated performance objectives. The first example is a performance objective for that goal. Another performance goal is that readers will recognize the major parts of a performance objective. The second example is a performance objective for that goal.

The main performance goal for this part of the supplement is that you, the interpreter, will write and use adequate performance objectives for interpretation. The core of every performance objective is the measurable behavior statement.

GOAL STATEMENT: _____

MEASURABLE BEHAVIOR:(__ of __) _____

TYPE OF VISITOR WHO
WILL PERFORM BEHAVIOR: _____

MINIMUM ACCEPTABLE PERCENTAGE OR NUMBER
OF VISITORS WHO WILL PERFORM BEHAVIOR: _____

MINIMUM QUALITY OF BEHAVIOR
THAT IS ACCEPTABLE: _____

STIMULI ELICITING BEHAVIOR _____

SETTING IN WHICH BEHAVIOR WILL BE OBSERVED: _____

RESOURCES VISITORS WILL REQUIRE
TO PERFORM THE BEHAVIOR: _____

LIMITS ON RESOURCES AVAILABLE TO
THE VISITOR & OTHER RESTRICTIONS: _____

Figure 2: Performance objective work sheet

Measurable Behavior Statement

After reading the section on goal analysis you should be able to recognize a measurable behavior statement and to generate terminal and indicator behaviors from performance goals. The performance objective below could be one of many written for a water-safety program. Underline the portion of the objective that describes the measurable indicator behavior. Use a copy of the work sheet from Figure 2.

> Ninety percent of boat owners boating on Lake Barkley will list the minimum required equipment as prescribed by the Coast Guard (1979) for their boat, making fewer than two errors.

You should have underlined the portion stating, "... will list the minimum required equipment as prescribed by the Coast Guard..." The action verb describing the desired behavior is "will list." The rest of the performance objective defines what, how well, under what conditions, and by whom the listing will be done.

An indicator behavior is the desired behavior that can be observed and measured. When someone can list the requirements, it indicates the person knows the requirements. Also note that the performance objective states exactly what the boater is expected to be able to list: the Coast Guard requirements described on pages 8 and 9 of the 1979 booklet, *Federal Requirements for Recreational Boats.*

The more precisely the desired visitor behavior is stated, the more *reliable* the objective is. Reliability refers to the extent to which people who read the objective will have corresponding ideas on how visitor compliance will be measured. If an objective is highly reliable, all will agree on the expected visitor behavior. If it is not reliable, all will have a different opinion. Given a statement of behavior as precise as this one, almost everyone could agree whether or not the objective had been met.

The following is another performance objective. This one might be for an interpretation campaign to reduce vandalism and other depreciative behaviors. The behavioral statement here describes a terminal behavior. Underline the portion of the performance objective that is the statement of measurable behavior.

> Seventy-five percent of persons observing apparent theft, destruction of property, or damage to vegetation or geologic features will write down the following information about the individuals responsible and report the incident to the ranger immediately:
>
> - Sex of offender(s).
> - Approximate ages of offenders.
> - Race.
> - Hair and eye color.
> - Clothing worn (including colors).
> - Kind of vehicle used: year, model, color, special equipment, damage or other marks.
> - State and number of license plate.

You should have underlined, "... will write down the following information about the individuals ..." and "... report the incident...."

Performance Criteria

Performance criteria describe how well or how often the visitor should be able to perform the indicator or terminal behavior. You may want boaters to wear some kind of life preserver when boating. That is a clear, observable terminal behavior. But, how many boaters have to wear life preservers before you feel your water safety program was a success? If just one boater wore a life preserver, you would not be satisfied. On the other hand, 100 percent compliance would be an unreasonable goal.

There are at least two good reasons to write performance criteria in your performance objectives:

a. You need to know when to reduce communication efforts and spend your time and money on other problems.

b. You want to avoid arguments with whoever evaluates your work about the effectiveness of your interpretation. It is better to agree on minimum acceptable performance criteria in advance.

Efficient use of limited interpretation resources means spending at least enough time and money on a program to get the job done at an acceptable level of quality. Time and money spent beyond the acceptable level of effectiveness would produce more benefits if used on another project. There is always more that needs to be done than resources can cover.

Few people outside interpretation have a good idea of what interpretation contributes to project management. Specific objectives help identify interpretation's role within the Corps of Engineers. Specific performance criteria help managers answer questions of accountability. Programs which demonstrate effectiveness and efficiency are more likely to be continued; those which do not may be eliminated or reduced.

> Fewer than 5 percent of OHV operators visiting Black Butte Lake will drive their machines on Corps of Engineers lands outside designated OHV areas.

Find the performance criterion in the above objective. A performance objective such as this might be written for part of an interpretation program contributing to a resource protection component of an OHV recreation management activity.

The performance criteria are "Fewer than 5 percent...." If 10 percent of OHV operators drive outside the acceptable areas, your interpretation program was *not* successful. If 4 percent do, your interpretation was effective enough.

> When shown motion pictures or video tapes of waterfowl in flight, 85 percent of waterfowl hunters hunting on the project will identify the species and sex of the birds, making fewer than 5 percent errors.

Which phrase represents the performance criteria in the above objective? This time the criteria are in two parts. You must specify the minimum quality of performance ("... fewer than 5 percent errors.") and the minimum number of

hunters who will achieve that proficiency ("... 85 percent ...") Often criteria must be written in this form, the idea being to describe minimum acceptable performance levels precisely enough so people can agree on whether they have been met or not (reliability).

Sometimes minimum acceptable criteria can be determined from biological or physical requirements. For example, biological carrying capacity might determine the number of people who can walk across a dune area before unacceptable damage occurs. If the number of people using the dune area is known, it is easy to calculate the percentage who must be persuaded to stay on the boardwalks and the beach.

If you are writing performance objectives for a boater safety interpretation program, one measurable behavior statement might read, "... boaters will not operate boats carrying more than the maximum safe number of passengers ..." You and specialists in safety, enforcement, and other management areas must now decide how many overloaded boats you can accept. This depends on the numbers of accidents you can tolerate, the probability that an overload will result in an accident, and reservoir characteristics which influence the accident severity.

If there are many ranger patrols, boating is concentrated in a small area, and the water is warm and calm, the consequences of an accident resulting from an overload might be relatively small on the whole and the probability of a serious injury or death remote. If, on the other hand, the waters are cold and stormy, boating is dispersed, and patrols are few, an overload might have a high probability of ending in a life-threatening accident. Managers at the first reservoir might accept a larger number of overloaded boats than managers at the second reservoir could.

Assume that you decide you can tolerate one accident per day due to overloaded boats. Previously you had determined that 10 percent of the boats on the lake on any given day were overloaded and 10 percent of the overloaded boats would have accidents. If there are 1000 boaters per day, you can expect 10 accidents. Since you will accept only one accident, your interpretation will have to achieve 99 percent compliance on the part of overloaded boaters.

Analyses such as the above can be carried out for many objectives. One can usually work backward from some administrative target to a level of minimum acceptable performance. You need to know the consequences of communication failure and the ability of the environment, organization, or social system to absorb or accept those consequences. People other than interpreters should be involved in setting criteria. However, resource managers, safety officers, or enforcement personnel cannot always give an estimate of the limits they can accept. Often necessary relationships are unknown. Safety people may not be able to give you the probability of an overloaded boat having an accident or the biologists may not be able to state the number of people who can walk across a dune without causing unacceptable damage. In those situations, the only alternative is an informed judgment made by a group of people with the relevant skills based on the best available knowledge.

Criteria must be agreed to in advance by those who will execute the interpretation program and those who will evaluate it, especially when criteria rely heavily on judgments. Even under the best conditions, determination of criteria involves

assumptions about acceptable consequences and cause and effect. In many cases, the choice of criteria must be almost arbitrary. Each determination should be as analytical as possible to minimize this weakness.

Conditions

A statement of conditions is included in performance objectives when the visitor will need special resources to perform the behavior or will be expected to perform only at specific times. Conditions describe:

- The *stimulus or setting* that will elicit the desired behavior.
- The *resources* required for the visitor to act.
- Any *limits* that will be placed on resources or stimuli available to the visitor.

Stimulus or setting. Adding a description of the stimulus or setting under which the behavior is expected helps increase the reliability of the objective. You may want boaters to wear life preservers as a result of your interpretation, but only when boaters are on the water. A description of the setting helps define which life preserver wearings should be counted and which should not.

Sometimes specific events should elicit the desired behavior. You may want boaters to come ashore when weather is threatening. You might specify certain sky conditions or the small craft warnings as a stimulus. Such an objective might read as follows.

> When small craft warnings are displayed, all boaters using boats of less than 30 ft* will come ashore within 30 min.

The stimulus condition is, "When the small craft warnings are displayed ..." Some other examples of stimulus conditions are listed below (stimulus conditions are italicized):

> ... snowmobilers will not operate their machines in meadow areas *when snow is less than 20 cm deep.*
>
> *When asked for recommendations or when describing recreation experiences to others,* ... will suggest one or more of the less used recreation areas listed....
>
> *If the visitor observes an apparent theft,* he or she will....
>
> *When one or more symptoms of hypothermia are recognized,* the boater will....
>
> *Upon returning home,* the visitor will use the energy audit checklist....

Resources and limits. Often it is important that the visitor have certain resources in order to perform the desired behavior. For example, you may want visitors to be able to identify plant species "using a taxonomic key." You may want

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* A table of factors for converting U.S. customary units of measurement to metric (SI) units is presented on page 4.

visitors to list five symptoms of hypothermia "from memory without reference to notes." You may want boaters to state the meaning of navigation buoys "when shown color photographs simulating the view of the buoy from a boat."

Performance objectives should contain descriptions of resources and limits that specify conditions under which the visitor will actually be expected to perform the behavior. This is important for both evaluation and training. If hunters will have to identify waterfowl on the wing, you do not want to train or test using drawings or closeup views of stationary birds. If boaters are required to recognize the various kinds of navigation buoys from a boat, training and testing should include realistic views of buoys as seen from a boat.

Sometimes it is not necessary to include a description of all stimuli, resources, or limits. However, they should be identified when the performance objectives are prepared and be left out only if doing so will not affect the reliability of the objective.

The Relevant Visitor

Effective interpretation is directed toward specific kinds of visitors. Interpretive messages and media should be selected to fit the characteristics of those it is intended to influence. More on why this is so and how to do it is contained in the supplement, "Audience Analysis Techniques."

Performance objectives often contain a statement identifying the particular type of visitor (or role) to whom the interpretation is directed. Description of the relevant visitor is kept to a minimum in the performance objective. Detailed audience analysis information will be contained in other interpretation planning documents used to prepare interpretation strategies.

Some examples of statements identifying the relevant visitor follow. Again, be as specific as necessary to direct the development and evaluation of interpretation. It is often sufficient to use a one- or two-word description and reference the more complete description in the audience analysis.

> Boaters using boats under 15 ft...
>
> Campers with self-contained sanitary systems...
>
> Visitors below the age of 18...
>
> Owners of boats using Corps of Engineers launch ramps...

The statement describing the relevant visitor tells users of the performance objective who to direct messages to and whose behavior to observe in determining whether the interpretation was effective. If your interpretation is directed at children between 10 and 12 years old, it is unfair to evaluate it by observing the effects on adults or younger children. People using the objective in the development of interpetation programs will know to tailor messages, media, and the environmental and social setting to the appropriate visitor.

If your proposed programs are reviewed by the project manager or at the District,

some activities, wordings, or designs may seem inappropriate unless both you and the reviewers know exactly who the interpretation is intended for and the effect it will have.

Summary

A performance objective is a precise statement of the effect you want to have on the visitor's thoughts, feelings, or behavior as a result of interpretation. Objectives tell precisely *who* will do *what,* how *well,* and under what *conditions.*

A well-written performance objective contains enough information to be reliable. An objective is considered reliable when several people using it to prepare or evaluate interpretation agree on whether the objective has been met when observing its effects on the visitor. A performance objective contains at least these elements:

- A statement describing the expected visitor response in terms of observable indicator or terminal behaviors.
- A statement describing the minimum acceptable level of performance.
- A statement describing the conditions (stimulus or setting, resources, and limits) under which the indicator or terminal behavior will be performed by the visitor.

In addition, the performance objective will specify the type of visitor that is to be affected by the interpretation. A more exact description of the relevant visitor will be contained in audience analysis documents. However, the objective must clearly delimit exactly who is expected to perform the terminal or indicator behavior.

At this point, you should *recognize* the three essential components of a performance objective. You should be able to distinguish between an adequately written performance objective and one that is lacking. Most importantly, you should be able to write performance objectives that can be used reliably to prepare and evaluate interpretation.

USING PERFORMANCE OBJECTIVES

Now that you know how to write good performance objectives, you can use them for a variety of purposes. Performance objectives are necessary for program evaluation, selection of message content and types of appeals, and accountability. They are also helpful in project coordination, interpreter training, and contracting.

Program Evaluation

Perhaps the strongest argument for conducting goal analyses and writing performance objectives is that measurable objectives are essential for quantitative evaluation of interpretation effectiveness.

Among the essential elements of quantitative evaluation are: (a) some way to measure the variables of interest, and (b) a decision rule. The measurable behavior of the performance objective provides a method for measuring the variable of interest. The criteria provide the decision rule.

At least two kinds of evaluation are important in interpretation. Evaluations are

made to determine program effectiveness after programs are completed and evaluations are made while programs are in progress to provide feedback for making adjustments. The first applies to all programs and the second to personalized programs such as guided activities and interpretive talks.

Evaluation of completed programs. Suppose interpreters want to develop and implement a program to help confine the use of OHV's to designated areas at Black Butte Lake in California. An analysis of the situation might reveal that, although nearly all users are aware that OHV use is limited to roadways and designated areas, many do not know where the areas are, while some know where the areas are but are not motivated to comply with the rules. The interpreters establish a program to disseminate information about OHV areas and mark them open for use. They also organize events involving opinion leaders among the OHV operators to generate social influence for proper use of the machines. The main performance objective of the program might be:

> Fewer than 5 percent of off highway vehicle operators visiting Black Butte Lake will drive their machines off roads on Corps of Engineers land outside designated OHV areas.

Other objectives relating to the knowledge, motivation, and behavior of opinion leaders would also be written for this subpopulation of users.

The overall effectiveness of the program would be evaluated by sampling time periods at random, observing use unobtrusively, and counting the numbers of violations. Effectiveness can be judged by comparing the observed percentage of violations with the objective criterion.

Evaluation of ongoing programs. In personalized programs, the interpreter can observe feedback and modify the delivery to achieve the desired effect. In a program on the role of the Corps of Engineers in flood control, the goal might be that the visitor will empathize with the victims of floods that occurred before levees were built. One empathizes when one can predict (actually feel) the emotional response of another person to a situation. An objective within the program might be:

> Given a description of the effects of the 1927 flood on the Halverstad farm, when asked to choose between descriptions of Mr. Halverstad's reaction upon returning to the home after the flood, 80 percent of the visitors will select the correct response.

To evaluate effectiveness during the program, the interpreter would build in questions to which the audience could respond. The percentage of correct responses can be compared with the desired percentage. If it is less, the interpreter may provide more detail about the flood and the people affected to increase empathy. If the response is sufficient, the interpreter may continue.

Selection of Message Content and Interpretation Techniques

Once specific objectives are written, the decisions among possible message designs become much easier. Objectives also provide a rational basis on which to

decide which interpretation techniques to use. Those which do not contribute to the desired effect, but are appealing for other reasons, can be eliminated. For example, the "touch and feel" display is common in visitor centers. It is well established that messages involving multiple senses teach more effectively than do messages involving a few senses. But how does the display relate to your message? What effect is the "touch and feel" display supposed to have on the visitor? Furthermore, how did you decide what to put on the table?

One of the most important functions of goal analysis and objective writing for interpretation is that it forces rational choices among communication alternatives. Interpretation is both an art and a science. By forcing a clear definition of what is to be achieved, goal analysis and objective writing implicitly demand logical explanations of why one method will achieve the effect better than another. That can draw in the extensive body of principles generated by communication and education research. The art of interpretation should not be used as an excuse to ignore the science of communication.

Accountability

Written goals and performance objectives make interpretation accountable. They permit the interpreter to argue effectively for interpretation's role in project management. Evaluation based on objectives permits the interpreter to demonstrate effectiveness. Performance objectives also permit the interpreter to make management and operations decisions that make the most efficient use of limited fiscal and personnel resources.

The interpreter that can show how a proposed program will reduce costs from vandalism, reduce enforcement, or prevent drownings will be more likely to have the proposal approved than the interpreter who cannot. By the same token, the interpreter with empirical evidence that the program actually had the desired effects is less likely to have the program reduced or eliminated than the interpreter who has no hard evaluation data. Without specific goals and objectives, it is difficult to provide credible data on program effectiveness.

Project Coordination

Sometimes different operations within the project seem to work at cross purposes. An example told among interpreters is of a park naturalist guiding a bus tour on a parkway. As the passengers were boarding the bus after a stop, the naturalist stopped two people who had picked some flowers from the roadside. He explained the rules against flower picking and urged the group to leave the flowers so everyone could enjoy their beauty. Then, as the bus drove to the next stop, they passed a park service tractor mowing the grass and flowers along the roadside.

Either the naturalist should not have given that talk or the maintenance department should not have mowed the roadside. A clear statement of the objectives related to messages about flower picking might decide the question and prevent such embarrassment to the agency. Even with clear goal and objective statements, the necessary coordination might not occur; however, without these statements, it almost certainly will not.

Interpreter Training

Seasonal employees are vital to most programs. They are also the Corps of Engineers that most visitors see, and they are also the employees least able to give an accurate picture of the agency or to promote desirable visitor behavior because they are generally inexperienced and untrained.

Without the guidance provided by approved interpretation goals and objectives, the interpretive messages communicated by seasonal interpreters are likely to be ineffective or even to produce undesirable results.

Time is limited for seasonal training. Interpretation goals and objectives provide guidance to trainers for the selection of topics and the preparation of training performance objectives. Again, the real value is to provide a rational basis for selecting among the many things that might be taught.

Contracting

Design of displays and visitor centers is usually done by a contractor. Contractors do not have the intimate experience with the project and users that a Corps employee would have. Although they may be experts in communication, they rely on you to define the effect their communication is to have on the visitor. If you do not provide them with stated performance objectives, they must work from assumptions and broad generalizations. The results can be technically excellent displays that have little (or an undesirable) impact on the audience.

SUMMARY

Written goals generated by performance analyses and performance objectives are essential for quantitative evaluation of interpretation effectiveness. They guide the choices of message content and types of appeals used. They permit the interpreter to coordinate activities with other branches and to argue for interpretation's appropriate place in project management. Stated goals and objectives are important in the development of effective seasonal training and communication with contractors designing displays and other interpretation media.

As a result of working through this supplement, you should be able to write performance objectives for interpretation. You should also be sufficiently motivated to regularly conduct performance and goal analyses and write performance objectives for interpretation programs. However, goal statements and performance objectives are worthless unless you use them.

We interpret to influence how people think, feel, and behave with respect to the topic. Our interpretation will inevitably have some effect; it ought to be the effect intended. Goal analysis and performance objectives help identify and specify the desirable effects. They are used to create, deliver, and evaluate effective and efficient interpretation. Write performance objectives and use them.

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INTERPRETATION PLANNING

A Supplement to

A GUIDE TO CULTURAL AND ENVIRONMENTAL
INTERPRETATION IN THE
U.S. ARMY CORPS OF ENGINEERS

Abstract

An interpretative plan gives overall direction to a project's interpretive effort and integrates it within the entire range of project activities. This supplement provides recommendations for developing an interpretive plan as part of a project's Master Plan. Guidance is given on all aspects of the planning process, including formation of the planning team, goal identification, resource inventory, plan development, and plan evaluation and revision.

INTERPRETATION PLANNING*

A Guide To Cultural And Environmental Interpretation in the U.S. Army Corps of Engineers

INTRODUCTION

According to Engineer Regulation ER 1130-2-428, "It is the policy of the U.S. Army Corps of Engineers that an IS (Interpretive Services) program will be implemented at each Corps operated project." The IS programs are to accomplish one or more of the following goals:

a. Aid project personnel in accomplishing management objectives.

b. Enhance the public's understanding of the role of the Army and the Corps of Engineers in development and administration of water resource projects.

c. Enhance the public's understanding of the purpose and operation of the project, its man-made, natural, and cultural features.

d. Develop public appreciation for proper use of project resources in an effort to reduce overall project operation and maintenance costs (U.S. Department of the Army 1983).

These four objectives indicate that the task assigned to the interpretive function in the Corps is large and vital. To accomplish these objectives, planning is necessary.

The purpose of this supplement is to provide recommendations for accomplishing interpretive planning. It provides information on four vital issues: "What is an interpretive plan?", "Why do an interpretive plan?", "Who should prepare the interpretive plan?", and "How do you do an interpretive plan?".

WHAT IS AN INTERPRETIVE PLAN?

An interpretive plan is a document that guides the character, design, development, and operation of facilities and programs necessary to interpret a project. The plan identifies the role of interpretation in accomplishing the mission of the organization and the goals of the project, and it ensures the integration of the interpretive program in the total area management program. The plan identifies appropriate interpretive theme(s) for the site; i.e., it briefly summarizes the primary and secondary messages or stories to be communicated to visitors at the site. It then states planning objectives for each theme and suggests locations, facilities, and media for accomplishing the objectives. Where more than one

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theme, objective, or program are recommended, these are given a priority and a time table for implementation is established. Staffing and budget requirements for implementing the plan are described. Finally, the plan may suggest a procedure for evaluating the effectiveness of the interpretive program it prescribes.

The plan provides direction to all interpretive efforts and should be consulted by interpreters when selecting interpretive sites, facilities, or programs. However, it should permit flexible and creative responses to interpretive problems and challenges as they arise. For example, while the plan should prescribe the interpretive themes and identify appropriate interpretive locations and media, it should not prescribe program components, specific interpretive activities, or detailed site or facility design. Also, the plan should respond to changes in agency direction, resource characteristics, or visitor needs. To facilitate any required change, it is suggested that the plan be reviewed annually and be subject to complete revision every 5 years.

The interpretive plan should be a part of the Park Management section of the Operational Management Plan. It is to contain descriptions, management objectives, and implementation plans for interpretation (U.S. Department of the Army 1983).

WHY DO AN INTERPRETIVE PLAN?

A Corps project's interpretive plan integrates the entire interpretive effort within the project management plan. It ensures that the objectives of the interpretive function are appropriate and in harmony with those of other administrative units of the organization.

A related benefit of a plan is the overall direction it gives to the entire interpretive effort. By identifying appropriate interpretive themes, objectives, and media, the plan provides continuity for the interpretive programs throughout the area and through time. This is especially important on large projects that have scattered interpretive sites, many interpretive programs, and a large staff. On such projects, the plan ensures that all parts fit together to achieve the same end without duplication or contradiction. The plan also ensures continuity in interpretive story and programming across changes in the interpretive staff. Thus, the loss of permanent employees or turnovers in seasonal interpretive staff will not affect the character and direction of interpretation at the project. Indeed, the interpretive plan should be a primary training manual for all new interpreters.

The plan also acts as a guide to all project employees, informing them of the project's interpretation objectives and implementation plans. This is important in that it fosters coordination and cooperation between those responsible for interpretation and other project staff. For example, sites, facilities, and even expertise might be shared. Noninterpretive staff may distribute interpretive materials at campground contact stations or interpreters may design programs to address maintenance problems.

The interpretive plan provides the rationale for and identifies sites and facilities needed for interpretation. For example, a historic structure on the site

might be useful for administrative offices or for cultural interpretation. An interpretive plan assesses the usefulness of the structure within the larger interpretive context of the entire project, and a more informed decision can be made. Also, by requiring and reporting a complete inventory of interpretive resources at the site, the plan helps to prevent the unknowing destruction of valuable interpretive resources.

Coordination of the onsite interpretive program with offsite interpretation is another benefit of interpretive planning. This coordination should occur not only within the Corps' own program but also between the Corps and neighboring agencies providing orientation, education, and interpretive services. For example, providing water safety training is an important objective of the Corps' interpretive services. This might be accomplished onsite during the boating and swimming season, but offsite in schools or outdoor clubs during the off-season. The interpretive plan gives direction to both programs, assigns an appropriate role to each, and guarantees that the two are mutually supportive. The American Red Cross provides water safety instruction, and interpreters might cooperate with this organization. Neighboring public resource areas — like state parks or national forests — may have the best example of a given interpretive resource, e.g. Indians mounds. If this is the case, interpretation of that feature should be left to the agency with the best resource example.

The careful and systematic collection, analysis, and evaluation of information that goes into the planning p[illegible]s help to identify the critical needs of the interpretive program and to provide justification for those needs. The interpretive plan can also be a useful guide for interpreters in work scheduling and allocating scarce resources. The plan typically identifies major interpretive themes and subthemes, and ranks the important interpretive activities to be accomplished. With each fiscal year, the interpreter — or the resource manager — can evaluate past progress against the priority schedule, identify the next most important interpretive tasks to be accomplished, and make appropriate budgetary and staffing requests and assignments. As the year progresses, daily work assignments can be made in light of the plan's priority schedule.

Related to scheduling is the need for evaluation. Evaluation has become increasingly important at the policy, planning, and programming levels of an organization. It is likely that interpretive activities, plans, and personnel will be evaluated by individuals who have no interpretive training or experience and may not know the role and capabilities of the interpretive staff within the organization. An interpretive plan can both inform them of the functions of the interpretive unit and provide them with appropriate criteria for evaluation. Since these criteria are the same ones under which the interpreters are working, evaluative judgments are more likely to be valid and useful in improving interpretive planning and programming.

WHO SHOULD PREPARE THE INTERPRETIVE PLAN?

Since an interpretive plan has a variety of functions and must mesh with the goals, objectives, and programs of the entire project, it should be developed through the coordination of a variety of resource experts. Ideally, this should be in

the form of a planning team that meets periodically during plan preparation. If this is not possible, the experts should be consulted individually throughout the planning process to provide comments, suggestions, and criticisms. If it is feasible to establish a team, the ideal size will vary with the size and complexity of the project area, but should generally not exceed five people. Beyond this number, communication begins to break down and team efficiency is reduced. It is important that all team members know the project well, appropriate professional disciplines are represented, all members have a designated role, and all members know and respect the roles of their colleagues. Whether a planning team is established or experts are used in a consulting capacity, the following areas should be represented: interpretation, project management, resource management, and landscape architecture or engineering. At least one member of the team should be from the project staff. Since this member has an intimate knowledge of the project, he or she would be instrumental in identifying management problems to be addressed, developing interpretive objectives and themes, and pointing out factors which may impact interpretive programming (Paskowsky 1983).

The organizing force of the planning team will be the interpreter. This individual should have broad interpretive training and experience and give overall direction to the team. He or she must (a) take a holistic approach to the planning effort; (b) know the principles of sound interpretive planning and programming; (c) understand the project's visitors and their attitudes, preferences, and behavior; (d) synthesize information provided by team members to develop appropriate interpretive themes; (e) know how to formulate interpretive objectives; and (f) know the advantages and disadvantages of various interpretive media.

A second team member should be someone from upper level management at the project — perhaps an assistant project manager. The role of this individual is to: inform the team of relevant Corps policies, goals, regulations, and higher level plans; assist in meshing the interpretive plan with the entire project's activities; and be a communication link with the project manager.

One or two other team members should be resource specialists who aid in the inventory of the interpretive resources of the site. Depending on the area, a biologist and/or an historian/archaeologist may be needed. These individuals would inventory, map, and evaluate the importance (in terms of science, management, and human interest) of such resources as forests, wildlife, fish, water, prehistoric and historic Indian cultures, pioneer history, the project history, and current land uses. These individuals would make substantial contributions to the development of interpretive themes for the site.

The final team member should be a landscape architect or engineer. The primary role of this individual is to advise the team on the feasibility of conducting interpretation at the various site locations. His or her recommendations will help the team decide if interpretation of a given resource should take place onsite or away from the resource. This team member can also help in recommending visitor flow patterns throughout the site, in minimizing visitor impacts, and in blending the overall plan to the constraints and capabilities of the landscape.

The interpretive planning team should feel free to seek the assistance and advice of appropriate specialists both within and outside the Corps as the need

arises. For example, someone from photography or graphic arts could provide assistance in designing brochures or exhibits, amateur ornithologists in the area could help in the bird inventory, researchers at a nearby university may be able to assist in the visitor analysis or an archeological survey, or private consultants may be able to assist in providing more detailed planning direction. In many cases, the project manager can assist in arranging the cooperative work efforts.

HOW DO YOU DO AN INTERPRETIVE PLAN?

Every Corps project is somewhat different and has its own unique interpretive planning problems, challenges, and opportunities. The interpretive plan should reflect the resource capabilities, constraints, and user needs at the project and should propose interpretive guidelines, programs, and solutions that fit the existing situation. Although every interpretive plan should be somewhat different, the planning approach or format outlined in Figure 1 will be similar across all areas.

An interpretive plan should include at least four topics: goals, inventory, plan development (including implementation strategies), and plan evaluation and revision. Because of budget and time constraints, it may not be possible to provide sufficient detail on all topics when the plan is first developed. Each topic should be addressed to some extent in the original plan, but additional or updated information can be incorporated at a later date.

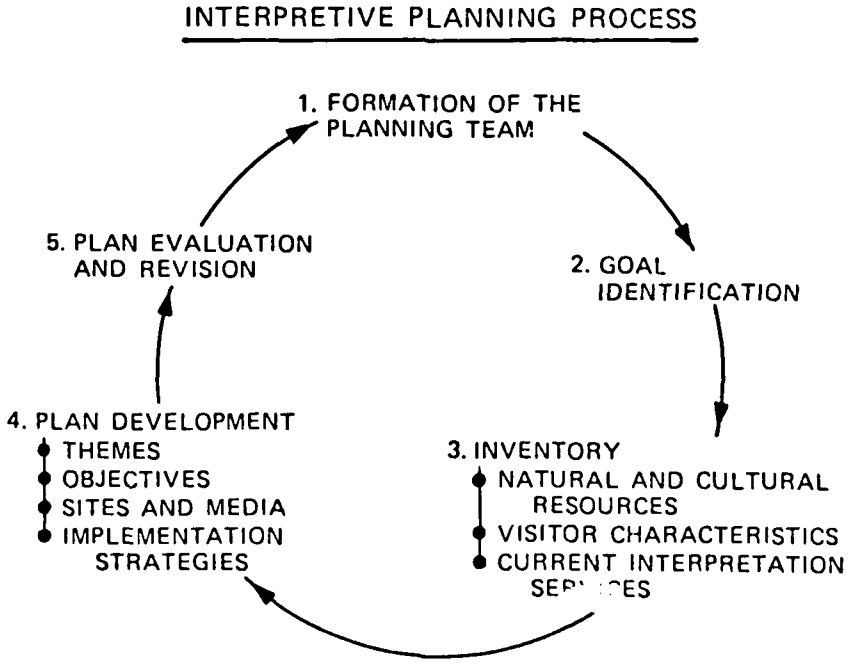

Figure 1. Interpretive planning process

Goals

The basic purpose of all interpretation at Corps projects should be contained in a statement of interpretive goals. The goals give overall direction to the interpretive effort and represent official Corps policy. The four goals for interpretation within the Corps were listed in the Introduction.

Inventory

Once interpretive goals for the project have been identified, the next planning step should be an inventory of available natural and cultural resources, visitor characteristics, and current interpretive services. Such baseline information reveals the interpretive potential of the site, the preferences and behavior patterns of the visitor, and the available interpretive resources. These resources are the raw material for the plan.

In many cases, this baseline information is already contained in the Operational Management Plan or can be obtained from previous Corps studies and a variety of other public and private sources. These should be utilized whenever possible. A list of potential sources can be found in Appendix A.

Natural and cultural resources. The project's interpretive goals indicate which resources are important, but, generally, the natural resources inventory should include: geological forces and formulations, climate, soil, water quantity and quality, vegetation, fish, mammals, birds, amphibians and reptiles, and insects. The inventory should report kind, quantity, distribution, and quality of the various resources. This information not only begins to define appropriate interpretive themes for the project but also identifies resource capabilities and constraints at the site. For example, the inventory may locate a rare and endangered species or soils in some parts of the site which may not withstand heavy visitor use. Thus, the natural resource inventory provides the interpretive story and helps the interpreter decide when and how to communicate that story.

Cultural resources, which hold high appeal for many Corps visitors, should also be inventoried. A cultural resource inventory should include a survey of prehistoric man at the site, Indian history, the period of exploration and settlement by European man, the project's history, and man's current land uses. Archaeological sites should be located and mapped, valuable artifacts should be identified and catalogued, man's past use of the site should be recorded, and current land uses should be mapped.

Where natural and cultural resource information is not available, it can be obtained through maps, guides, field inventories, or consultation with outside experts or agencies. It will generally be impossible to get a complete inventory of all resources during the initial planning period. What is important is that the most fragile and valuable resources be identified and that all known resources be recorded and mapped. This permits measures of change in important resources over time and the ultimate development of a complete resource inventory as the plan is periodically revised.

Visitor characteristics. Any interpretive program will be meaningless unless it relates to the interests, preferences, and needs of the visitor. The chapter

on "Understand the Visitor" in Propst and Roggenbuck (1981)* and "Audience Analysis Techniques," should be consulted during the visitor inventory phase of the planning process. In general, interpretive planners need to know the number of people who visit the project and who may attend interpretive programs — both now and in the future. This information is a basic prerequisite when deciding how much interpretive effort and funds should be expended at the site. Data on the distribution of use through time and space are needed in scheduling interpretive services. Information on visitor behavior (what people do at the project) and visitor preferences can help interpreters anticipate program attendance and select appropriate program times, topics, and locations. Percent of repeat visitation provides an indication of the need for program change and diversity. Other more specific information can help interpreters decide how to present their programs. For example, knowledge of visitors' age, education, sex, occupation, length of stay, place of residence, group size, and attitudes is often useful in selecting appropriate media and in targeting the message to the audience.

Information on these plus other visitor characteristics can be obtained through a review of existing data and observational techniques. Useful data may be available from traffic counts at the project; use estimation surveys and other periodic visitor use surveys at the project; Natural Resource Management System (NRMS) data reported by each project; camping permits; and visitor surveys conducted on the project itself or on nearby recreation areas by universities or other Federal, State, or county agencies. Interpreters can also observe and record such visitor characteristics as behavior, age, length of stay, and group size in such places as visitor centers, campgrounds, or during campfire programs, nature hikes, or powerhouse tours.

In the Interpretation Manual, other methods for collecting visitor information are described that may be helpful to interpretive master planning. Some methods are quite complex, and the services of a skilled researcher are generally required to initiate them. Also, Office of Management and Budget (OMB) approval is required when visitors are formally asked questions about their characteristics, preferences, attitudes, or behavior. However, once such studies are designed, approved, and field tested, project staff could carry them out.

As was the case with the inventory of natural and cultural resources, it is likely that not all of the visitor use information will be available during initial plan preparation. What is most important is that existing information be used when available, that an appropriate and effective data collection method and sampling plan be selected if the opportunity for a visitor study arises, and that a formal procedure be established for collecting visitor use data to update subsequent plan revisions.

Current interpretive services. A review of current interpretive services provides baseline information on what is immediately available for interpretive plan development and implementation. The number and quality of interpretive facilities, staff, programs, publications, and other supportive material should be

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* This publication will hereafter be referred to as the "Interpretation Manual."

described in a site's interpretive plan. Interpretive services that are well received and are meeting agency objectives should be retained. On the other hand, the plan should not be completely constrained by the current situation. If available interpretive resources and facilities are insufficient in quantity or quality to accomplish planning objectives, then changes should be recommended.

The inventory should also include a review of interpretive services at adjacent land areas to avoid duplication of visitor services, ensure that the interpretive capabilities of resource areas are used most wisely, and provide a more holistic interpretive experience for the visitor.

Plan development

The body of the interpretive plan should list interpretive themes, objectives, sites, media, and implementation strategies. Figure 2 is a partial diagram of the planning process.

Themes. A theme has been defined as a statement that tells why a site is so important that society will spend commonly held funds to ensure that it is not forgotten or lost (U.S. Department of the Interior, undated). A theme should depict the intrinsic character of a site — the unique qualities that make it special. For interpretive purposes, themes should be general statements of the important stories or messages concerning the site. Each Corps project should have its own unique interpretive themes, and all interpretive programs should relate to one or more of the themes. Themes thus act as a commc ' thread tying together all interpretive services.

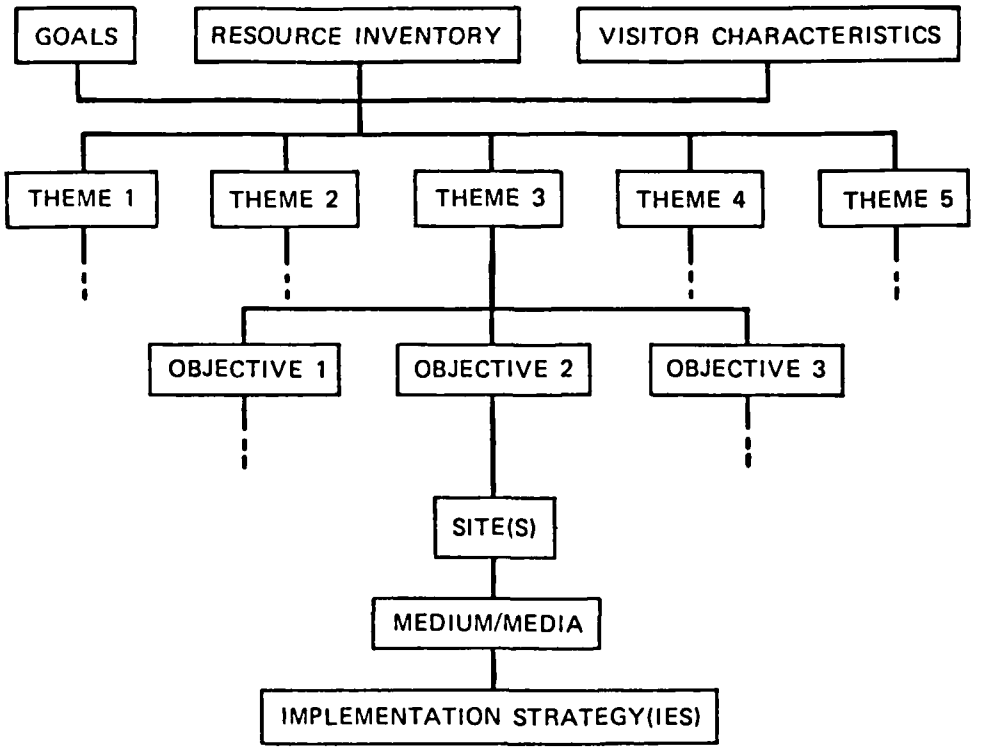

Figure 2. Planning process

Themes should be developed on the basis of the resource inventory, visitor interests, and agency goals and should be classified as primary or secondary. One theme could be *Water Safety*, a message to reduce water accidents and enhance recreational experiences. *Water Travel* might be another theme, a story of the role water played as transportation corridors in the Nation's development. The theme *Leave No Trace* calls for messages of how to enjoy the environment without impact. Of these three, *Water Safety* might be designated as a primary theme with the others assigned a secondary position. These designations would aid in allocations of limited funds and scheduling of work priorities.

Objectives. Objectives are critical to the development of a complete program of interpretive services. In the Interpretation Manual an entire chapter is devoted to the goals formulation and statement of clear objectives. Briefly, planning goals state what product or result the interpretive program — taken as a whole — is supposed to accomplish. Planning objectives lie midway between policy objectives and program or evaluation objectives in terms of their specificity (Putney and Wagar 1973). They are solidly based in policy, but are more specific to individual projects than goals and reflect the themes of that project. Planning objectives are found in interpretive master plans, and they guide the plan's selection of appropriate interpretive sites, facilities, and media. An example of a planning objective would be "to reduce the number of water accidents and water-related deaths at Duck Lake." This objective reflects a water safety theme and a Corps policy to provide safe and enjoyable recreational opportunities at its water projects. Guidelines for developing objectives can be found in the supplement "Goal Analysis and Performance Objectives."*

Sites and media. The resource inventory provided the planning team with the description and location of all resources with interpretive potential. During the sites and media planning phase, one or more sites are selected for each planning objective. Site selection criteria include the capability of the resource to illustrate the interpretive concept, the location of the resource, visitor preferences, and site constraints. Generally, interpretation will be onsite. At times, however, interpretation may occur at the project site but away from the resource being interpreted. Visitor centers with their slide shows, movies, exhibits, and dioramas are examples. While removal of the visitor from the interpretive scene can lower program effectiveness, it is sometimes necessary in order to give a resource overview, protect the visitor or site, or for visitor convenience.

Sites off the project might also be selected for interpretive purposes. For example, informing the potential visitor about the recreational facilities and opportunities at a Corps water project might best be accomplished at state tourist information centers. Water safety education programs might be given in schools surrounding the project.

A planning sheet should be developed for each interpretive site selected. This sheet should describe the site, indicate its location on an area map, illustrate the visitor flow pattern to the site, list the interpretive theme(s) and objective(s) of the site supports, and describe the required media, interpretive staff, funding, and

* "Goal Analysis and Performance Objectives," by Ronald Hodgson, is another supplement in this series.

time schedule for interpreting the site. Appendix B contains an example of one type of planning form that can be used for this portion of the plan.

The type of media used at each interpretive site may be a personalized or nonpersonalized service, or a combination thereof. Personalized interpretive services include information desk duty, interpreters stationed at the site, a roving interpreter, guided walks, interpretive talks, campfire programs, living history interpretation, cultural demonstrations, and auto tours. Audio stations, messages on portable cassette recorders, messages over auto radio, interpretive signs, self-guided trails or walks, self-guided auto tours, interpretive exhibits, and visitor centers are examples of nonpersonalized interpretive media (Sharpe 1976). The advantages and disadvantages of each of these media are discussed in detail in the chapter on "Choosing the Appropriate Media" in the Interpretation Manual.

Selection criteria that should be considered when choosing interpretive media for a given site are: planning objectives, visitor characteristics, resource and visitor protection, costs, personnel requirements, location, media flexibility/changeability, and maintenance. As examples, interpretive signs and simple brochures may be effective in orienting the visitor, but personalized services may be required to change behavior. Personnel may not be available to provide services on a consistent basis. If the resource area is too dangerous or too fragile for recreationists to visit, the object to be interpreted or a replica may have to be placed in a visitor center.

Implementation strategies. Two issues should be considered when developing plan implementation strategies: costs and program scheduling. Precise cost figures for future interpretive services may be difficult or impossible to obtain. The plan should, however, provide rough cost estimates for planning and design, construction and media production, and operation and maintenance of all interpretive services to be offered at the project. These cost estimates should include statements on the source of the funding and should provide direction to the more precise annual budgeting process.

To obtain total program cost estimates, planners should consider the costs of providing services at each interpretive site, interpretive costs that relate to the area as a whole, and costs of any offsite interpretation. Cost figures should be based on current Federal employee salary schedules, estimates of required man-hours for project staff, estimates provided by equipment and materials suppliers, local design and construction costs, and past experience with maintenance costs.

The scheduling of the development and operation of interpretive services should be done simultaneously with the cost-estimation phase. This should be done for the 5-year operational period of the plan, with a breakdown of costs of program development and operation within each fiscal year. Priority schedules for work to be accomplished should be based upon planning objectives, theme importance, visitor preferences, resource protection, and anticipated annual budget allotments.

Plan evaluation and revision

The interpretive plan should be reviewed annually at the time of budget preparation for the next fiscal year. At 5-year intervals, the plan should be revised

if necessary. The Interpretation Manual provides a chapter on "Evaluation of Interpretation" that should be consulted during the plan review process. Evaluation is necessary, first of all, to assess the appropriateness of planning objectives and themes. Some revision may be necessary if Corps goals and policies or the resource management system have changed. A change in the resource itself, knowledge of the resource, or visitor preferences may also necessitate a plan change. Secondly, program managers, Corps administrators, elected representatives of the people, and ultimately the American public need to know if objectives have been met in a cost-efficient manner. If objectives have not been met, then program managers need to know why and how to make the necessary adjustments. The interpreter and his or her immediate supervisor can perform the annual evaluation and review. The 5-year review should be conducted by a planning group such as described earlier.

ADDITIONAL PLAN COMPONENTS

Two other plan components that can provide long-range benefits and increase overall interpretive program effectiveness are: a statement of research needs and a detailed bibliography. As resources and visitor needs are inventoried, themes and objectives developed, programs for achieving objectives recommended, and progress evaluated, the need for additional information will become apparent. These informational gaps should be stated in terms of research needs, and they should be ranked by importance. This list can ensure that all research allocations, either in terms of time or money, are used wisely. For example, some research may be accomplished through summer intern help, volunteer interpreters, year-end monies, or formal project allocations.

The interpretive plan should close with a detailed bibliography, and provisions should be made for its periodic revision. The bibliography can form the basis for an interpretive library at the project level and would be a very useful training tool for new interpreters, especially seasonals. The list of references should give full coverage to interpretive themes, but should include important citations relating to natural and cultural resources, safety, visitor characteristics, interpretive planning and programming, and program evaluation.

SUMMARY

This supplement has attempted to provide general guidelines, not precise directions, for interpretive planning. Background information includes a description of an interpretive plan, the benefits of such a plan, and who should prepare the plan. The major segment of the supplement gives general "how to" guides by describing interpretive goals, resource inventory plan development, plan evaluation and revision, and the need for research and a detailed bibliography. Interpretive planners should not view this as a constraint on their creative energies as they respond to unique project problems. Rather, the goals of the supplement are to help planners focus their creative talents on important project opportunities and interpretation for management and the public good.

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APPENDIX A: POTENTIAL SOURCES FOR INVENTORY INFORMATION

- Books and listings of local historians, archaeologists, etc.
- County records offices
- District and Division publications and maps
- Local university library and pertinent departments for previous studies (Check Theses and Dissertations)
- Library of Congress and National Archives and Records Service reproductions from historical and military map collections, other records
- Magazines and local newspapers
- Museums
- Other Federal agencies
  - Bureau of Land Management
  - Census Bureau
  - Fish and Wildlife Service
  - National Park Service
  - U.S. Forest Service
- Personal interviews with local residents
- Existing project data
  - Campground fee receipts
  - Natural Resource Management System (NRMS) data
  - Traffic counts
  - Visitor surveys
- Previous resource inventory contracts
- Project Environmental Impact Statements or assessments
- Project master plans
- Public libraries
- Retired or former personnel
- Soil Conservation Service surveys and soil survey maps
- State agencies
  - Archives and Libraries
  - Departments of: Natural Resources, Parks, or Wildlife
  - Highway Departments
  - Historical Commissions
  - Regional Planning Commissions
- U.S. Geological Survey Quadrangle maps, mineral resources maps and charts

APPENDIX B: INTERPRETIVE PLANNING FORMS

The Interpretive Site Inventory Form and the Story Development Forms reproduced herein have been changed slightly for suggested Corps use. The following instructions for completing the forms are taken from Veverka, Poneleit, and Traweek (1979).

THE INTERPRETIVE SITE INVENTORY FORM

The first form to be employed in the interpretive planning process for a park or site interpretive plan is the "Interpretive Site Inventory" form. This form is designed to be used in conjunction with an Interpretive Site Location Map, which can be any map (e.g., a topographic map, a base map, etc.) of a park or area undergoing the interpretive planning process. Each specific site (either being planned or currently in existence) for which interpretation or interpretive services (such as a self-guided trail) are being developed should be located on the map and assigned a site index number consisting of one or more letters and a number. The letter(s) indicates the generic type of site it is, and, in this scheme, the codes for the interpretive site categories would include the following:

B—Biological Sites: for example, waterfowl nesting areas, beaver lodges, unique ecological zones, etc.

F—Facility Sites: such as an interpretive trail, trailside exhibit, interpretive center, or other related facility. This would be used to indicate both the recommended location for such facilities as well as the location of existing facilities.

G—Geological Sites: such as bedrock outcrops, glacial till, glacial formations, caves, fault lines, etc.

H—Historic/Archaeological Sites: for example, log cabins, grave sites, historic buildings, sites where historic events took place, Indian mounds, etc.

O—Orientation Sites: such as existing or recommended information centers, bulletin boards, kiosks, and directional signs for interpretive services/facilities.

P—Paleontological Sites: such as fossil beds or deposits .

The number following the site letter code is used to distinguish between similar sites and gives each site its own distinctive "identity" code. For example, five different historic sites being inventoried for interpretive programming would have the following site index numbers: H-1, H-2, H-3, H-4, and H-5. If a facility such as an interpretive sign is being planned for each of these sites, then the appropriate code letter "F" would be added to the site index number to illustrate this facility. The site index numbers for these five sites would then become HF-1, HF-2, HF-3, and so on. The latter example illustrates the fact that more than one category may be listed for the same site. This would typically occur where there was a facility and an orientation function combined, as is the case with a major visitor center. Such a site might be coded "OF-1" ....

Once the site index number for a specific site has been established, completing the "Interpretive Site Inventory" form is quite simple. First, only one sheet is completed for each interpretive site being inventoried. The space for "page 00 of 00 pages" should be left blank until the form has been completed and the number of "Continuation Sheets" and the number of "Story Development" forms utilized are also known .... If a section of the "Interpretive Site Inventory" form does not apply for a given site, the planner should enter "Not Applicable" or "N/A" in the space provided. Future reviews of the form during the planning process may indicate the need to update an "N/A" section.

Since further space may be required to expand on sections of the "Interpretive Site Inventory" form (or, as we shall see, the "Story Development" forms), a "Continuation Sheet(s)" should directly follow the appropriate form, and all continued sections should be clearly labeled in the space provided.

THE STORY DEVELOPMENT FORMS

The second type of planning form is the "Story Development" form, and the headings for these sheets are completed in exactly the same fashion as for the "Interpretive Site Inventory" form which immediately precedes them for a given site. There are three variations of the "Story Development" form (A, B, and C), each containing spaces for complementary information. Together with the "Interpretive Site Inventory" form and "Continuation Sheets," they comprise a *sequenced set for each site* inventoried. The sets of forms will allow interpretive planners to present a complete package of information about each site and the proposed interpretive services and/or facilities for that site .... If a section of the "Story Development" form series does not apply for a given site, the planner should enter "Not Applicable" or "N/A" in the appropriate space. Subsequent reviews of the form during the planning process may indicate the need to update an "N/A" section.

Interpretive Site Inventory	Park:	Page of

Site Index No:	Site Name:

Site Location:

Site Description:

Seasonal Accessibility:

Interpretive Significance:

Attach photograph/illustration here.

Continuation Sheet	Park:	Page of
Site Index No:	Site Name:	

Story Development-Form A	Park:	Page of
Site Index No.:	Site Name:	

Interpretive Theme:

Interpretive Program Objectives:

Story Development-Form B	Park:	Page of

Site Index No.:	Site Name:

Interpretive Media:

Story Development-Form C	Park:	Page of

Site Index No.:	Site Name:

Justification:

Planner's Comments:

EVALUATING INTERPRETATION

A Supplement to

A GUIDE TO CULTURAL AND ENVIRONMENTAL
INTERPRETATION IN THE
U.S. ARMY CORPS OF ENGINEERS

Abstract

To measure the effectiveness of any action, some type of evaluation is necessary. In this supplement two evaluation designs are described: experimental and quasi-experimental. Examples are used to illustrate the application of these designs in evaluating interpretation.

It is not possible to provide in this supplement all of the details required to implement each evaluation strategy described. Instead, enough background information is provided to enable the reader to select the appropriate design for his or her situation. For each design, the reader is referred to additional sources for more detailed guidelines.

EVALUATING INTERPRETATION*

A Guide to Cultural and Environmental Interpretation in the U.S. Army Corps of Engineers

INTRODUCTION

One interprets to influence the ways visitors think, feel, and behave with regard to each other, the resources, and the agency. Evaluation compares the observed visitor behavior with the desired behavior. This supplement describes alternative methods of evaluation and factors that influence evaluation strategies. It is one of a series of supplements to "A Guide to Cultural and Environmental Interpretation in the U.S. Army Corps of Engineers" (Propst and Roggenbuck 1981), designed to provide specific guidelines for developing, implementing, and evaluating interpretation programs.

Evaluation techniques presented in this supplement will provide the framework necessary to make decisions on whether to keep, change, or eliminate interpretation programs. For instance, suppose a project has a problem with off highway vehicle (OHV) use in an unauthorized area. After deciding that the problem can be solved with interpretation, the managers design and implement an interpretation program. Using evaluation techniques presented herein, managers will not only be able to determine if OHV users quit riding in the unauthorized area, but also:

a. If a change in behavior is due to the interpretation program rather than other influences (such as the development of a new OHV area in the vicinity or bad weather).

b. If the number of riders in the unauthorized area has been reduced enough for management purposes.

c. Which messages, media, and distribution plans were most effective in producing the change (if more than one were used).

Less exacting evaluation techniques do not provide this information.

Interpretation is evaluated by measuring how visitors respond to it and comparing that response to the thoughts, feelings, and behaviors that would exist without the interpretation.

The evaluation must:

a. Measure *visitor* response in terms of a change in feelings (attitudes, motivations, values, etc.), knowledge, or behavior.

b. Control for other factors which might cause changes in visitor feelings, knowledge, and behavior.

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* This supplement was written by Dr. Ronald W. Hodgson, California State University, Chico, Calif., and Ms. Janet Akers Fritschen, Michigan State University, East Lansing, Mich., under Intergovernmental Personnel Act Agreements with the U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.

In order to measure visitor response (*a* in preceding paragraph), it is important to know who and what are to be measured. Both of these, for example, can be found in this hypothetical performance objective for the Black Butte Lake interpretation program:*

> Sample performance objective. *Fewer than five percent of off highway vehicle (OHV) operators visiting Black Butte Lake will drive their machines off roads on Corps of Engineers lands outside of designated OHV areas.*

To evaluate a program designed to achieve this objective, one must measure the driving behavior of OHV operators using Black Butte Lake lands. Specifically, one must count the number of OHV operators visiting the lake and the number who drive off highways on Corps lands outside designated areas. Further information on the intended audience can be taken from the audience analysis conducted for the program.

Methods for making these measurements fall into two categories: obtrusive and unobtrusive. Obtrusive measures require that the visitor be contacted. Interviews and self-administered questionnaires are examples of obtrusive measures. Because of concern over the impact these measures could have on the visitor's experience, the Office of Management and Budget (OMB) has placed restrictions on their use. Most evaluation conducted by Corps personnel will, therefore, incorporate unobtrusive measures. Since these measures do not require direct contact, they place little or no burden on the visitor. Unobtrusive measurement methods include: participant observation, direct observation, and observation of physical traces.

The supplement "Audience Analysis Techniques" describes some unobtrusive measures. Further information may be obtained from local colleges and universities and research methods books. Selected reference books are listed in the Bibliography at the end of this text.

The second requirement for evaluation, that extraneous factors be controlled (*b* on preceding page), is met by the evaluation design. Two types of designs which may be used for interpretation are described in this supplement: experimental and quasi-experimental. Experimental designs are used when it is possible to manipulate the situation and select random samples of visitors. When this is not possible, quasi-experimental designs can be used. Both types of designs provide the control necessary to ensure a valid evaluation.

It is not possible to provide all the instructions necessary to design and implement evaluation strategies in this supplement. Instead, the information presented here is intended to function as a framework. Those who have had previous training or experience in evaluation may be able to fill in the necessary details themselves. Others may need to seek help from applied behavioral scientists within or outside the Corps to plan and implement an evaluation strategy for their particular situation.

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* For further information see "Goal Analysis and Performance Objectives" and "Audience Analysis Techniques," two other supplements contained in this report.

EXPERIMENTS

Experiments can be used whenever individuals or groups can be given different kinds of interpretation (or no interpretation) *at random* and those receiving one kind of interpretation *are isolated* from those who receive other kinds. Receivers are isolated from each other if they cannot communicate with each other about the interpretation each received. Because interpreters control when and where information is made available on the project, it is frequently possible to provide one kind of interpretation to some visitors and another kind to other visitors. With some forethought, the assignments can be made at random and with isolation, making an experimental evaluation possible.

Randomization

There is nothing casual or haphazard about random sampling. Random sampling is a precise way of dividing a large group into smaller groups so that the smaller groups are equivalent to each other and to the larger group on all characteristics. A sample is said to be "representative" if it is an equivalent replica of the larger group from which the sample is drawn. To ensure that a sample is representative, it can be drawn in one of two ways:

a. The different study treatments could be assigned to different time periods (hours/days/weeks). For instance, campers could be personally invited to interpretive programs on some randomly selected weekends (Treatment 1) and not personally invited on other weekends (Treatment 2).

b. As parties appear at the site, they could be randomly assigned to one of the treatments. For instance, randomly selected boating parties could be given an interpretive brochure when they launch (Treatment 1). Other parties would not be given the brochure (Treatment 2).

The treatments must be assigned randomly (over time (Example *a*) or concurrently (Example *b*)) to eliminate the effect of any factor which may influence results (e.g., changes in weather or visitor characteristics).

When more than one interpreter or location is involved, the treatments must also be assigned randomly to these. Otherwise, it would not be possible to determine whether observed differences between treatment groups were due to the interpreter, location, or interpretation message. For a more detailed explanation of randominzation and random sampling, see Appendix A.

Isolation

To control for the effects of communication between those who are receiving one treatment and those who are receiving another, some means of isolation must be introduced. Isolation may be accomplished in one of two ways. First, treatment messages may be assigned to groups rather than to individuals. People generally recreate in groups. If messages are assigned to individuals, there is the possibility that different members of a group would receive different treatments. Communication within the group might then expose individuals to both treatments.

The second method of isolation is the assignment of treatments to different time periods. This method is used when it is difficult to control who receives the

treatment. For example, isolation by time is often necessary when the treatments use mass media, such as a display, self-guided trail, or slide-tape program.

Experimental Designs

In the experimental designs presented in this supplement, there will be two types of treatments:

a. The interpretation program to be tested.

b. That which the program is being compared against. This is called the "control" and may be no interpretation program, the regular program, an alternative program, or any combination of these.

For the remainder of this section on experimental designs, the first treatment (*a* above) will be termed the "experimental treatment" and the second (*b* above) will be termed the "control treatment."

A control treatment is essential for all experimental designs. Without it, it is impossible to determine how effective the experimental treatment is relative to other alternatives, including no interpretation. The control also eliminates other factors, such as a change in the population or bad weather, as possible explanations of the observed differences in behavior.

Two types of designs will be discussed: Posttest Only and Pretest-Posttest. With both designs, visitors are randomly assigned to treatments. In the Posttest Only design, testing is conducted only after the experimental program and the control alternative (if it consists of a program) are implemented. In the Pretest-Posttest design, testing is conducted both before and after the interpretation program and control alternative are implemented.

Design 1: Posttest Only (with control group). The Posttest Only design is evaluated after the experimental interpretation program and control alternative are implemented (Figure 1). Following treatment, both groups are observed and the thoughts, feelings, and/or behaviors that were to be influenced are measured. The measurements for the experimental treatment group are compared statistically with those for the control treatment group. Based on criteria* established prior to the study, a decision is made as to whether the method being evaluated was more successful than the alternative. An application of the Posttest Only design is illustrated below.

At a hypothetical lake, project management has determined that too few boaters are wearing life preservers. The present proportion is estimated (from past experience) to be 63 percent. It is desirable that at least 85 percent wear life preservers; that means 22 percent more boaters must be influenced to wear life preservers when boating at the project. Based on a performance analysis and an audience analysis, it is decided that if personal contact by a uniformed ranger at the launch ramp is added to the present water safety program, the desired increase in life preserver wearing will result. The ranger would discuss boating safety and specifically recommend the use of life preservers. The cost of such a

* These criteria come from the performance objective for the interpretation program to be evaluated (see the supplement "Goal Analysis and Performance Objectives").

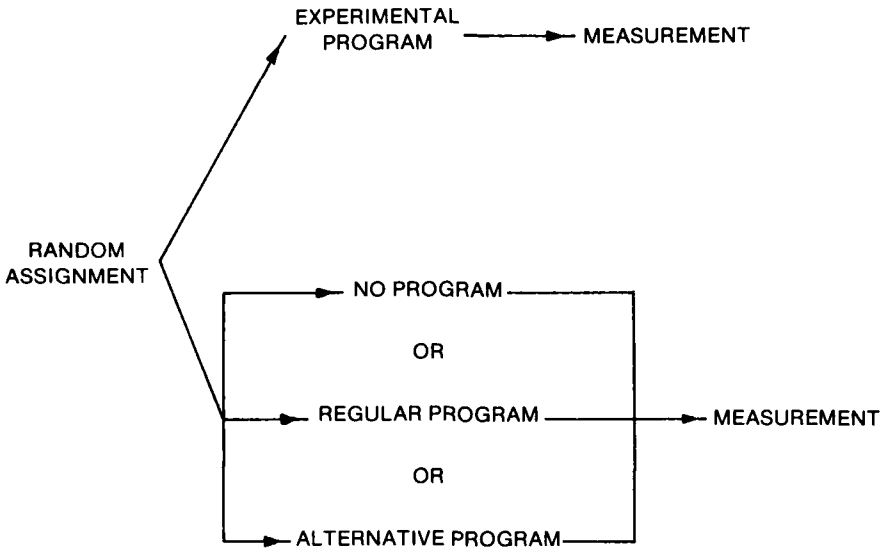


Figure 1. Posttest Only (with control group) schematic

program is fairly high, so it is important to know if it is effective before it becomes an established management action.

Three treatments are to be tested:

Treatment 1: Boating safety message delivered by a uniformed ranger at boat launch ramps.

Treatment 2: Message not related to boating safety delivered by a uniformed ranger at boat launch ramps.

Treatment 3: No message delivered at boat launch ramps

Through this combination of treatments, project management will be able to determine (a) whether a boating safety message is more effective than no message and (b) if the boating safety message does increase use of life preservers, whether the increase is due to the message itself or the presence of a ranger.

A study period during the regular boating season is decided upon. Three rangers are trained and assigned randomly to launch ramps, days of the week, and times of the day. During half those periods, the rangers randomly select a sample of boating parties and give them the boating safety message (Treatment 1). They also record the boat registration numbers of the parties contacted. During the remainder of those periods, the ranger contacts a random sample of parties but gives them a message not related to boating safety (Treatment 2, control). Again, the boat registration numbers are recorded. Registration numbers of boats belonging to parties receiving the safety message are kept separate from those of parties that receive the nonsafety message.

At other randomly assigned periods, no ranger is stationed at the ramp and rangers do not go there any more often than called for by usual patrol duties (Treatment 3, also a control).

To evaluate the three treatments, rangers observe boaters on the lake and record the boat registration number and whether or not the occupents are wearing life preservers. Boating parties to be observed are randomly selected while on the lake. To avoid any effect rangers might have on the wearing of life preservers, each party is observed at a distance from an unmarked boat.

Later, the boat registration numbers collected on the lake and at the launch ramps (during treatments) are compared. Using the registration numbers, the parties sampled on the lake are divided into three groups:

- Those who received the safety message from the ranger.
- Those who received the nonsafety message from the ranger.
- Those who received no special message.

Forty percent of the sample of boating parties who received no message (Treatment 3) were not wearing life preservers. This is close to the original estimate of 37 percent. The proportion of those who received the safety message and were observed wearing life preservers is 89 percent. From this, it appears the message had the desired effect. The "non-safety message" (Treatment 2) seems to result in about the same amount of life preserver wearing (67%) as "no message" (Treatment 3) (60%).

One can judge whether the observed differences are the result of chance (sampling error) by testing for statistical significance using a chi-square. A chi-square statistic larger than 6.0, with 2 degrees of freedom, is statistically significant at the 5-percent level. Thus, the project managers could conclude that the safety message delivered personally by the ranger significantly increased life preserver wearing. More information on statistical methods can be found in Appendix B.

Design 2: Pretest-Posttest (with control group). This design is similar to the Posttest Only design except that testing is conducted before and after the experimental program and control alternative (if there is a program) are implemented (Figure 2). Assignment to control and experimental treatment is at random.

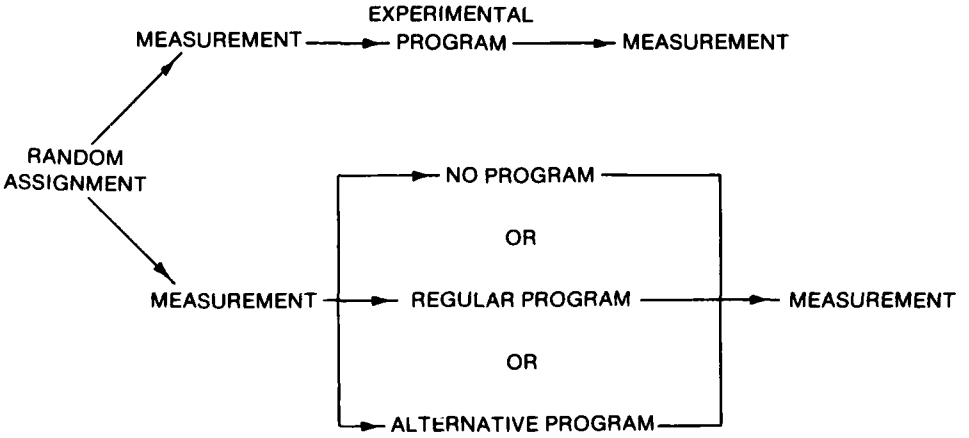


Figure 2. Pretest-Posttest (with control group) schematic

One role of a visitor center is to affect visitors' perceptions by influencing the kinds of things to which they pay attention. What people choose to notice in the environment can affect their learning and enjoyment. Suppose an interpretive trail is designed to teach ecological concepts such as competition, cooperation, and nutrient cycles. Before taking the trail, visitors can pass through a visitor center in which displays and slide shows are presented to establish a mood and mental set conducive to the study of ecology. An interpreter might wish to know whether or not a visit to the interpretive center causes users to learn more from the interpretive trail. A pretest-posttest experiment could be used.

The control and experimental treatments are assigned at random to days during the study period. On control days, the center is closed and people go directly to the trail. On experimental days, everyone passes through the center before going onto the trail.

Before they enter the visitor center on experimental days or begin the trail on control days, visitors are contacted and asked to take a short written test. The test is designed to measure knowledge of relevant ecological principles. Once the visitors have completed the trail, they take another version of the test. Although the posttest would not contain the same questions as the pretest, it would measure the same concepts.

To evaluate the effectiveness of the visitor center, the differences in scores between the pretest and posttest are compared. To obtain these statistics, the evaluator first works with each day individually, averaging the pretest and posttest scores, then subtracting the averages to obtain a difference. Next, the days are grouped into experimental and control treatment and the differences averaged for each group. If the visitor center has had the desired effect, the difference between pretest and posttest scores will be greatest for those days when people passed through the visitor center before taking the trail. A t-test can be used to evaluate the statistical significance of any observed differences (see Bruning and Kintz 1968).

Discussion. Of all evaluation designs, the Posttest Only design with random assignment is the most effective. It can be expanded to evaluate multiple treatments and to determine the interactions among source, message, channel, context, and setting through somewhat more complex factorial designs (see Kerlinger 1973, Chapter 20, for examples).

The Posttest Only design fits the needs of interpretation evaluation well. It is often possible to assign interpretation procedures to visitor groups at random without seriously modifying administrative arrangements and without interfering with the visitor's normal behavior.

The use of randomization minimizes the need for direct contact with the visitor. Only the posttest measurement is required and that can often be collected unobtrusively or as part of the interpretation strategy. This is a particular benefit since approval from OMB is required for direct questioning of visitors.

The Posttest Only design also offers excellent control of any outside factors which may affect the results. If randomization is carefully done, all treatment groups are statistically equal on *all* characteristics except the interpretation program to which they were exposed. Because everything else is made statistically

equal, the observed differences can only be the result of the treatment or of sampling error. The probability that sampling error produced the differences can be estimated statistically and can be lessened by increasing the number of visitors studied.

Since visitors are randomly selected from the population and randomly assigned to treatments, the results may be generalized back to the population. The design also permits the use of relatively easy to calculate statistics with understandable interpretations.

In the Pretest-Posttest design, the pretest can introduce complications into the evaluation. It can sensitize the visitor to the subject and establish a mental set that could effect learning. Although the control group prevents the evaluator from attributing the effects of the pretest to the experimental program, the effects of the program itself may be masked. Visitors may also respond differently to the program or environment if they know they are being tested.

The Pretest-Posttest design requires more contact with the visitor and more of the visitor's time than does a Posttest Only design. Another disadvantage of the Pretest-Posttest design is the difficulty of creating equivalent but different pretests and posttests. If exactly the same test is given before and after, the gain in scores might reflect the teaching effect of the test itself.

All of the above problems associated with the pretest can be corrected or controlled for. However, the randomized Posttest Only design is usually applicable in cases where the Pretest-Posttest design might be considered. The Posttest Only design is generally preferred.

QUASI-EXPERIMENTS

Randomization is not always possible. Sometimes interpreters must evaluate the effectiveness of changes introduced at a time in the past. Sometimes the decision about where and when the new procedure will be introduced is constrained by management or political considerations which prevent random assignment to control and treatment conditions. In these situations, the evaluator can resort to quasi-experimental designs that use methods other than randomization to reduce the number and plausibility of alternative explanations. Although true experiments are preferrred to quasi-experiments, well done quasi-experiments can provide credible results.

The problem facing the evaluator using quasi-experiments is the same as when experiments are used. The task is to compare how people think, feel, and/or behave after receiving interpretation with how they would think, feel, and/or behave had they not received interpretation. Because a great many things besides interpretation can influence how people think, feel, and behave, and because randomization cannot be used to ensure an equivalent control group, other techniques must be used to rule out alternative explanations.

Two types of quasi-experiments are described here. The first, Time Series, is used with data that have been recorded in the past. There are several variations of the Time Series design that are useful to evaluators of interpretation. The second

type of quasi-experiment is the Non-Equivalent Control Group design. This is used in place of a Pretest-Posttest experimental design when randomization is not possible.

Time Series Designs

Time Series designs are particularly appropriate to evaluate the effects of an interpretation procedure introduced at some point in the past. In Time Series designs, data are collected and plotted over a period of time. The time at which the interpretation program was implemented is noted on the graph, and data before and after implementation are compared. Depending on the Time Series design variation selected, data from one or more groups may have been plotted and interpretation may have been given to one or more of the groups.

Variation 1: Interrupted Time Series. At a hypothetical project, fire safety messages were introduced into interpretation programs several years ago. Because records are kept of the number and causes of fires and related factors, such as weather, it would be possible to evaluate the fire prevention effectiveness of the interpretation.

In Figure 3, the number of visitor-caused fires is plotted by year. In 1972 (in this hypothetical example) fire prevention messages were introduced into the regular interpretation programming. At about that time, the number of fires began to decrease and continued to do so for the remainder of the period.

If everything else that might affect the fires remained substantially the same over the period from 1960 to 1980, one might conclude that the interpretation had the desired effect of reducing visitor-caused fires. There are, however, many alternative explanations that must be eliminated before such a conclusion can be reached.

Public concern about the environment was rapidly growing about 1970; a generally increased environmental awareness may have initiated the downturn even without interpretation. Weather cycles may have been at the driest about 1972, becoming gradually wetter from 1970 to 1980. The number of users may

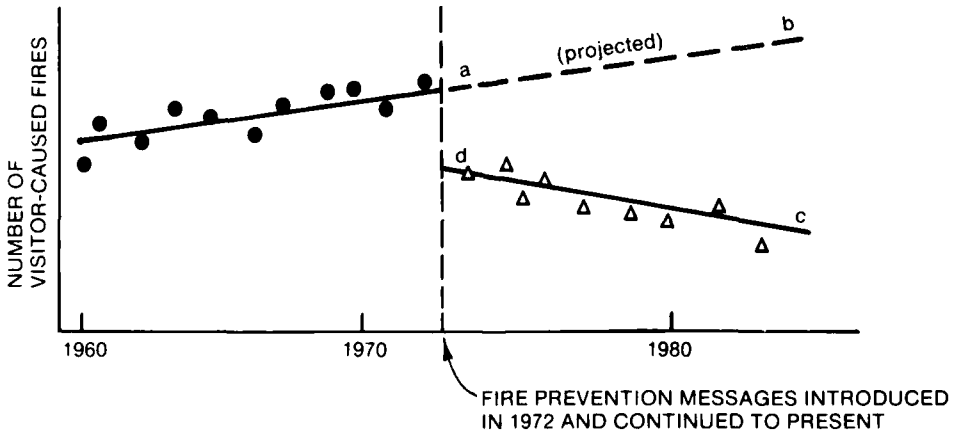


Figure 3. Hypothetical data in an Interrupted Time Series to evaluate the effectiveness of fire prevention interpretation

have begun to decline about the same time the prevention messages were introduced. Other prevention efforts may have been introduced at the same time, such as fuel hazard control, improved fire rings, or a program of campground improvement.

Each possible alternative explanation must be considered and demonstrated to be unlikely. Data about each possible cause can be plotted. If no important changes occur in these plots in or near 1972, and if all causes that might reasonably affect fire starts have been considered, it may be concluded with some confidence that interpretation introduced in 1972 caused the reduction in fire starts.

One can estimate the approximate number of fires prevented by the interpretation program by subtracting the actual number of fires from the expected number of fires. The expected number of fires is found by projecting the trend line for the number of fires prior to 1972 (line ab in Figure 3). The area abcd, represents the number of fires prevented by the interpretation program.

Variation 2: Multiple Time Series. Often, the possibility of alternative explanations can be controlled by observing a time series for a similar group that did not receive the interpretation program being evaluated. This "control group" is not equivalent in the same way the control group is in a randomized experiment. When selecting a control group in quasi-experimental design, one seeks a group that has experienced, as nearly as possible, the same history as the treatment group.

Suppose an interpretation program had been introduced at a campground to reduce damage to area trees. If it was not implemented at a similar campground on the same project and if records of tree damage were kept, time series data for the two campgrounds could be compared (Figure 4). The data from the campground where interpretation was not used would serve as a control for other explanations of observed reductions in tree damage.

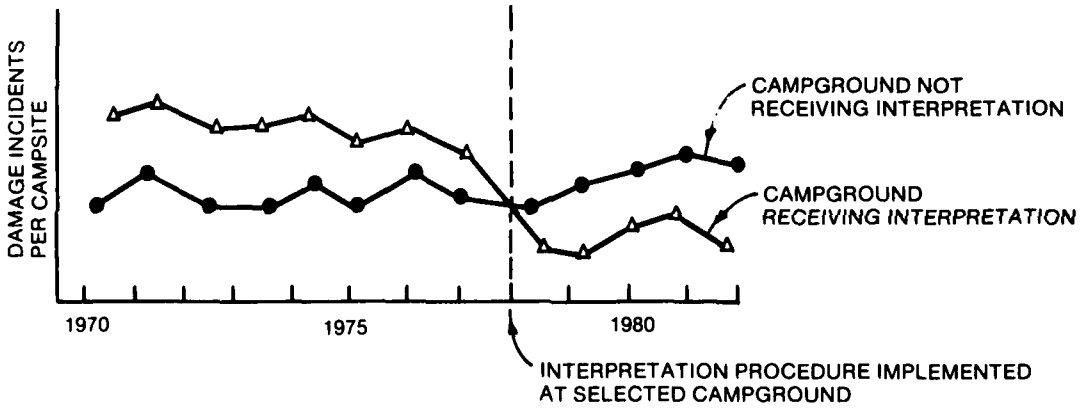
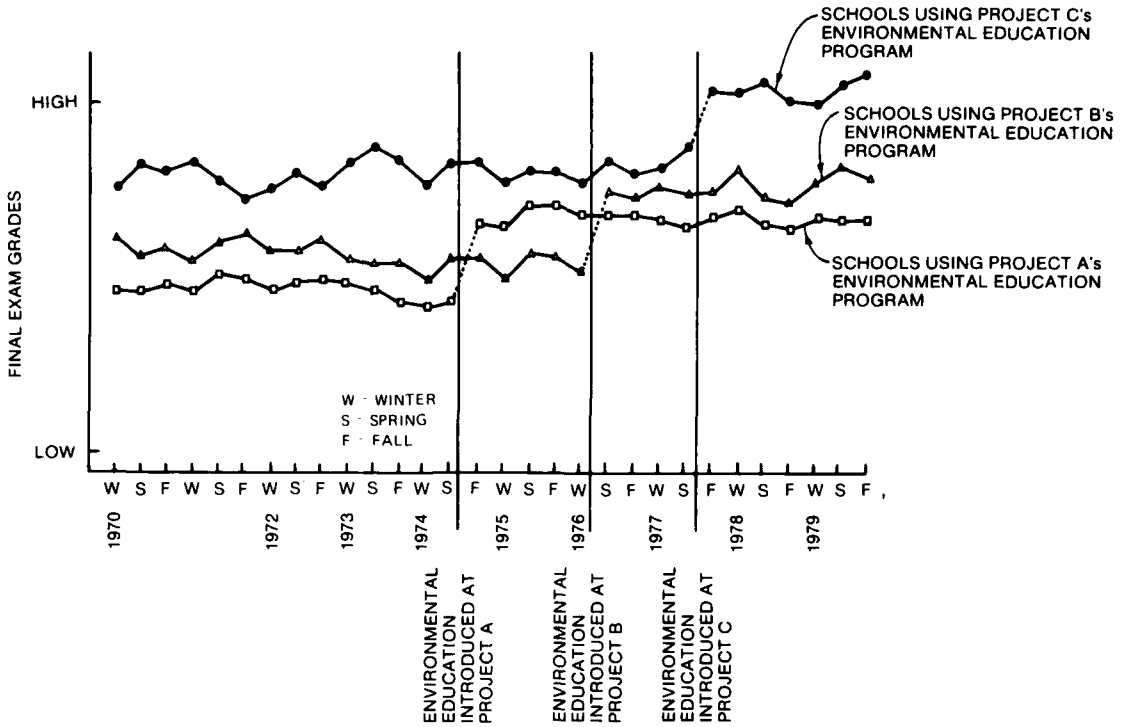


Figure 4. A hypothetical example illustrating the use of a Multiple Time Series design to control for alternative explanations


SCHOOLS USING PROJECT C's ENVIRONMENTAL EDUCATION PROGRAM
SCHOOLS USING PROJECT B's ENVIRONMENTAL EDUCATION PROGRAM
SCHOOLS USING PROJECT A's ENVIRONMENTAL EDUCATION PROGRAM
HIGH
LOW
FINAL EXAM GRADES
W - WINTER
S - SPRING
F - FALL
W S F W S F W S F

A deflection that occurs only after the program of interest was introduced, as in this example, suggests that the program did have an effect. Control is introduced through the use of multiple graphs; each helps eliminate alternative explanations. In this example, it is possible, of course, that something else caused the deflections from the trend. However, the possibility that the events causing improved grades occurred at the same time that the environmental education programs were introduced at all three projects seems remote.

Discussion. The Time Series designs, particularly the Multiple Time Series design, provide good control of alternative explanations of observed differences. They are particularly useful when records are routinely kept or where other natural data, such as tree rings, allow accurate dating of events. They can be used to evaluate interpretation procedures introduced at some point in the past and for which no evaluation was planned. They can also be used when evaluation is deliberately planned in advance, but random assignment is not possible.

Quasi-experimental time series designs lack the full control of true experiments, but still can provide persuasive evidence of effect. Perhaps the most serious difficulty with these designs is that they require data from many points in time. The evaluator will seldom be permitted to collect his or her own data over the period of many years. In general, it will be necessary to use existing records. Because the data in archives were not collected with the study in mind, they will often be poor measures of the program's influence. It may also be difficult to gain access to archive records. They may have been kept by people with varying degrees of dedication and competence and definitions may have changed over time. Therefore, the quality and consistency of records must be evaluated before they are used in a Time Series study. Evaluators should consult Webb et al. (1966), Chapter 3, before designing an evaluation study using archival data.

Cook and Campbell (1979, pp 225-232) discuss other difficulties involved in use of the Time Series quasi-experimental designs. Beyond the difficulties with archival data, the most important problem for interpretation evaluators will probably be delayed causation. Many communication effects, such as attitude change, require time; for the attitudes to influence behaviors may take even longer. In these cases, a deflection in the data trend may occur one or two time periods after introduction of the interpretation procedures. Such results can be difficult to interpret since the association with the interpretation is not obvious. When the deflection follows the intervention by about the same amount in several cases (as in the Multiple Time Series design with Multiple Interruptions) and no alternative explanation seems feasible, one might infer that the interpretation caused the effect.

These designs have been presented only briefly here. Because a great many things can affect the meaning of results produced by quasi-experiments, users of these methods are encouraged to consult at least the relevant chapters in Cook and Campbell (1979) or an equivalent reference before using the design in all but the most straightforward situations.

Non-Equivalent Control Group Designs

These designs are similar to the Pretest-Posttest (with control group) designs of randomized experiments, except that the Non-Equivalent Control Group designs

are used when random assignment is not possible. Without random assignment, there is no assurance that the experimental and control groups are equivalent and it is more difficult to be certain that the observed differences are due to the interpretation program rather than some other factor.

Two variations are described here. Each involves two groups which are similar in as many characteristics as possible and which share the same general environment during the evaluation period. In the first variation, only one group receives the interpretation; in the second, both groups do. The second variation resembles the Multiple Time Series design with Multiple Interruptions.

Variation 1. In this example, an interpretation procedure is developed to help increase a project's carrying capacity by distributing certain kinds of use from high impact areas to less used parts of the lake. The program consists of offsite communication directed toward the user population at large, using mass media, public service announcements, and contacts with other principal information sources. Random assignment is not possible since the messages will be available to all project users in the market area.

A second project is selected which has similar resources and users. The two projects are far enough apart so that their market areas do not overlap. Use levels and types of use are measured at all recreation areas on both projects before the interpretation program is initiated at the project selected for treatment (Figure 6).

The program is conducted at the treatment site and, after an appropriate time, the use levels and types are measured again at both projects. If the interpretation was effective, the levels and types of use will have changed more in the desired direction at the treatment project than at the control project. That is, the seldom used areas which people were encouraged to use would receive proportionally more use and there would be fewer conflicting uses at all areas. These changes would not be observed at the control project. Even if changes were evident, it must be determined that some event other than the interpretation program did not cause the change in use pattern at the treatment project.

When only one pretreatment measurement is made, there is the possibility that use at that time was peculiar for some reason. If the second measurement shows a change, it might be the result of the interpretation or simply that the unusual circumstances have returned to normal. Hence, this design is much improved if several pretreatment measures are made at both projects to establish a more

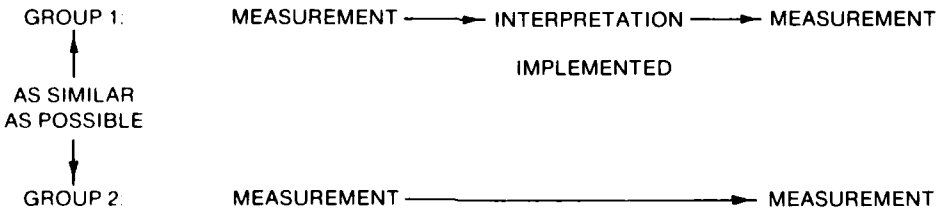


Figure 6. Non-Equivalent Control Group schematic, with similar groups, only one receiving interpretation

credible description of normal use levels and types. It is also useful to include more than one control and treatment project.

Variation 2. In another variation of this design, one which provides stronger evidence, both groups receive the interpretation, though at different times, and the results are observed. Interpretation is conducted first at only one project. If use redistribution occurred as predicted at this project but did not occur at the other, there is some evidence that interpretation had the intended effect. If the program is then instituted at the second project at a later date and a change in use similar to that which occurred at the first project follows, the evidence is stronger. If more than two projects are involved and the same results are observed, the argument for interpretation as the cause of change is more believable. Figure 7 is a schematic of this design.

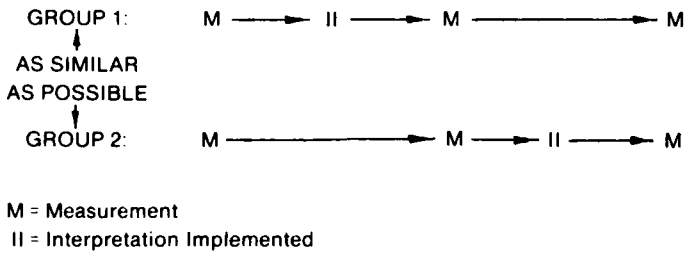


Figure 7. Non-Equivalent Control Group schematic, with similar groups, both receiving interpretation at different times

Discussion. Non-Equivalent Control Group designs can provide credible evidence of interpretation effectiveness, especially when the results of multiple groups are used, as in Variation 2. Because random assignment is not used, the groups in Non-Equivalent Control Group designs cannot be assumed to be equivalent. Thus, study results are somewhat less persuasive than those from true experiments. In addition, Non-Equivalent Control Group designs suffer from the same problems as the randomized Pretest-Posttest (with control group) designs.

Readers are again referred to Cook and Campbell (1979) or a similar reference for a more complete discussion of the Non-Equivalent Control Group designs and the interpretation of the several possible outcomes.

CONCLUSIONS

The experimental and quasi-experimental designs described in this supplement may appear time-consuming and costly. Recognize, however, that all interpretation is evaluated, often by intuition or by haphazard methods. Every time budgets are made up, interpretation is judged against other project management needs. It is better that such judgments are based on properly conducted evaluations rather than on guesses or prejudices.

Interpretation has been demonstrated to have effects useful to project management.* As interpreters become more expert at evaluation techniques, and as many evaluations are made, the case for interpretation will probably become stronger.

As a result of evaluation, interpretation will certainly become more effective as a management tool. Evaluation will identify ineffective techniques which can be avoided in favor of more effective procedures. The insight into the workings of interpretive communications provided by evaluation research should produce innovations that make interpretation more effective and efficient, saving money and improving project management.

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APPENDIX A: RANDOMIZATION

There is nothing casual or haphazard about random sampling. Random sampling is a precise way of dividing a large group into smaller groups so that the smaller groups are equivalent to each other and to the larger group in all characteristics. That is what is meant when a sample is said to be representative. The representative sample is an equivalent replica of the larger group from which the sample is drawn.

The word "equivalent" has special meaning in statistics and evaluation. If a group of people were divided at random into two smaller groups of equal sizes, it would be unusual to find that the two samples were exactly the same in all, or even one, characteristic. The average age would not be exactly the same in both groups. Neither would the average height, nor the proportions of males and females, nor any other specific characteristic. However, the two groups would be the same for these characteristics *within known limits and degrees of certainty.*

With random sampling it is possible to say things like, "I am 95-percent certain my estimate of the mean age of people attending the interpretive geology program is 27 years, plus or minus 4 years," or to be 90-percent certain, after assigning people to three groups at random, that the average ages in the groups are within plus-or-minus 1.5 years of each other.

Statistical tests make use of these *confidence intervals* to help the experimenter decide whether the differences observed between groups after the treatments are implemented are real. Without random assignment one has no assurance that the experimental and control groups are equivalent, and there is no logical basis for using statistical inference nor for generalizing the results from the groups studied to any larger population.

Randomization is essential in experimental design. Random sampling is also important when collecting data for description or correlation studies. When randomization is not possible, some quasi-experimental designs can be used to eliminate the possibility that something other than interpretation caused the observed differences between the experimental and control groups.

RANDOM SAMPLING

Two kinds of random sampling procedures are described here. The first is simple random sampling, the second is systematic sampling with a random start. More elaborate sampling plans are often desirable but require greater understanding of probability to use correctly. These two methods are satisfactory for most of the situations an interpreter will encounter.

Simple Random Sampling

In random sampling, each unit (person, party, or thing) has the same chance of being included as any other unit, or the differences in the likelihood of being selected are precisely known. If one wishes to assign three rangers to twelve launch ramps at random, one would want each ranger to have the same chance of being assigned to any four of the launch ramps as to any other four launch ramps.

Some familiar random sampling examples include the role of dice, the dealing of cards from a well-shuffled deck, the draft lottery, and bingo. If you cut a card deck, the chances of cutting a 7 are 4 in 52 or 1 in 13. The chances that you will cut a 7 are exactly the same as the chances that you will cut a 9, an ace, or a queen.

Simple random assignment can be achieved through any method of selection that gives every unit the same probability of being selected. One could list all the units (launch ramps, hours of the day, or boating parties, for example) and assign each unit a single, unique number. No unit would appear in the list more than once and no two units in the list would have the same number.

All the numbers might then be written on ping-pong balls which are put in a container large enough to hold them all and still be about half empty. The container could then be tumbled vigorously for several minutes so all the balls are well mixed. Then, one ball is drawn and the number recorded. It is tumbled again, another ball is drawn and the number recorded and so on.

If one has a table of random numbers, the ping-pong balls can be dispensed with. A table of random numbers is reproduced as Appendix C of this report. Part of that table is included in Table A1.

Table A1
RANDOM NUMBERS

8	1	9	0	0	4	1	3	7	5	9	7	2	5	0	9	6
4	0	8	1	6	6	2	6	3	5	6	2	3	2	8	9	4
6	9	5	1	2	3	3	8	4	7	5	9	2	8	4	4	1
3	3	9	8	0	7	1	5	5	0	3	3	5	2	9	3	4

The numbers in a random number table are in no particular order. They were generated by a process similar to the drawing of ping-pong balls from the shoe box. To select random numbers from a random number table, you may start anywhere in the table and read across or down. Because all the numbers are randomly ordered, it does not matter where you start as long as you do not choose a number for some reason related to the things you are sampling. For instance, you should *not* start with number 6 because ranger A likes working at launch ramp number 6.

Suppose you wish to select 40 employees out of 260 to receive special training in interpretation methods. You want to select them at random because you wish to evaluate the effectiveness of the special training before implementing it throughout the district. First, you would list all the employees. Then you would assign each one a number. The numbers would begin with 001 and end with 260.

To use the random number table, you would divide the table into columns of three digit numbers. Beginning in the upper left corner, moving across the row, the first number would be 819. Since this number is greater than 260, it is skipped. The next number is 004. Employee number 4, then, would be selected for special training. To select the remaining 39 employees, continue moving across the row, dropping down to the next line when the end of the row is reached. Using this procedure, the next six employees selected would be 137, 250, 166, 123, 155, and 033.

Systematic Sampling

Method. In systematic sampling, only the beginning point is selected randomly. From there, the sampling is done in a specific order. For example, an interpreter may want to measure the effects of different messages concerning power generation on powerhouse tour groups. Each group taking the tour is to receive one of four messages. To determine which message, the interpreter numbers the messages 1, 2, 3, and 4, then randomly selects one of the four numbers. If the number selected was a 2, then the first tour group would receive that message. Instead of randomly selecting numbers for the following tour groups, the groups would be assigned message numbers in ascending order: 2nd group = 3, 3rd group = 4, 4th group = 1, 5th group = 2, 6th group = 3, etc.

In the special training example, the 40 employees might also be selected at random using a systematic sampling procedure. First, divide 260 by 40. That is 6.5. If you could take every 6.5th employee, you would end with the 40 you need. Obviously, you must take either every 6th or every 7th. Next, randomly select a number between 001 and 260 as the starting point. If you used the random number table in A1, that number might be 198. Beginning with 198, you would take every 6th employee (or 7th if you prefer). Note that when you come to the end of the list you would have to continue the count by moving to the beginning of the list.

Systematic samples can be applied to flows of people as well as to lists. One can sample the people entering a park, vehicles leaving a recreation area, or boats launching at a launch ramp. The procedures are similar to sampling from a list: (1) a starting time is chosen, (2) an interval is estimated by dividing the expected total flow by the sample size desired, and (3) selection proceeds as described previously.

Systematic sampling and assignment will be the easiest approach to randomization in most cases. When the list or stream of users is not rank ordered on some variable important to the interpretation, important variables are not cyclical, and everyone appears in a stream of users the same number of times, the systematic sample with a random start will produce a representative sample. Several problems affecting the representativeness of systematic samples are discussed below.

Common sampling problems. The problems discussed here relate to selecting a sample that replicates the characteristics of the larger group. Experimental evaluation involves randomization at two stages. First, a sample is drawn from the larger population of users at random. Then, the sample is assigned at random to control and experimental groups. Problems of representativeness (equivalence) are most likely to occur when the sample is taken from the larger population.

A variety of conditions encountered in recreation areas can affect the representativeness of the sample. The evaluator should be alert to any condition that makes the probability that one type of user will be selected different from the probability that another type will be. It is impossible to describe every potential problem, but some are described here as illustrations.

The sample may be affected by visitor characteristics. In a campground, for

instance, sedentary campers are more apt to be included in a sample simply because they spend more time at the campsite than active campers do. It is likely that the proportion of sedentary campers in the sample will exceed the proportion in population as a whole. If sedentary campers are different than active campers, this will bias the sample. To avoid this problem, the evaluator should select campsites at random, then visit each site until the sampled campers have been contacted.

Amount of activity may also affect a sample that is based on people entering or leaving an area. In this case, those who are frequently moving in and out of the area are most apt to be sampled. By restricting the sample to those who are entering the area for the first time or leaving for the last, the problem can be corrected.

Another factor that affects sampling is length of stay. Visitors who stay in the area for long periods of time have a greater probability of being sampled than those who only stay short periods. This can be corrected by distributing materials only when the user makes the first entry or last exit for the entire trip. Even then, those who make more trips per year will be more likely to be sampled than those who make fewer trips. Known, but unequal probabilities can be corrected for by weighting in analysis. If this method is considered, a statistician should be consulted.

Facility design may also affect the representatives of the sample. Campgrounds are often designed to have an equal number of campsites in several loops. When campsites are sampled systematically and the number of sites per loop is a multiple of the sampling interval, the sites sampled will be in the same relative location on each loop (Figure A1). One might always sample the site closest to the lake or nearest the showers. These may be more desirable sites and the people using them are likely to be different from those using other sites. They may have occupied the site because they stayed longer and could relocate or because they have a job that permits them flexible working hours so they could get away earlier on Friday and arrive when the campsite selection was better. If length of stay or occupation are correlated with variables important to the interpretation method being evaluated, the results could be misleading. This difficulty can be best corrected by using simple random sampling instead of systematic sampling or by selecting a new random start for each loop.

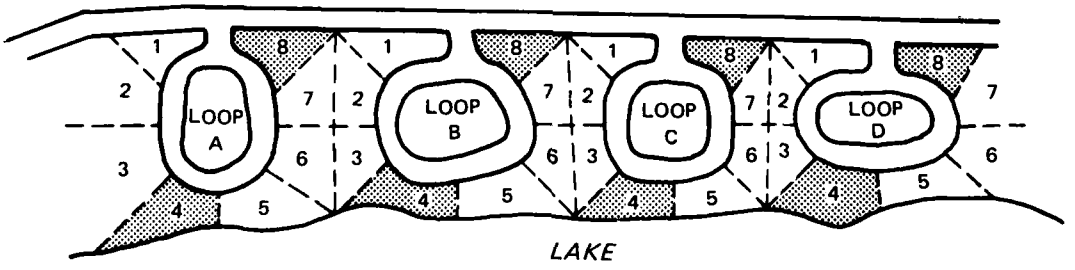

Figure A1: When the number of sites in campground loops is a multiple of the sampling interval (in this case, every fourth campsite), sites in the same relative location will be sampled, possibly biasing the sample

Another factor which affects the sample is the sampling location. If testing is conducted at a visitor center, the results will only represent visitor center users. To obtain a sample that represents all project users, testing must be conducted at various locations throughout the project or at some point where all users pass.

Finally, timing of samples is important. Sampling at launch ramps in the morning may yield more fishermen; in the afternoon, more waterskiers; and in the fall, more hunters. Midweek sampling at the project may yield a different type of user than will weekend sampling. Users between Memorial Day and Labor Day may be different from users between Labor Day and Memorial Day. Seasons and cycles are different in different parts of the country. Fishing seasons, hunting seasons, fall colors, snowbird migrations, and snow and ice conditions are only a few things that cause use patterns to change over time.

These illustrations are presented to sensitize the user of this supplement to the kinds of things that should be considered when sampling. The list of examples is far from complete. Further reading about survey sampling is recommended. Several references are cited in the Bibliography to this supplement.

SUMMARY

Random sampling is the most desirable way to ensure that the group selected is representative of the larger population of project users. Only when random sampling is used is it possible to estimate the degree of confidence in the results and make statistical inferences about the relationships observed.

Random assignment of people, parties, or things to experimental and control groups ensures that the two groups are initially equivalent in all charcteristics for statistical purposes. No other method of assignment is as effective. Initial equivalence is necessary to control for the possibility that something other than interpretation caused the differences observed between the experimental and control groups. Randomization is often possible in project interpretation settings. When possible, it should be used.

APPENDIX B: STATISTICS

Statistical tests allow one to decide whether the difference between the control and experimental treatment groups is the result of interpretation programs or is the chance difference expected with random sampling and assignment. A statistically significant difference is one that is unlikely to have been observed if the differences were the result of randomization alone, rather than the effect of the different type of interpretation given to the control and experimental treatment groups.

The 10-percent significance level is appropriate for most interpretation evaluations. When a difference is said to be significant at the 10-percent level, it means a difference that large or larger between the experimental and control treatment groups would happen because of randomization only 10 times in 100, or less. One would be 90-percent certain that the observed differences resulted from differences in the interpretation received by the two groups.

MEASUREMENT LEVELS

Measurement is the process of assigning numbers to the thoughts, feelings, and behaviors that are to be influenced by interpretation and to differences in the processes that do the influencing. The simplest kind of measurement is to separate things into categories and then count them. Boaters might be divided into those who wear life preservers and those who do not. Visitors might be divided into those who prefer self-guided interpretation and those who prefer personal interpretation. This level of measurement is called "nominal."

The next level of measurement is "ordinal." Here things are ranked on some characteristic. Two things are known with ordinal measurement: that the objects are different, and that one has more of the specific characteristic than the other one.

As a measure of understanding of wildlife ecology, visitors might be asked to rank in importance habitat destruction, predation, hunting, and disease as causes of wildlife extinction in an area. The rankings would be an ordinal scale. The Mohs hardness scale for minerals is another example of an ordinal measure.

The two highest measurement levels are "interval" and "ratio." An interval measure has intervals between the scale numbers that are equal or of a known ratio. The Celsius temperature scale is an interval measure. A ratio measure is an interval measure with an absolute zero. The Kelvin temperature scale, dollars, meters, kilograms, seconds, and calories are all ratio measures.

The absolute zero makes certain comparisons possible with a ratio scale that make no sense with an interval scale. For instance, it is meaningless to say that 40° C is twice 20° C or that there is no temperature when the thermometer reads 0° C. However, $40 is twice $20 and you have no money when you have $0.00. The same statistics are useful with both interval and ratio measures.

STATISTICAL TESTS

The appropriate statistical test to use depends on several factors. One important factor is the level of measurement used. Many statistical tests require interval or ratio level measurement. When measurement is ordinal or nominal, other kinds of statistical tests may be used. Several common statistical tests are listed, with the required measurement levels, in Table B1.

Table B1
VARIABLE MEASUREMENT LEVELS AND ASSOCIATED TEST STATISTICS

Variable Measurement Levels → / First Variable	Second Variable: Nominal	Second Variable: Ordinal	Second Variable: Interval
Nominal	Chi Square	Mann-Whitney U Test Kruskal-Wallis	Difference of Means Analysis of Variance

Chi Square

This test is useful when you have nominal measures for each observation on two variables, each with two or more categories. For example, one variable might be assignment to control or experimental treatments (message or no message). The other variable might be wearing or not wearing life preservers while on the water. Application of Chi Square to this problem (Table B2) was illustrated in the discussion of the Posttest Only (control group) experimental design in the main text.

Table B2
ILLUSTRATION OF THE ORGANIZATION OF A 2×2 TABLE FOR CHI SQUARE

	Receive Safety Message	*Do Not Receive Safety Message*	*Total*
Wear Life Preservers	283	103	386
Do Not Wear Preservers	92	118	210
Total	375	221	596

The Chi Square test permits one to decide whether the actual differences in the frequencies (numbers) among the cells (in this case there are four cells: receiving message/wearing preservers, receiving message/not wearing preservers, not receiving message/wearing preservers, and not receiving message/not wearing preservers) are larger than the chance differences one would expect from randomization. If they are and the experimental design was properly done, one

can conclude that the two variables (message type and preserver wearing) are not independent and that the safety message had an effect. If the differences are not, one may decide that the message had no effect (and the differences resulted from sampling error) or that the results are inconclusive.

The Chi Square test can be used when the two variables have more than two categories. In the example described above, Variable 1 (message or no message) could be expanded to include several different kinds of safety messages. One might emphasize the pain and injury associated with boating accidents, another might emphasize the probability of injury or death if safety precautions are ignored, a third might focus on safe behavior as an expression of love and concern for one's family, and a fourth might be a no-message control.

The resulting behaviors (Variable 2) might have more than two categories as well. For some theoretical reason, the "pain and injury" message might be expected to result in avoidance behaviors such as staying off the lake in questionable weather or to give up boating entirely. The "probability" and "love of family" messages might be expected to result in continued boating but with increased precautions such as life preserver wearing, reduced loads, and reduced speeds. This evaluation experiment would produce a 4 × 3 table.

The Chi Square statistic is computed by squaring the differences between the expected and the actual frquencies in each cell, then dividing the squared difference by the expected frequency. The sum of these values is the Chi Square. Step-by-step procedures for computing Chi Square are found in Bruning and Kintz, *Computational Handbook of Statistics,* and other basic statistical texts.

The larger the value of Chi Square for a given degree of freedom, the less likely the differences between the expected and actual frequencies will have resulted from randomization and the more likely they will be the result of the differences in messages used.

One must know the degrees of freedom to use a table of Chi Square critical values. A Chi Square has degrees of freedom (df) equal to the number of rows minus one, times the number of columns minus one ((R -1)(C -1)). The 2 × 2 table in Table A2 has (2 -1)(2 -1) = 1 df. The 4 × 3 table described above has (4 -1)(3 -1) = 6 df.

With 6 degrees of freedom, Chi Square values are significant when larger than 10.6. That means that if one calculates a Chi Square from a 4 × 3 table and the value is 10.6 or more, the differences between the numbers expected in the cells (e.g.: people who received a "probability" message and increased precautions) and the actual numbers probably occurred because of the interpretation program, not by chance. In other words, the safety message had some kind of effect.

One must look at the table of differences between the expected and actual frequencies to determine whether or not the effect was the one desired. In the example on safety messages to increase the wearing of life preservers (Table B2), one would want to find differences between expected and actual frequencies to be positive in cell one (safety message; wear preserver) and negative in cell three (safety message; do not wear preserver). One would not expect the same effect to appear in cells two and four under the no-message control condition.

Mann-Whitney U Test

The Mann-Whitney U Test tests the significance of differences between the medians of two groups. This test is useful whenever one has two groups (experimental and control treatments) and an ordinal measure of the treatment effect. For example, an evaluator may wish to compare the provocation effect of interpretation involving audience participation with the effect of interpretation in which members of the audience are passive receivers. The audience might be school groups participating in onsite environmental education. "Provocation" might be assessed by a scale measuring interest in studying science. The school groups can be ranked on the basis of the scale scores, then divided into those who experienced participative interpretation and those who received passive interpretation. With 15 school groups, the resulting table may appear as in Table B3.

Table B3
RANKED SCHOOL GROUP INTEREST IN STUDYING SCIENCE BY TYPE OF INTERPRETATION RECEIVED

Type of Interpretation	*Rank of Interest in Science*														
Participative	1		3	4	5		7			10					15
Passive		2				6		8	9		11	12	13	14	

The Mann-Whitney U Test can be computed by adding the ranks for the two treatments then using either of the formulae:

$$U = N_1N_2 + \frac{N_2(N_2+1)}{2} - R_2$$

$$U = N_1N_2 + \frac{N_1(N_1+1)}{2} - R_1$$

where

N_1 = the number of groups receiving treatment 1
N_2 = the number of groups receiving treatment 2
R_1 = the sum of the ranks for treatment 1
R_2 = the sum of the ranks for treatment 2

Tables for the Mann-Whitney U statistic are available for samples that are relatively small. When larger numbers of observations are made, one can use the normal distribution to decide the significance of the differences between the median scores for the two groups. Step-by-step procedures are described in Bruning and Kintz (1968). See also Blalock (1979).

Analysis of Variance with Ranks, Kruskal-Wallis Test

When there are more than two kinds of treatments and the measure of effect is ordinal (as with rankings), the Kruskal-Wallis Test can be used to determine the significance of differences among the medians of the groups. In the evaluation study illustrating the Mann-Whitney U above (Table B3), a no-message control

group might be added. Thus, there would be three sets of ranks by interest in studying science: one for the participative approach, one for the passive approach, and one for the no-message control approach.

The statistic H measures the degree to which the sums of ranks in the several categories differ from the sums to be expected if the experimental and control treatments had the same effects on the interest in studying science. When there are more than five cases in each category, the value of H is approximately that of Chi Square. The Chi Square tables can be used to determine the statistical significance of the value of H . Computational methods for the Kruskal-Wallis Test are illustrated in Blalock (1979).

Difference of Means

An evaluator may wish to test the hypothesis that a previsit to schools as part of the environmental education program increases the teaching effectiveness of the onsite visit. In particular, it is believed that the previsit will increase the amount of time students spend onsite in study-focused activity as opposed to play-focused activity and that the ratio of instructional student-teacher interactions to discipline-oriented interactions will increase. Both time spent and ratio of teaching-to-discipline interactions are ratio measures.

If the evaluator designs an experiment so that some schools (selected at random) receive previsits and others do not, then observes the student and teacher behavior onsite, the significance of the observed differences between the experimental and control treatment groups can be evaluated with a difference of means test.

If the previsit had no effect, the mean percent of time spent in study-focused activity and the mean teaching-to-discipline ratio would be equal, except for chance differences resulting from random assignment.

The test statistic is t . Step-by-step computational procedures are detailed in Bruning and Kintz (1968).

The degrees of freedom are calculated $((n_1 + n_2)-2)$ and the critical value for the 10-percent significance level is read from a table of the t-distribution. If the t-value computed is greater than the critical value from the table, the likelihood is very small that the differences between the means of the control and experimental treatment groups resulted from randomization alone. In that case, one can conclude that the previsit had an effect. In this example, if the experimental treatment group means are larger than the control treatment group means, the effect would be in the desired direction.

Analysis of Variance

Sometimes it is desirable to compare the effects of more than two categories of treatment. For example, an evaluator may wish to test whether print media or electronic media are more effective in reaching users away from the site. She may suspect that print media are more effective for people of higher socioeconomic status and electronic media are more effective for people of lower socioeconomic status. Further, she may guess that socioeconomic status will, itself, affect the degree to which mass media messages reach the public.

The evaluator might arrange to put public service messages in newspapers and

on the radio in the project market area. During the period the messages are running, she could sample visitors arriving at the park to determine their knowledge of the message content, the medium from which they received the message, and their socioeconomic status.

An analysis of variance would allow her to test the hypothesis that (a) socioeconomic status affected the perception of mass media messages, (b) the type of medium affected the perception of mass media messages, and (c) the receiver's socioeconomic status interacted with the type of medium to affect perception of the mass media messages.

Analysis of variance can be used when the measure of effect is interval or ratio and when the kinds of treatments are measured nominally. The effects of several treatments and the interaction among treatments can be tested at the same time.

Multiple correlation and regression can be used to test hypotheses of the same type and are more appropriate when the kinds of treatments can be measured as interval or ratio scales. Analysis of variance is a special type of regression analysis. The general model can be applied to the sample problem using dummy variables for the treatment type. Interested users should consult Blalock (1979) or any other text describing multiple correlation and regression.

Considerable care is required in the design of evaluation experiments involving simultaneous multiple treatments. Interpreters are advised to consult statistics texts and a statistician before designing such experiments. Such experiments can provide very valuable information about how interpretation strategies interact with each other and with visitor characteristics. The relative difficulty of conducting such studies correctly must be recognized but should not discourage evaluators from undertaking them, given the proper preparation.

A brief summary of considerations important to analysis of variance is given by Bruning and Kintz (1968). A concise, but more in-depth discussion is presented by Blalock (1979) and in Kerlinger (1973). Most introductory statistics texts treat analysis of variance.

STATISTICS FOR QUASI-EXPERIMENTS

Strictly speaking, statistical tests of significance are not appropriate for many quasi-experiments because equivalence between control and experimental treatment groups is achieved by means other than randomization. However, statistical computations do play a role in quasi-experiments. Correlation is important in Multiple Time Series designs and regression is essential to Time Series designs and other quasi-experimental designs. Interpreters should consult Cook and Campbell (1979) for an excellent discussion of appropriate statistics and their applications.

CONCLUSIONS

Several statistical tests appropriate to experimental designs using different measurement levels have been introduced. The descriptions here are intended to

help the interpretation evaluator select the appropriate kind of statistical test. Actual computation and use of the tests require reference to one of the texts cited, to other statistical texts, or to statisticians.

Only measurement-level considerations were dealt with. Statistics such as the difference of means and analysis of variance are based on other assumptions about the sampling distribution and the population sampled. In cases where the consequences of error are severe, as where an evaluation is costly to conduct or where major resource allocation decisions will be based on the results, a trained statistician should be consulted. The cost of statistical consulting is likely to be very small relative to the potential losses due to error.

In spite of these cautions, interpreters should *not* avoid designing experiments to evaluate their interpretive effectiveness. On the contrary, with some additional reading, interpreters should easily become proficient at routine evaluation methods.

APPENDIX C: RANDOM NUMBER TABLE

8	1	9	Ø	Ø	4	1	3	7	5	9	7	2	5	Ø	9	6
4	Ø	8	1	6	6	2	6	3	5	6	2	3	2	8	9	4
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4	9	1	2	1	8	3	5	1	1	6	7	1	Ø	2	6	8
1	4	Ø	4	2	7	6	5	6	Ø	9	Ø	3	5	5	9	8

AUDIENCE ANALYSIS TECHNIQUES

A Supplement to

A GUIDE TO CULTURAL AND ENVIRONMENTAL
INTERPRETATION IN THE
U.S. ARMY CORPS OF ENGINEERS

Abstract

This supplement provides guidelines for conducting an audience analysis for interpretation programming. It covers the applications of audience analysis, types of visitor information to gather, unobtrusive data gathering techniques, observation recording forms and schedules, and data analysis. A set of examples from actual studies is also provided.

AUDIENCE ANALYSIS TECHNIQUES*

A Guide to Cultural and Environmental Interpretation in the U.S. Army Corps of Engineers

INTRODUCTION

Why is audience analysis necessary for interpretation? The Corps of Engineers provides interpretive services in order to accomplish specific goals. The general objectives of the Corps' Interpretive Services program (Headquarters, Department of the Army 1983) is to:

a. Aid project personnel in accomplishing management objectives.

b. Enhance the public's understanding of the role of the Army and the Corps of Engineers in development and administration of water resource projects.

c. Enhance the public's understanding of the purpose and operation of the project, its man-made, natural, and cultural features.

d. Develop public appreciation for proper use of project resources in an effort to reduce overall project O&M costs.

Meeting this goal requires that interpretive services and programs effectively reach visitors to Corps areas. To do this, it is necessary to know something about their characteristics, needs, and interests. Audience analysis can provide this information.

You might feel that this process is an unnecessary step because you already have a "feel" for the needs and interests of the visitors to your area. However, it is well documented that park personnel often have very ***different*** interests and attitudes than visitors to recreation areas. To avoid superimposing your ideas and stereotypes on visitors, the audience must be analyzed.

A second reason for believing that audience analysis may not be necessary for ***your*** interpretive services is that a lot of visitor data already exist for your site. However, visitor analysis does not always equal audience analysis. You cannot meet all visitor information needs with any one interpretive service, so it becomes necessary to target particular audiences. In most cases, you will need to pull particular information from your visitor data when doing audience analysis for interpretation. How to do this is described later in this supplement.

When should audience analysis occur? You might guess that it should happen during planning for interpretation; in other words, before a program, nature trail, or brochure is actually implemented. You would be right, of course, as it is important to understand who you are planning for as their characteristics will alter the nature of the service provided. However, ***before*** interpretive programs is

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* This supplement was written by Dr. Maureen McDonough, Michigan State University, East Lansing, Mich., under an Intergovernmental Personnel Act Agreement with the U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.

not the only time you should be concerned with audience analysis. The process of audience analysis should also occur ***during*** and ***after*** implementation of interpretive services. Figure 1 summarizes the time frame involved. ***Before*** implementation, you need to know characteristics of the potential audience, such as age or place of residence, expectations they might have for both their whole recreation outing and for a particular program or activity, and their interests.

It is also necessary to be aware of the audience ***during*** the actual implementation of interpretive services. Actual audience characteristics may differ from the ones predicted during program planning. For example, you may have planned an evening campground program for an audience made up primarily of senior citizens because the audience analysis conducted prior to the program showed that the campers were mostly seniors; but when you arrive at the amphitheatre, much to your surprise the audience is primarily adolescents! Obviously, a few on-the-spot changes need to be made in your program. While this is an obvious example of audience analysis during program implementation, there are many other more subtle audience characteristics that need to be considered, including audience response. Is the audience yawning, falling asleep, staring at you with total disbelief, or actually leaving? These are all sure signs that immediate adjustments need to be made in the program! Do visitors consistently walk right past an interpretive sign without reading it or regularly neglect to pick up trail brochures? If so, these interpretive services are not reaching the visitor.

The third important time for audience analysis is ***after*** a program is implemented. Areas to consider at that time include audience comments or feedback, use patterns of interpretive services such as trails or visitor centers, and visitor questions that relate to the interpretive service offered, particularly those that reflect a lack of communication during interpretive encounters. These things will give you clues to audience interests and needs to assist in planning future interpretive services as well as revising services already in place. They will also add greatly to better program development in the ***before*** stage.

Audience analysis is an ongoing process which should occur at all stages of the provision of interpretive services rather than just during actual program development. Information gathered during each stage is useful during other stages. While

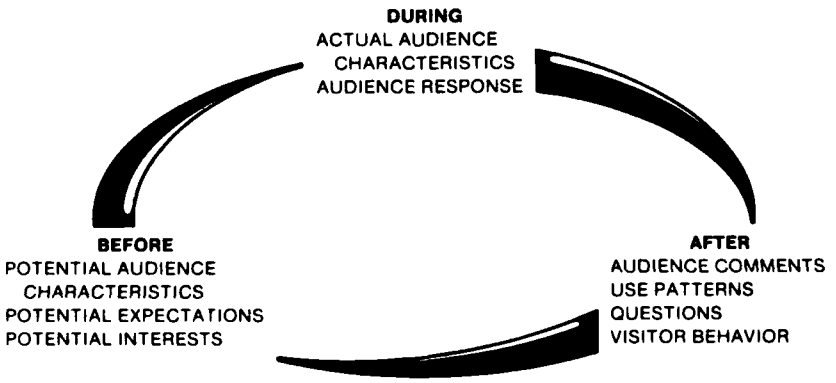


Figure 1. When should audience analysis occur?

there is some overlap between audience analysis procedures after interpretive services have been implemented and program evaluation techniques, these activities are ***not*** identical. Audience analysis may be considered one part of program evaluation, as "effective" services mean, in part, that you have reached your audience. However, it does not constitute all of evaluation.

WHAT DO YOU NEED TO KNOW ABOUT AUDIENCES?

When you stop to think about it, there are many, many pieces of information about visitors that you might collect. Which of these are useful in audience analysis for interpretation? The Manual "A Guide to Cultural and Environmental Interpretation in the U.S. Army Corps of Engineers" (Propst and Roggenbuck 1981) goes into detail documenting the background for the importance of certain audience characteristics to better interpretation. Important information on three special populations (children, the elderly, and the handicapped) is included. Rather than repeat that discussion here, a summary of important audience attributes along with examples of how knowledge of these attributes could be used in providing interpretive services is provided in Table 1.

Things you might want to know about audiences are grouped into three general categories: Visitor characteristics, visitor attitudes, and visitor motivations/ expectations.

The examples in Table 1 are not inclusive of all applications of visitor characteristics but are meant to start you thinking. While looking at the list and thinking about ***your*** visitors and audiences, remember, the most important visitor characteristic of all: visitors to Corps areas come to recreate. Interpretive services must fit into a recreational framework if they are to be effective.

Which of the audience characteristics listed in Table 1 is important to interpretive programming depends on the visitors to ***your*** site. Only ***you*** can look carefully at your visitors and balance site characteristics, management objectives, and visitor attributes to determine the constituency of interpretive audiences. A certain amount of judgment is required. Be sure, however, that you look objectively and try to see what is really there rather than what you would like to see.

METHODS FOR AUDIENCE ANALYSIS

Now that you have an idea of what kinds of information you would like to know about potential audiences, how do you go about gathering it? There are basically three approaches: use of existing data, observation, and more formal survey methods such as questionnaires and interviews. Table 2 summarizes these methods including the kind of information available from each. The methods are discussed below.

Use of Existing Data

Sources of existing data available to Corps personnel include: statistics from previously conducted recreation use surveys, campground fee receipts, and results available from recreation research.

Table 1

AUDIENCE ATTRIBUTES AND IMPLICATIONS FOR INTERPRETATION

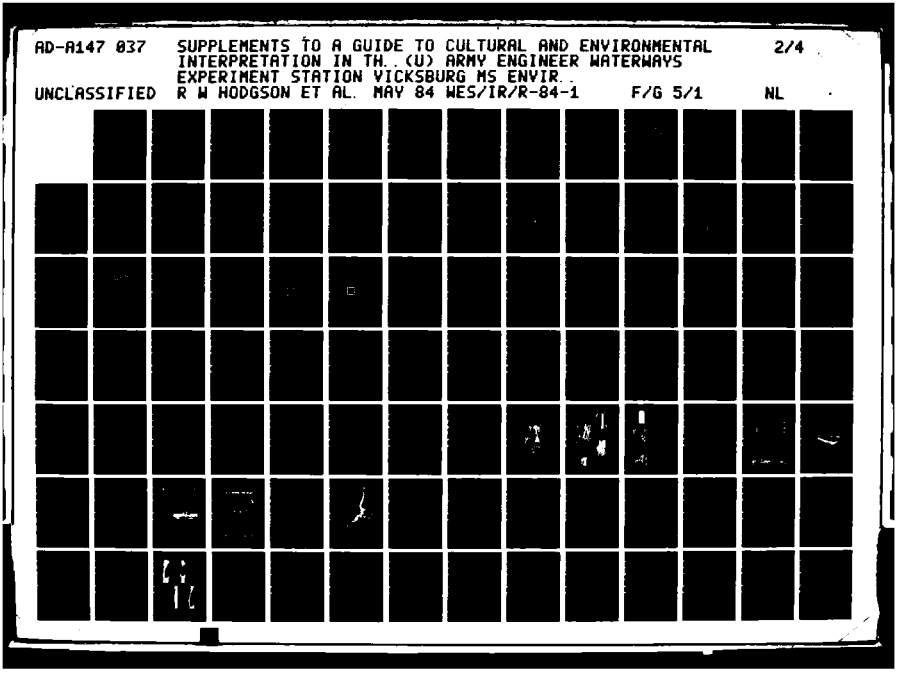
	Potential Audience Differences	*Examples of Implications for Interpretation*
Characteristics of Visitors	AGE: It is not necessary to learn the exact age of visitors. Social age is easier to determine and more useful. Social age refers to young children, elementary age children, adolescents, adults, or mature age adults.	
	Young children	Have a short attention span so interpretive programs should be active, short, and change emphasis frequently.
	Elementary age children	Can only deal with concrete information.
	Adults	Many members of this age group have families and are thus concerned about safety topics. Programs that deal with safety will appeal to this group.
	Mature Age Adults	Usually are retired, have a lot of time to explore parks and spend more time at a site. Interpretive programs at a site frequented by older visitors should be diverse and nonrepetitive.
	EDUCATION: Educational differences take two forms: level of education and subject area of education.	
	Level of education (formal and informal)	Level of education can influence whether or not people are used to dealing with abstract concepts. Park brochures, exhibits, and programs tend to be full of terminology that is too technical and ideas that are too abstract. Beware of *judging educational* level solely on years completed in school. Informal or adult education also contributes to level of education.
	Subject area of education	Just because someone understands physics does not mean they know a thing about plants or birds. The reverse is also true. A person with a high school diploma may have spent a lifetime learning about natural history. Do not make assumptions about content of knowledge based solely on level of education. Use the knowledge visitors bring to enrich your interpretive services. Often, differences in audiences based on education are only really apparent ***during*** programs.
	SEX:	There are some differences between sexes in preferences for interpretive program topics, but they are not well documented. Why these differences exist is unclear, and it is possible they are a result of interactions with other characteristics such as education, age, or place of residence. Interpreters are encouraged to look ***carefully*** at potential or apparent differences in interpretive interest when planning interpretive services.

(Continued)

Table 1 (Continued)

	Potential Audience Differences	*Examples of Implications for Interpretation*
Characteristics of Visitors (Continued)	PLACE OF RESIDENCE:	
	Rural, suburban, or urban	The analogies and examples used in an interpretive activity would vary depending on this characteristic. The concept of interdependence in natural communities might be effectively related to the way a city functions for an urban person, but a different analogy would be necessary for a rural visitor.
	FAMILIARITY: There are two aspects to familiarity: local vs. nonlocal visitors and repeat vs. new visitors. These two characteristics interact with each other.	
	Local new visitors	Need good orientation information but may have preconceived beliefs and knowledge based on living near the site.
	Local repeat visitors	May not attend interpretive programs at all. Sense of proprietorship makes dissemination of new information a real challenge to interpreters.
	Nonlocal new visitors	Need very basic orientation information first. Ideas about ***your*** site may be based on visits to other sites. More likely, ***your*** site is a destination, so housekeeping types of information are of primary importance. May spend more time during one visit than local visitors.
	Nonlocal repeat visitors	Same concerns with housekeeping and length of stay as with nonlocal new visitors. However, their ideas about the site are based on memory or recollection of their last visit which may or may not be accurate due to faulty memory, or management changes.
	SOCIAL GROUPS: People generally recreate in groups and the type and size of a group are influential in determining the kind of interpretive services sought.	
	Families	Families are interested in being together. Therefore, interpretive services that allow for family interaction are effective.
	Partial families	Partial families rely heavily on interpretation to gain familiarity with an area and to find things to do as a family unit.
	Adult groups of older visitors without children	Primary motivation is to be together as a group; tend to avoid interpretive services where group interaction is not encouraged (e.g., most evening amphitheatre programs).
	School age groups (5 to 9 years old)	Strong pair relationships are important in this type of group. Interpreters should not try to divide these pairs as much trauma and little communication will occur.
	Size of group	Large groups require a different approach to program delivery as well as exhibit design.

(Continued)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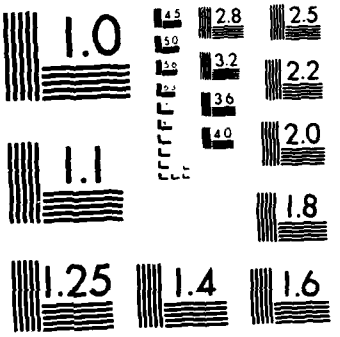

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Table 1 (Concluded)

	Potential Audience Differences	*Examples of Implications for Interpretation*
Characteristics of Visitors (Continued)	VISITOR-USE PATTERNS:	
	Location	Interpretive services located near areas of visitor concentration and activity are more effective because they are more likely to be used (e.g., parking lots or picnic areas).
	Time of day	Different activities have different temporal patterns; for example, boaters generally use launch ramps early in the morning. Early morning, then, is a good time to contact large numbers of boaters.
	Length of stay	Visitors staying a short time will not participate in interpretive services that require a long investment of time. Interpreters need to provide some short programs for these visitors.
Attitudes of Visitors	ATTITUDES: While most aspects of attitudes are generally hard to measure, it is not difficult to tell whether a visitor feels positive or negative about something.	
	Positive attitudes	Interpreters can build on a positive feeling toward recreation generally to create a more positive attitude toward the Corps.
	Negative attitudes	Negative attitudes may be based on beliefs that are either false or were created by a prior bad experience. Interpreters can provide information that will change beliefs and help create more positive attitudes.
Motivations/ Expectations of Visitors	VISITOR MOTIVATIONS: Visitors have reasons for participating in particular activities.	Boaters, for example, are very anxious to put their boats in the water and are unlikely to read or listen to long messages at the ramp. A brochure to take with them might be much more effective.
	VISITOR EXPECTATIONS: Recreationists, generally, have several common expectations as well as specific ones for recreation experiences.	
	Common expectations	
	Fun	People recreate to have fun. Interpretive services, while educational, should also be fun if they are to be effective. Too many interpretive services are boring.
	Informality	People view recreation areas as places to relax in an informal atmosphere, yet many interpretive programs take place in formal settings like auditoriums and amphitheatres. Interpreters should work to create more informal atmospheres. Otherwise, they are working against human nature.
	Specific expectations	It is important for interpreters to find out what individuals expect from their experience and to base interpretive services on these expectations. Many expectations are a result of age, sex, or other characteristics discussed above. Some are a result of objectives or goals for a particular outing, such as learning something about nature. Expectations that are met result in a satisfying experience. To be effective, interpretive services should fit expectations.

Table 2

SUMMARY OF METHODS FOR COLLECTING AUDIENCE ANALYSIS INFORMATION

Kind of Information	*Method*
Age	Campground fee receipts (Golden Age Passport) Direct observation Participant observation Formal surveys
Education	Participant observation Formal surveys
Sex	Direct observation Participant observation Formal surveys
Place of residence	Campground fee receipts Direct observation Participant observation Formal surveys
Familiarity	Campground fee receipts* Participant observation Formal surveys
Social Group	Campground fee receipts (size) Direct observation (size and type) Participant observation Formal surveys
Visitor use patterns	Campground fee receipts (length of stay) Direct observation Behavior traces Participant observation
Visitor attitudes	Recreation research literature Participant observation Formal surveys
Visitor activities (motivations expectations)	Campground fee receipts Recreation research literature Direct observation Behavior traces Participant observation Formal surveys

*Available from a modified receipt form.

Recreation use surveys often provide information on:

- Activities. This allows insight into visitor expectations and motivations.
- Place of residence. This lets you know whether people are from rural, suburban, or urban environments and whether or not they are local.
- Length of stay for both campers and day users.
- Group size.
- Why people chose a particular site. This gives some information on visitor expectations as well as an indication of whether people are repeat visitors.
- Weekend versus weekday use. This is an indication of visitor use patterns.

Campground fee receipts. Campground fee receipts can also provide useful information for audience analysis. Although the information only applies to campers, it is often more current than previously conducted user surveys. The fee receipt used by the Corps (ENG Form 4457) contains information on: size of group, length of stay, area of origin (vehicle license number), and age (Golden Age Passport). A modified fee receipt (ENG Form 4457-Test) is being tested that will also include information on repeat visitation, primary destination, camping and noncamping equipment used, and the user's home zip code (Curtis 1982).

Recreation research. A third source of existing data is recreation research done either within the Corps or by other agencies, universities, or research groups. Often visitor use surveys have been done on similar sites and this information may provide insight into your visitors. Data on visitor attitudes, motivations, and expectations are difficult to collect but can provide insights into the meaning of

such variables as age or participation in boating for developing interpretive services. Be sure, however, that you read these studies carefully and examine the way the information was collected. Not all research may be really suitable.

Observation

Observation is a good tool for collecting information for audience analysis because the visitor is not disturbed with a series of formal questions. Observation is actually a way of recording and systematizing the kinds of visitor behavior that Corps personnel see every day. The systematic nature of record keeping in observation is the key to its usefulness as an information gathering tool.

Clark (1977) describes three types of observation methods that are useful for studying recreationists: direct observation of events as they occur, observation of behavior traces, and participant observation.

Direct observation. Direct observation of events as they occur is the most common view of what observation is all about. Information that can be gathered by this approach includes: age, sex, place of residence (license plates), social groups (including type and size), visitor use patterns, and activities. In order to use this approach, you must define exactly what you will be observing ***before*** you begin actual observation. Other problems and limitations of this approach that you need to be aware of before you begin are:

a. The presence of an observer may change the behavior that is under observation. To avoid this, observers need to be very unobtrusive.

b. Direct observation can be very inefficient and expensive if you are trying to observe behaviors that occur only rarely. For example, direct observation may not be a useful tool in trying to determine the number of visitors who are interested in birdwatching. But on a site with heavy boating use, it would be a useful tool to determine the length of time visitors actually spend at a boat launch ramp.

c. Observers need to be thoroughly trained so that actual events are being recorded. Unless guidelines are clearly laid out, there may be little resemblance between what is actually occurring and what is being recorded. This is particularly true if more than one observer is used.

Observation of behavior traces. Observation of behavior traces is a useful technique for gathering audience analysis data because it eliminates the problem of people reacting to the presence of an observer. Information on visitor behavior is obtained from evidences of visitor presence and activity, such as particular types of litter peculiar to certain activities, erosion of certain trails more than others, vehicle tracks, number of brochures picked up from a rack, or even footprints. When dealing with audience analysis for interpretive purposes, observation of behavior traces can provide information about visitor use patterns (for example, where are people spending their time?) and activities. Advantages to trace behavior observation are low cost, high observation/time ratio, and lack of the necessity for visitors' presence.

While observation of behavior traces cannot tell you anything about individual behavior, it can give some relatively inexpensive information about group or aggregate activities. As long as specific conclusions are not drawn from such

general data, this technique can provide some very useful insights. A good source for unique approaches to this technique is Webb et al. (1972).

Participant observation. Participant observation is an intermediate type of strategy which falls in between direct observation and more formal surveys. It involves systematic, well-defined observation, interaction with visitors, informal interviewing, and systematic counting and can involve the observer in assuming the role of the people being observed (Lofland 1971). Participant observation allows you to describe and record information through direct interaction with participants (Campbell 1970). It also allows you to record your own reactions to what is happening. The identity of the observer is often not known to those being observed, but it can be revealed if desired. If the observer is known, that should be taken into account in understanding information gathered.

Types of information available through participant observation are: age, sex, education, place of residence, familiarity, social groups, visitor use patterns, visitor attitudes, and visitor motivations and expectations. Advantages of participant observation include relatively low cost and the opportunity to talk to visitors. It should be stressed that you are recording informal discussions rather than formal interviews. Disadvantages include the potential for bias on the part of the observer and potential observer influence on the subject's behavior.

Tools. There are basically two types of *tools* needed to collect information for audience analysis using any type of observation: a sampling plan and a record-keeping system. Observation, to be effective, must be systematic and well thought out and these tools must be developed *before* you begin.

Laying out a sampling plan for observation is not extremely difficult if a few basic ideas are kept in mind:*

a. All a sampling plan means is that you must make sure that you observe and collect information representative of all days of the week, all times of day, and at all pertinent locations on site. If you do not do this, you will end up with biased information, which will give a distorted picture about what is really happening. You may want to only concentrate on one or two particular sites within your recreation area. However, you still need to set up an observation schedule for those sites which are representative across time. Also, remember to consider what you observe at any one site within the context of the whole recreation area. Having a sampling plan that lays out ahead of time *when* and *where* to collect observations allows you to check to see if the criterion of representativeness is met. If it rains during an observation time you can use your plan to substitute a similar time that meets the necessary criteria for representativeness because it was planned ahead of time.

b. Another consideration is how long to observe at any given spot and how long to carry on observations over a period of months. This depends on the type of information to be gathered. If you want to record behavior, the recommended time for observing at one sitting is between 30 and 60 min. Less than 30 min is not enough to record all the information and more than 60 does not give substantially more information. If, however, you want to get actual counts (e.g., number of visitors stopping at a particular exhibit), you may have to observe for longer periods of time. As for how long over time, it depends on the site, the visitor season, whether you feel visitors change over the season, and

* See also "Evaluating Interpretation," another supplement in this series.

your objectives for observation. For example, are you doing audience analysis for a single program or for an entire interpretive plan? Remember that observation also takes place during interpretive programs and those observations will be of a very short duration. It is not necessarily *how much* time you spent but how it is distributed.

c. You have a choice of either sampling time blocks or sampling people. Often sampling time is much more efficient and simpler than trying to sample every third group or every tenth person.

The second tool needed in observation is a systematic record-keeping system for recording observations. There are a wide range of record-keeping systems that you might choose from or adapt to suit your needs. Whichever format you prefer, consider the following:

a. You cannot possibly record everything you see. You need to decide ahead of time what behaviors you are interested in; these are what you record systematically. You also need to allow yourself some flexibility as you will always find things that you did not anticipate. In fact, that is one of the objectives of trying to see what is really happening through observation. Keep an open mind.

b. Depending on what you are trying to find out, observation can include informal interviewing. This information needs to be recorded on your observation form in a systematic way as well.

c. The important features of an observation form are that it is systematic, includes time, date or day of the week, weather conditions, the basic visitor information needed for audience analysis, and space for recording interview responses. It must also allow you to tie the oberved behaviors back to the site or location characteristics.

d. An observation form should also be easy to handle and recorded information should be easy to tabulate.

e. There are two approaches to take in recording observations. A small scale drawing of the site can be marked in a code to show what people are doing where. This method is useful for some purposes, but it makes it necessary for you to record information about activities, age, etc., on separate sheets. This gets cumbersome and makes any later compilation of the material difficult. Also, it is easy when you have one or two sites to observe. Otherwise, base maps must be made for every area under observation.

The other approach is to record all behaviors on a form. This has benefits because all information is on one sheet and all information for all areas is recorded the same way. The actual recording will go more smoothly because you are not always changing forms and codes, an elaborate coding system is not needed, and, when it comes to compilation, all the information across sites can be compiled quickly and compared easily.

Examples of sampling plans and recording forms that have been used in past studies can be found in Appendix A to this supplement. They are not necessarily perfect examples, nor will each one fit every situation. Instead, they are included to illustrate some of the methods that can be used in designing sampling plans and recording forms.

Formal Survey Methods

Formal survey methods include interviews, mail questionnaires, and diaries. In general, they provide accurate information on descriptive characteristics such as age, sex, and group composition. They also can provide good information about attitudes and other social-psychological explanations of why particular things are happening *if* the instrument for measuring attitudes is carefully conceptualized and constructed and *if* the researcher is really interested in attitudes rather than behavior (Clark 1977; Babbie 1973). These two "ifs" are the big drawbacks to survey research, particularly for a person untrained in research methods. In general, surveys tend to be less expensive in terms of results per time investment than observation strategies (Babbie 1973), but the problems in developing reliable and valid survey questions can outweigh this advantage. (Federally funded formal surveys require approval by the Office of Management and Budget.)

Survey methods are rather poor at measuring actual behavior because of memory problems (when recall by respondent is required), as well as individual definitions of what constitutes a particular behavior. Also, people have a tendency not to answer questions about nonnormative behavior (Heberlein 1971). Many times, surveys are actually measuring attitudes and values when trying to gather information about behavior. Writing questions for a survey is not an easy task even for an experienced researcher. This is coupled with the difficulties of developing survey sampling plans, dealing with nonresponse problems, and analyzing often complex data. You are *strongly* advised to consult someone experienced in survey research if you choose to use this method for audience analysis. When you look at Table 1, you will see most of the information you might want for audience analysis purposes is available through other methods.

You should be aware, however, of the different types of survey methods and their pros and cons so, if need be, you can solicit appropriate material from researchers.

- ***Personal interviews*** have the advantage of personal contact with the respondent, higher response rate, and more depth but tend to be expensive (Babbie 1973; Field 1973).
- ***Telephone interviewing,*** when correctly approached, can alleviate the expense of interviewing while retaining the advantages (Field 1973).
- ***Mail questionnaires*** are easy to administer, have a low cost relative to other methods, and can be distributed to a large number of people, but they suffer from a high nonresponse rate and the potential for nonrepresentative results that accompanies nonresponse (Babbie 1973).
- ***Diaries*** can alleviate some of the problems of behavior recall because people record their activities soon afterward. In order to be useful, the researcher must provide specific and detailed instructions about the kinds of information to be recorded (Clark 1977).

As a final note on methods, it is fairly evident from the preceding discussion that no one method of audience analysis can provide all the information needed. Each has its advantages and its drawbacks. There is no quick solution or single "best" method. The best method is really a combination of methods that attacks your questions in several different ways. It is up to you to decide what you need to know about your audience, assess your site and program characteristics, look at the pros and cons of each method, and select a set of methods to meet your needs.

ANALYSIS

Now that you have collected information about your potential audience, what should you do to begin to make sense out of it? This task will not be too hard if you kept future analysis in the back of your mind when deciding how to collect the information in the first place. Analysis really starts before, not after, the data are collected.

What is data analysis? Analysis is simply the way to reorganize the information collected so that it answers the questions you had in the first place. When collecting audience information on a continuous basis, analysis of this information should be regular and continuous as well. If you wait until you have mountains of information before you begin to organize it for analysis, then it becomes a tedious, frustrating, and easily abandoned task. If however, you set up a system for analysis early and organize the information as you receive it, questions about your audiences can be answered at any time with a minimum of effort.

The following steps are important in analysis:

a. Review the questions you were trying to ask in the first place. Be sure you clearly understand what you want to know. It is easy to get muddled up by extraneous facts when you are collecting data. Before you start analysis, step back and look at the questions again.

b. Identify any biases or limitations on the information you have and clearly state them. If you are using existing data like the Recreation Resource Management System (RRMS), is it old or from a different site? For whatever reason, did you sample on more weekends than weekdays? Are children underrepresented in your observations? *All* data, no matter how carefully collected, have biases and they limit the kinds of generalizations you can make about audiences. Be sure you know what your limitations are.

c. Reorganize and sort the information. This can be done in a variety of ways. If you mapped behavior, you can collate all the information onto one base map; trends will be apparent. A second way to sort is based on counting the incidences of the important variables as you have defined them. For example, if you want to know the number of children under 12, you go back through your observations or surveys and count the number of children under 12 or the number of groups with children under 12.

You have basically two choices on how to report this information once you have it: (a) frequencies based on raw numbers (of the 60 groups observed, 45 groups had children under 12 while 15 did not), or (b) frequencies based on percentage (of the 60 groups observed, 75 percent had children under 12(45/60) while 25 percent (15/60) did not). When calculating this type of frequency, you must make a decision about what the base for percentaging will be. In the above example, the base was 60.

Each of these ways of reporting information has its own advantages. If you are interested in sheer numbers for planning the actual number of programs you need, then frequencies based on raw numbers would be the most useful. On the other hand, if you are interested in relative proportions, frequencies based on percentages would be better. For example, in both year one and year two of audience analysis, you might have 45 groups with children under 12. This would indicate that you needed to continue programming for children at the same level. However, if

numbers of visitors increased from year one to year two, the proportions would also change: 45 groups with children under 12 may be 75 percent in year one and only 50 percent in year two. This trend may suggest an increase in another type of visitor whose interpretive needs should be considered.

Another way to describe visitors would be to consider two or more characteristics at the same time or to look at subgroups within the visitor population. This is where you need to adjust the percentage base as briefly discussed earlier. For example, you may be interested in how many of the groups with children under 12 are from urban backgrounds. Your base would then be 45 (from the previous example). To easily visualize the information, you may want to construct a simple table such as:

Table X. Place of origin of groups with children under 12.

Urban	66.7% (30)
Suburban	22.2% (10)
Rural	11.1% (05)
	100.0% (45)

The final step in analysis is also the most important. After you have reorganized the data in such a way that it begins to answer your questions, you must interpret the numbers and their implications. Numbers, figures, and trends do not and cannot magically tell you what to do in and of themselves. ***You*** must think about what they really mean in terms of your resources, objectives, and other factors that enter into a management decision.

EXAMPLE

To illustrate one application of audience analysis, the following example has been developed. In this hypothetical situation, project staff: (a) determine the need for an audience analysis, (b) select the type of information they wish to gather, (c) choose methods to gather this information, (d) select sites to be sampled, (e) develop observation recording forms, (f) establish an observation schedule, (g) analyze the data, and (h) apply the results.

Good Time Lake (GTL) Recreation Area is a large site with two campground loops, a picnic area, swim beach, launch ramp, visitor center, amphitheatre, and nature/hiking trails (see Figure 2). It is a heavily visited lake with 2 million recreation days of use a year. The primary visitation season is from late May through mid-September. Staff includes one park manager, two permanent rangers, and one permanent interpreter (at the visitor center). In the summer, five seasonal rangers and two seasonal interpreters join the staff. Visitation surveys were collected two years previously during the summer season.

Management objectives for GTL are:

- Resource Protection:
  - (a) Provide public use facilities that are sensitive to environmental conditions.
  - (b) Locate public use facilities in areas where they will have minimal environmental impact.

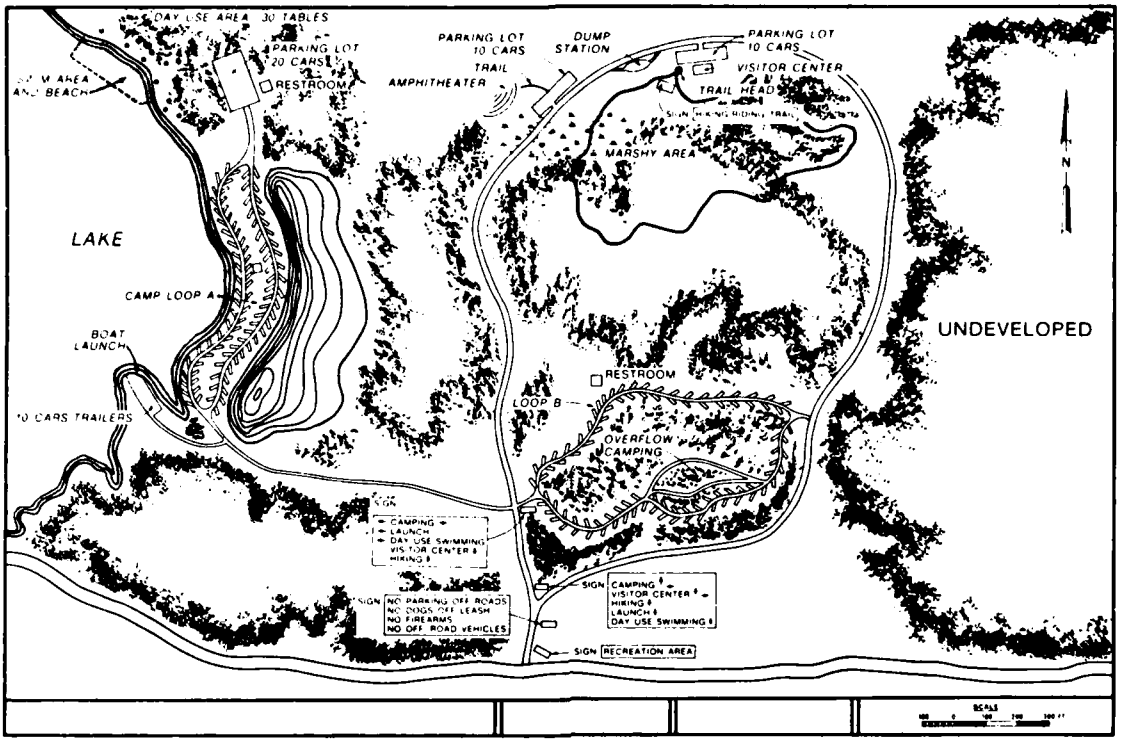

Figure 2. Good Time Lake Recreation Area

(c) Provide alternatives to using vehicles to move between activity areas in the recreation area:

- Enhance Recreation Experience:
  - (a) Provide camping facilities for a wide diversity of user groups.
  - (b) Minimize contact between visitors participating in conflicting recreation activities.
  - (c) Minimize conflicts between autos, pedestrians, and bicyclists.
  - (d) Provide opportunities for the visitor to become aware of, understand, and appreciate project resources.

Existing interpretive services consist of occasional evening programs at the amphitheater, a self-guided nature trail, and visitor center exhibits relating to Corps activities and the natural history of the area. These services are very underutilized and the staff wants to improve what is available as well as institute new programs. One of the first steps in planning for these changes is audience analysis.

Data to be Gathered and Methods

After considering the range of audience analysis information that they could potentially collect, the staff of GTL listed the types of information and specific

Table 3

TYPES OF DATA TO BE COLLECTED AND COLLECTION METHODS

Type of Information	*Specific Questions*	*Method*
Age	Should we have more interpretive services for children? For mature age adults?	Observation
Place of residence	Should services be more or less oriented to urban visitors?	Survey zip code information
Familiarity	Are visitors local? Should interpretive services be changed on a more regular basis (due to large percentage of repeat visitors)?	Survey zip code information Survey information
Social group	Do families predominate? Are groups large or small?	Observation
Visitor use patterns	Where are concentrations of visitors located? What are they doing? Are there differences by time of day?	Observation

questions in which they were interested (Table 3). They then carefully considered objectives, information needed, site design, and staffing levels and decided to collect this information from the past survey and through observation during the summer. The selected data collection methods for each type of information are also listed in Table 3.

Sites to be Sampled

When looking at the resources of GTL with audience analysis for interpretation in mind, it became clear that there were two subareas within the recreational area: a noninterpretive area and an interpretive area. The noninterpretive area includes camp loops A and B, launch ramp, swim beach, and picnic area. The interpretive area consists of the Visitor Center, self-guided trail, and amphitheater. The decision was made to observe visitors in both of the areas. In addition, since three staff members were available, both areas would be sampled simultaneously.

Observer 1, for the noninterpretive area, would begin observations at camp loop A, then move through the swim beach and end with the picnic area. Observer 2 would start at camp loop B, then make observations at the boat launch. Observer 3, for the interpretive area, would begin with the Visitor Center, move to the official self-guided trail head, and then to a site of unofficial access to the trail.* The Visitor Center closes at 6:00 p.m., so it would be excluded from evening observation periods. Observations would be conducted in the amphitheater only when programs were given. Though it would probably be used informally by the visitors at other times, the staff felt that there would not be enough use to make sampling worthwhile. It was also felt that the interpreter would be able to record the appropriate data prior to the program.

* GTL staff had noticed that many of the campers in camp loop B were accessing the self-guided trail through a convenient "volunteer" trail in the campground.

Observation Recording Forms

The next step was to develop a way to record the information being observed. Three somewhat different recording tools were developed due to the slightly different nature of the information that was required from each area within Good Time Lake. At the noninterpretive areas, the staff wanted to gather information on number of people per group, group type, and age distribution. A note card was prepared for easy handling (Figure 3). In the camping loops, one card would be completed for *each site* with occupants. At the boat launch area, every group that put their boat in or took it out during a 20-min period (starting when the Observer reached the site) would be sampled. One card would be completed for *each group*. At the swim beach and picnic area, the Observer would start at one end and move to the other making observations on *each group* (or individual, if alone) present. Groups that arrived after the Observer passed would not be included.

For the interpretive areas, three separate forms were developed. In addition to the information gathered in the noninterpretive areas, the staff wanted to know visitor source (parking lot, walk-in) for the Visitor Center (Figure 4), whether a leaflet was taken at the self-guided trail head (Figure 5), and what the amphitheater

NONINTERPRETIVE AREA OBSERVATION FORM

DATE _____

TIME _____

WEATHER _____

_____

NUMBER IN GROUP _____

Age Distribution:*

(record number of each)

____ Preschoolers (under 5)
____ Children (5-12)
____ Adolescents (13-20)
____ Adults (21-60)
____ Seniors (61 +)

LOCATION:

____ Camp Loop A, site #____
____ Camp Loop B, site #____
____ Boat Launch
____ Swim Beach
____ Picnic Area

GROUP TYPE:

____ Single person
____ Family
____ Family and friends
____ Organized group

Activities observed** _____

_____

_____

_____

_____

* This would be approximate age.

** Only those activities actually observed would be recorded.

Figure 3: Observation form for noninterpretive areas

VISITOR CENTER OBSERVATION FORM

DATE _____

TIME _____

WEATHER _____

_____

NUMBER IN GROUP _____

Age Distribution:*

(record number of each)

____ Preschoolers (under 5)
____ Children (5-12)
____ Adolescents (13-20)
____ Adults (21-60)
____ Seniors (61 +)

VISITOR SOURCE:

____ Parking Lot
____ Walk-in from Trail

GROUP TYPE:

____ Single person
____ Family
____ Family and friends
____ Organized group

* This would be approximate age.

Figure 4: Visitor center observation form

SELF-GUIDED TRAIL OBSERVATION FORM

DATE _____

TIME _____

WEATHER _____

_____

NUMBER IN GROUP _____

Age Distribution:*

(record number of each)

____ Preschoolers (under 5)
____ Children (5-12)
____ Adolescents (13-20)
____ Adults (21-60)
____ Seniors (61 +)

LOCATION:

____ Official trail head
____ Unofficial access in Camp Loop B

Did visitor(s) take a brochure? ____

GROUP TYPE:

____ Single person
____ Family
____ Family and friends
____ Organized group

* This would be approximate age.

Figure 5: Self-guided trail observation form

AMPHITHEATER PROGRAM OBSERVATION FORM*

NUMBER OF PEOPLE ATTENDING PROGRAM ____

DATE _____

TIME _____

WEATHER _____

_____

PROGRAM TITLE† _____

_____

Age Distribution**
(record number of each)
____ Preschoolers (under 5)
____ Children (6-11)
____ Adolescents (12-20)
____ Adults (21-60)
____ Seniors (61 +)

At beginning of program, as part of warmup, ask:

1. How many have visited GTL before this summer? ____
2. How many have been to GTL previously this summer? ____
3. How many are not camping during this visit to GTL? ____
4. Of those who are camping,
   How many are camping in Loop A? ____
   How many are camping in Loop B? ____
5. How many have been to the Visitor Center? ____

* It may be difficult to gather information on group size and type in this setting, so they were deleted from this form.

** This would be approximate age.

† Different types of programs may draw different types of users.

Figure 6: Amphitheater program observation form

program title was (Figure 6). At the Visitor Center and the two trail access points, the Observer would spend 20 min at the entrance (beginning when the Observer reached the site), making observations on *each group* (or individual, if alone) that entered the Center or trail during this period. For *each amphitheater program* one form would be completed.

Observation schedule

In order to obtain a representative sample, it was decided to conduct observations throughout the day and evening. The staff at GTL thought visitor types changed somewhat over the summer, so they planned to sample one week each month during their summer season (June to August). In order to obtain the actual weeks, they randomly selected one week per month being careful not to select those weeks or weekends that contained a holiday or special event. These latter time periods were excluded because holiday visitors are likely to be different than the usual visitors. To obtain information about these users specifically, observations could have been conducted during the holiday weekend or special event. The data would then be analyzed separately as "Holiday Visitation."

The dates selected are listed in the left hand column of the sampling schedule (Figure 7). Notice that the calendar is laid out so that weekends are not broken up.

The staff felt that a sampling time period of 8:00 a.m. to 8:30 p.m. would catch all but a very few of their visitors. They broke this up into five starting times: (a) 8:00 a.m., (b) 11:00 a.m., (c) 2:00 p.m., (d) 5:00 p.m., and (e) 8:00 p.m.

The starting times were spaced 3 hr apart to allow enough time for the observers to cover all areas under observation.

Next, these starting times were assigned to the sampling weeks. The main criterion for assigning times was that they be evenly distributed across the week and throughout the summer. To obtain a sufficient number of observations, they decided to make two sets of observations per day, Monday through Friday. In assigning times, they made sure that (a) all starting times were covered equally during the course of the week, and (b) all starting times were covered as equally as possible each day of the week over the course of the summer (Figure 7). Weekend starting times were assigned in a similar manner, except that three starting times were assigned to one of the weekend days. Finally, the amphitheater programs were scheduled whenever they occurred during the week (in this case Friday and Saturday evenings at 8:00). Note that, on some evenings, amphitheater observations were made at the same time that observations were made in other recreation areas. This allowed the GTL staff to see what alternative activities nonparticipants were engaged in.

The staff decided that if they could not make observations for some reason (heavy rain or a project emergency), they would sample the same day and time the following week. For example, if they missed Wednesday, July 28, they would sample Wednesday, August 5, at 8:00 a.m. and 8:00 p.m.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
June 7-13	8:00 a.m. 2:00 p.m.	11:00 a.m. 5:00 p.m.	2:00 p.m. 5:00 p.m.	11:00 a.m. 8:00 p.m.	8:00 a.m. 8:00 p.m. program*	11:00 a.m. 5:00 p.m. program*	8:00 a.m. 2:00 p.m. 8:00 p.m.
July 26-Aug. 1	11:00 a.m. 5:00 p.m.	2:00 a.m. 8:00 p.m.	8:00 a.m. 8:00 p.m.	8:00 a.m. 5:00 p.m.	11:00 a.m. 2:00 p.m.	8:00 a.m. 2:00 p.m. 8:00 p.m. program*	11:00 a.m. 5:00 p.m.
August 9-15	8:00 a.m. 8:00 p.m.	8:00 a.m. 11:00 a.m.	11:00 a.m. 2:00 p.m.	2:00 p.m. 5:00 p.m.	5:00 p.m. 8:00 p.m. program*	11:00 a.m. 5:00 p.m.	8:00 a.m. 2:00 p.m. 8:00 p.m.

*Observations are made at the amphitheater programs whenever they are offered during the selected weeks

Figure 7: Observation schedule for Good Time Lake

Analysis

The staff at GTL organized and analyzed the information they had collected at the end of ***each*** sampling week (to catch potential sampling errors and compare figures by month) and at the end of the summer (to obtain overall counts and patterns). Some of the results were:

Place of residence. Survey zip code information indicated that 82 percent of the visitors were from urban and suburban areas while 18 percent were from rural areas.

Age. Differences in age distribution between sites were recorded:

	Swim Beach, %	*Camp Loop A, %*	*Camp Loop B, %*	*Visitor Center/ Trails, %*	*Evening Program, %*
Children	40	27	8	5	5
Adolescents	37	23	10	10	10
Adults	18	25	30	23	20
Seniors	5	25	52	62	65
	100	100	100	100	100

Social group type and size. Families with children under 18 dominated at the swim beach and Camp Loop A, while family and friends without children dominated in Camp Loop B and the interpretive area. Group size was generally between two and six, except in the day-use area where large groups of ten to twenty used the swim beach.

Familiarity. Survey zip code data indicated that the majority of visitors (76 percent) were nonlocal (from over 50 miles, or more than a 1 hr drive away) while 24 percent were local. While most visitors to the amphitheater programs were nonlocal, many were repeat visitors both during this season and from previous years:

New Visitor	21%	Repeat (this year)	55%
Repeat	79%	Repeat (from previous year)	73%
	100%		

Use patterns. The following use patterns were observed.

a. Visitors who attended the amphitheater programs were primarily campers from Loop B. Few campers from Loop A or day users attended the programs.

b. Only a small number of people who walked the trails visited the Center or took a leaflet at the trailhead.

c. Approximately one third of those walking the trails accessed them via a "volunteer" trail from Camp Loop B.

d. The noninterpretive areas usually had higher concentrations of visitors. Loop B was the exception as it was generally sparsely populated with mature age visitors, and only began to fill after Loop A was already full.

Application

Upon pondering the audience analysis information they had collected, the staff at GTL saw the particular objective of "providing opportunities for the visitor to become aware of, understand, and appreciate resources" was not being met

through current services, as it was apparent that they were only serving a small portion of their total visitors. Several implications became evident that were in keeping with overall management objectives:

a. Better access to interpretative services was needed. Current services were not located near areas of high visitor concentration. More services in camp Loop A and in the swim beach area were a possibility, including programs (day and evening), signing, bulletin boards, and exhibit shelters. Increasing the size of the parking lot at the visitor center was another possibility. Trail access from the western activity centers to the interpretive area was a third possibility. Finally, informing visitors of the availability of interpretive services might increase attendance.

b. While there were large numbers of children and adolescents visiting GTL, attendance at interpretive programs was dominated by older adults. Possibilities to remedy this situation included offering children's programs at a variety of locations around the site or offering them in the interpretive area and publicizing them around the site. The latter would require provision of better access to the interpretive area.

c. Because of the high number of repeat visitors, interpretive services, including programs, exhibits in the visitor center, and trail leaflets, needed to be changed regularly (across seasons and within seasons).

d. The urban origin of most visitors suggested the need for a more "urban" orientation to interpretive services. Possibilities included new themes for the visitor center exhibits and trail leaflets that draw analogies between urban and natural environments.

e. Visitors to Camp Loop B had created their own trail access to the nature trails. Because of this they were missing the trail leaflets available at the trailhead. A possible solution would be to convert the "volunteer" trail into a managed trail and provide trail leaflets directly at the trailhead in the campground.

The staff at GTL completed two other tasks before they began to implement new ideas generated from audience analysis activities. First, they ranked the above implications of their information and generated a detailed plan for implementation including budgets, time table, and staff requirements. Second, they developed a system for evaluation of their revamped services. Part of this evaluation system provided for continuous monitoring of potential audience characteristics so that interpretive services could be regularly updated to meet visitor needs.

SUMMARY

To develop and maintain effective interpretation programs, it is essential to know the characteristics, needs, and interests of project visitors. This can be accomplished through one of the many techniques for audience analysis. Those covered in detail in this supplement can be designed and implemented by project staff. Furthermore, they do not require participation on the part of the visitor and thus do not require Office of Management and Budget approval. Although the techniques discussed herein are directed specifically at interpretation, they could also be used to gather information for any number of purposes (e.g., to determine if more electrical hookups are needed in the campgrounds or if more ramps need to be provided at the boat launch area).

If, after reading this supplement, you need further information or guidance on data gathering techniques, a variety of sources may be consulted. There are a number of research methods and statistics books available. Three good sources are starred in the bibliography, others include:

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b. *Practical Research, Planning and Design,* 2nd ed., P. D. Leedy, 1980, Macmillan, New York.

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APPENDIX A: EXAMPLES OF SAMPLING PLANS AND OBSERVATION RECORDING FORMS

EXAMPLE 1

In a study of users on a self-guided nature trail, visitors were observed as they walked the trail and their behaviors were recorded on a map. The following sampling plan and example of the recording form were adapted from "Visitor Behavior at the Lake Tahoe Visitor Center: A Preliminary Report of an Observation and Interview Study of the Activities of Vacationers on a Forest Service, Self-Guided Nature Trail," by Richard Kuehner.*

Introduction

A representative selection of visitors is perhaps more important than later statistical analysis. Statistical analysis on less than a carefully selected sample is usually meaningless, whereas published raw data from a carefully selected sample can be further analyzed by the reader. The readers are thus given the chance to form their own conclusions.

The study method chosen and research money available limited the size of the sample. Each observation-interview** combination took about 1-1/2 hr to complete. This means two people working an 8-hr day sampled about five individuals and their groups (the latter to a limited extent). Money was not available to hire additional teams of observers and interviewers. Thus, in the 2-month period, a total of 234 visitors were surveyed.

Since the majority of the annual visitors come in July and August (Graham 1971), we arbitrarily considered these to be most important. Therefore, we sampled only in the months of July and August. Visitor behavior may be quite different in the fall when the salmon spawning can be observed. A fall study would complement this one well.

The sample was stratified systematically by several variables. We controlled for the time of day, day of week, month, and sex of the visitors.

Time of Day

We attempted to equally partition the sample into four arbitrary time periods of the day. Actually, the final sample was divided as: 26 percent between 9:00 and 10:59 a.m., 22 percent between 11:00 and 12:59 a.m., 30 percent between 1:00 and 2:59 p.m., and 21 percent between 3:00 and 5:00 p.m. The before noon period was hard to fill because occasionally the first visitor to the trail did not arrive before 10 a.m. This threw off the sampling for the entire day. Also, we did not begin an observation too close to the 5:00 p.m. closing time for the Stream Profile Chamber.

Day of Week

Roughly an equal number of each day of the week was worked; i.e., 6 Saturdays, 6 Sundays, 6 Mondays, etc. We originally thought that the weekend crowd would be different from the midweek visitors. As it turned out, however, the weekend visitors were mostly "week long" vacationers rather than day trip or 2-day trip visitors. The visitor learning on different days of the week was by no means the same, but the pattern was irregular and unexplainable.

Selection of Individuals to Interview

Only one person per group was observed and interviewed since unobtrusively observing more than one person at a time is impossible. Even using an observation checklist that limits the number of things observed, it was still impossible to follow two people's movements simultaneously. Of course this becomes even harder if the group is larger than two.

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** In this study, observations were supplemented with interviews.

Nature of Observations

How the observed person related to his or her group, however, was recorded. So, indirectly, we have some group information. This effectively extends the information on the relatively small total sample.

Visitor Selection Sequence

The sequence followed in observations and interviews was designed to be reproducible and easy to follow. A brief outline of the information collection sequence follows:

Step 1. Select group to observe.

Step 2. Select individual within group.

Step 3. Unobtrusively observe selected individual throughout his entire Rainbow Trail experience.

Step 4. Interview the observed individual.

Step 5. Translate field notes to observation sheets immediately after observation.

Step 6. Proofread interview forms and add other impressions immediately after interview.

Step 7. Staple corresponding observation and interview forms together (done in office).

Step 8. Code observation and interview forms for computer processing (done in office).

The first visitor group was selected each day after 9:00 a.m. when the Stream Profile Chamber was opened. The first group to begin on the trail (to cross a predesignated line) was selected. Subsequent visitors were selected after

OBSERVATION SCHEDULE

Date:

Time:

Subject: M ___ F ___

Group size/composition:

	sex	age	race
	M	_____	_____
	F	_____	_____
	Boys	_____	_____
	Girls	_____	_____

Day of week: S M Tu W Th F S

Clothing of subject:

Weather:

Take trail booklet: (# per group)

Return booklet: (# per group)

Mosquito Level:

N none

L light

M moderate

F fierce

C concentrated; where? _____

Misc. Equipment Along:

___ Camera

___ nature books

___ maps or Forest Service pamphlets

___ pack

___ lunch

___ animal (i.e., dog)

Asked questions in visitor center after taking trail:

Interaction with children:

Figure A1. Observation Schedule

the hour, half hour, or quarter hour. When both the observation and interview notes were complete for the first visitor, we would wait for one of the preset times, then select the first group crossing the predesignated line. The longest wait for the start of a sample period was about 14 min. This systematic selection, by the clock, of a sample group reduced personal bias.

Next, one person was systematically selected from the group for observation. This selection varied with group size and sex as follows:

Single person "group"—observe any adult, group selection arbitrarily takes precedence over sex selection.

Groups of two or more—alternate between men and women adults. If two groups occur in a row of the same sex only, then begin alternation as it is again possible; group selection again takes precedence over sex selection.

- Couple—alternate between men and women adults.
- Two of one sex per group—alternate between men and women adults—select first one to cross the line at the beginning of the trail. The second time a group of two of the same sex is encountered—take the second one to cross the line. The next time take the first again. A rotating tabulation was kept.
- Groups of three or more of the same sex—handle as above except that you take the first to cross the line the first time, the second the second time, the third the third time, and so forth. Separate rotating tabulations were kept for each group size.

Notes about each group were made on the Observation Schedule (Figure A1). Visitor behaviors were located and described on maps of the trail and Stream Profile Chamber (Figures A2 and A3).

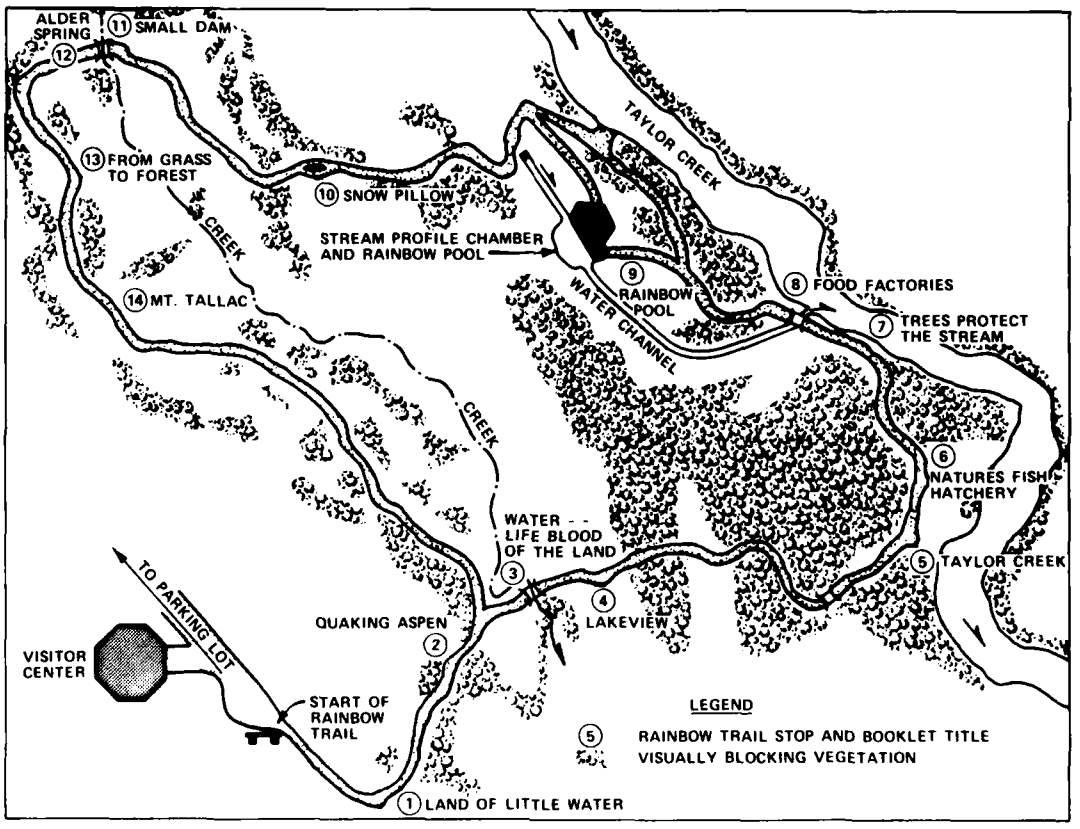

Figure A2. Map of trail

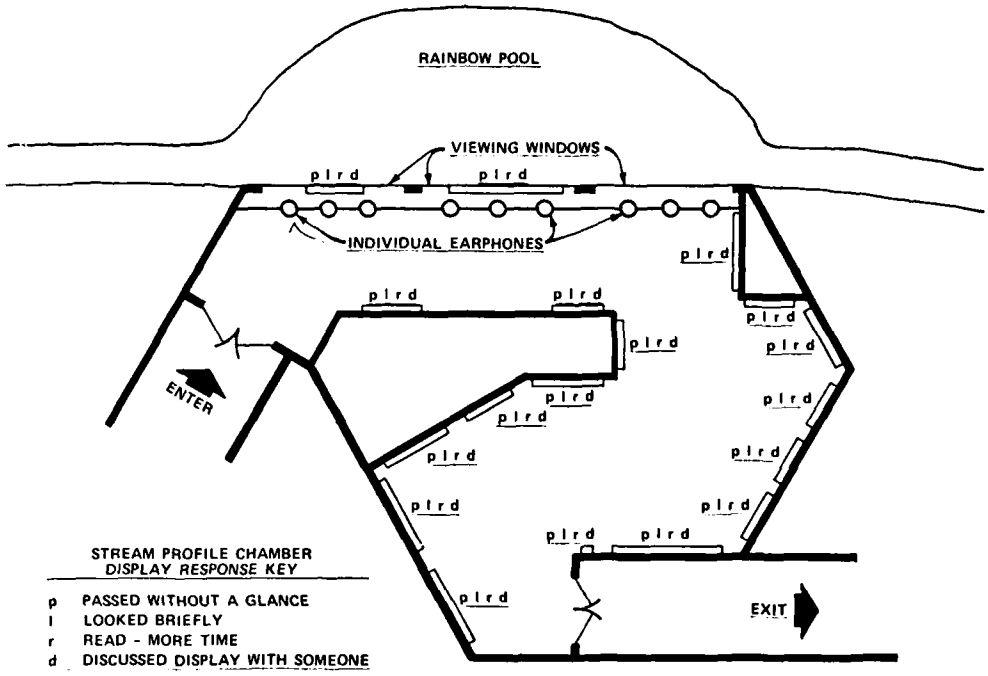

Figure A3. Map of Stream Profile Chamber

EXAMPLE 2

Another example of behavior mapping can be found in a study of users of the First National Bank Plaza in Chicago, Ill. In this example, traffic flow patterns as well as user behaviors were noted.

The following sampling plan, recording form, tables, and figures were adapted from *A Pilot Study in Post Construction Evaluation, First National Bank Plaza, Chicago, Illinois,* prepared by Al Rutledge, Department of Landscape Architecture, University of Illinois.*

The Site

Orientation to the layout is provided by the accompanying map (Figure A4). The Plaza occupies an acre plus of ground in the south-central segment of Chicago's main business district, the "Loop." Narrow, traffic-clogged streets separate it on the east and west from prestigious office buildings and on the south from a collection of lesser structures and enterprises.

Within the Plaza's block, the imposing 57-story First National Bank looms immediately to the north. The western rim of the block is contained by a low consumer finance building underneath which is located a coffee shop and additional bank facilities. On the southern edge, a disguised cooling structure rises about one story above the street to form the base for three towering flagpoles. It is adjacent to an elevator lobby which services a restaurant and other public facilities below. While no building skirts the eastern perimeter, shops, a theater, and access to a subway and subterranean parking garage are situated there beneath the Plaza's intermediate level. The parking garage is

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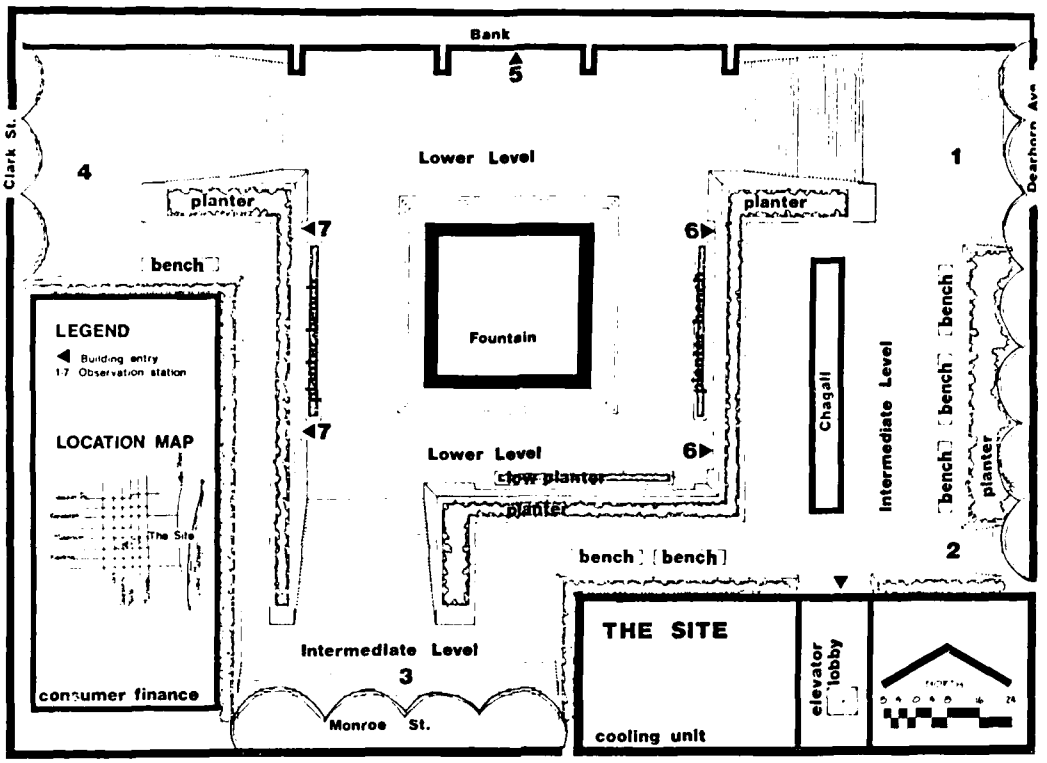

Figure A4. First National Bank Plaza

also accessible from the bank and coffee shop.

The Plaza's decking is divided into three horizontal planes. The first, essentially a tree-bowered sidewalk, is at street grade and is not shown on the drawings. The intermediate level is reached by banks of steps, its eastern leg distinguished by a multi-sided Chagall mosaic which, at the time of this study, was boxed from inspection awaiting its final touches. The lower level is punctuated by a central fountain and contains entries to the coffee shop on the west, shop-subway concourse on the east, and bank on the north. Window walls on all four sides of the lower level permit viewing from inside the peripheral buildings.

This study is addressed to the intermediate and lower levels of the Plaza.

Observations

It was decided to notate information about users on 8- by 10-in. maps (exemplified by Figure A5) according to instructions indicated in Figure A6. Subjects were to be identified as to sex, age, race, and "type," the latter coming from user categories imagined to typify whom an urban plaza might draw. Their movements were then to be traced on the map and their activities recorded where they occurred by way of symbols pulled from a list of anticipated behaviors (Figure A7).

As explained in the instructions, subjects would be chosen by random selection at various entrances to the Plaza. In that the subject would be tracked, traffic flows might also become known, hence provide another facet missing from the usual methodologies which tend towards the exclusive production of stationary data.

Results

The results were summarized in the form of graphs, maps, and tables. They provide information on who the plaza users are, how they behave, and when and where these behaviors occur.

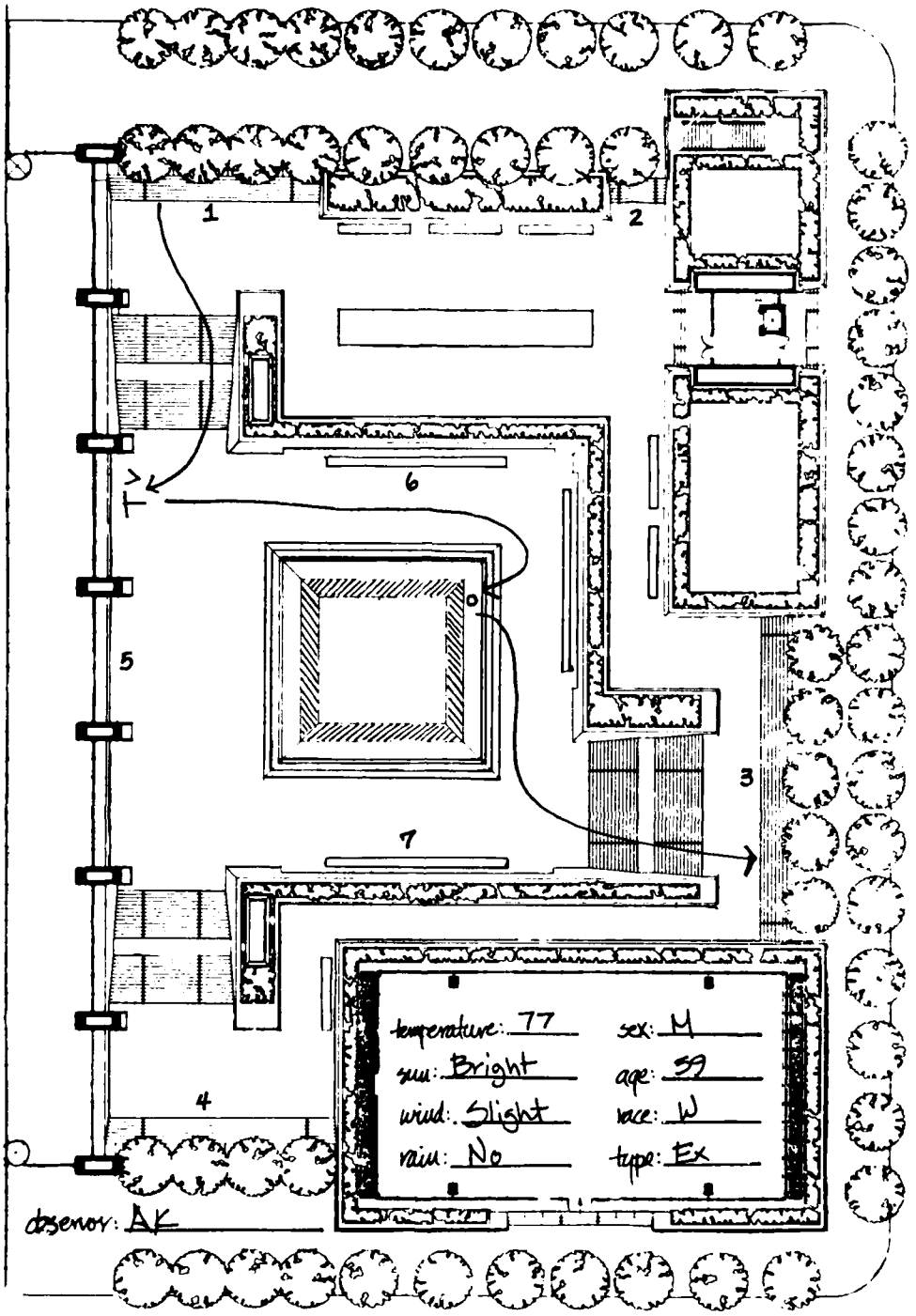

Figure A5. Sample worksheet

Investigations include observations at the plaza level and 35 mm slides taken from the fifth floor of the bank building (for purposes of recording density).

Each observer shall have the following:

1. Mechanical pencil or ball-point pen.
2. 3-ring, looseleaf notebook.
3. 100-150 plaza maps with symbol and personal data legends on the reverse side.
4. Station selection chart.
5. Random selection chart.
6. Watch (synchronize with other observers).
7. Stop watch.
8. Camera (35 mm with slide film).
9. Good handle on procedure.
10. Camera (35 mm w/28 mm lens for density slides—one only).

Schedule for Observers

Two (2) observers per hour with one (1) additional observer between 12:00-1:00 and 1:00-2:00 (plaza level).

One (1) observer taking density shots with camera from the fifth floor of the bank building. Densities can be taken by visual observation, at fifteen (15) minute intervals, and recorded on a map, if the plaza is not overly crowded.

Observers

One (1) map per person.

Information contained on map:

FRONT

1. Stations (points of entry and exit) by number (1 thru 7) for reference to station selection chart.
2. Personal data space.*
3. Eco-data space.**
4. Signature of observer space.

BACK

1. Symbol legend for behaviors.
2. Personal data (type) legend.

Random selection and station selection charts will be separate.

Follow selection charts and legends religiously.

Density

Slides every fifteen (15) minutes of the total plaza area (2 or 3 exposures each time). Record time and number of slides (label roll) for each series. Densities can be taken by visual observation, at fifteen (15) minute intervals, and recorded on a map, if the plaza is not overly crowded.

Steps for Observations (Plaza Level)

1. Refer to station selection chart for point of beginning.
2. Follow subject (selected from random selection chart) thru plaza until exit, i.e. when puts foot down on first step or when door opens.
3. On the map, record time of entry at entry point and time of exit at exit point.
4. In space provided, record personal and eco-data for each observation (subject).
5. On the map, graphically record movement and activity of each subject. See symbol legend.
6. Time each major behavior and record adjacent to symbol on map.
7. If, at a given station, the subject as indicated on the random selection chart does not appear within three (3) minutes then follow the next subject. If no subject appears with a five (5) minute span, then circle the station, record a "no show" and proceed to the next station.
8. If "next subject" as noted in No. 7 above is similar to the last subject observed, then pick the next dissimilar subject and follow thru the plaza.
9. Sign each map in appropriate space.
10. When changing "guard" (each hour) the new observer will follow the station selection chart, continuing from the last station of the previous observer.
11. Behavior symbol for "other" (0) should, when used, have a number in the circle and the activity referenced and noted in the margin of the map.

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* For recording demographics
** For recording weather and temperature.

Figure A6. Instructions for observers

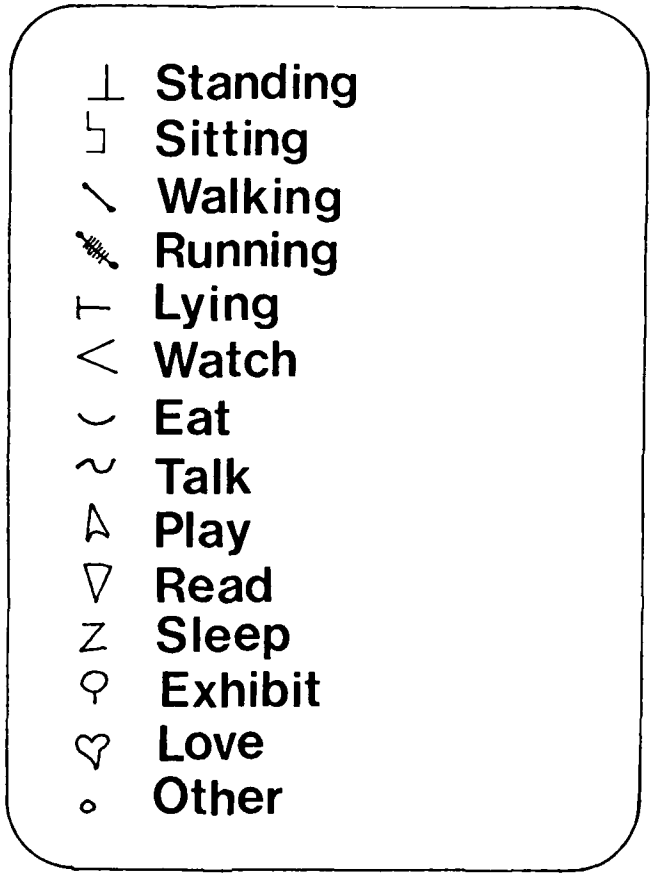

Figure A7. Behaviors

Densities. Half-hour population counts were tabulated from 35 mm slides then related to time (Figure A8) and place (Figures A9 and A10). Figures A9 and A10 show the work-ups for 9 a.m. and noon, typical urban arrival and lunch hours. Similar maps showing user locations were roughed out for each half-hour increment between 8 a.m. and 6 p.m.

Behaviors. Data generated by the mapping procedure were first drawn up as a composite of traffic lines, other ("moving") behaviors which occurred while traffic was in progress and "stationary" behaviors or those actions which took place after traffic movement had ceased. This was done for each hour according to the number of people tracked. Figure A11 represents the compilations for the hours of 9-10 a.m.

Each of these information facets was then broken down by the hour and also totaled over the entire research day in a series of tables and maps. A tabular sample is shown in Figure A12; representative maps are displayed in Figures A13 and A14.

Data as to sex, race, age, and user type were subsequently tabulated (Figure A15) and fed into every dot and line which symbolized a person on the behavior maps. As an example, compare Figure A14 with Figure A16.

As illustrated by Figure A17, places where user-environment confrontations were noticed by the onground photographer were identified on a map.

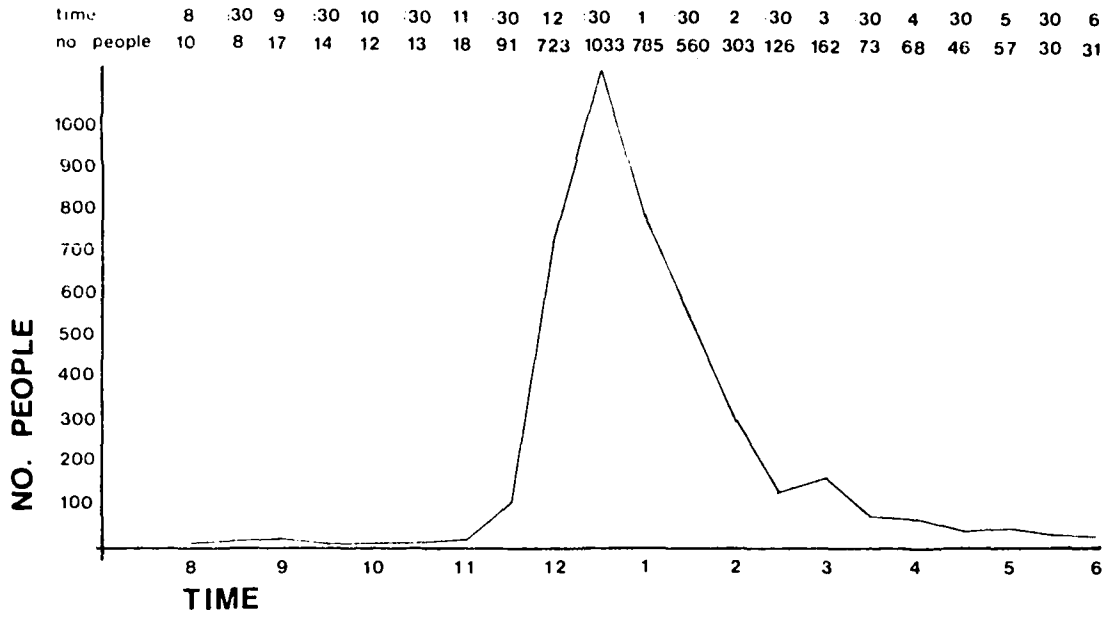

Figure A8. Population count

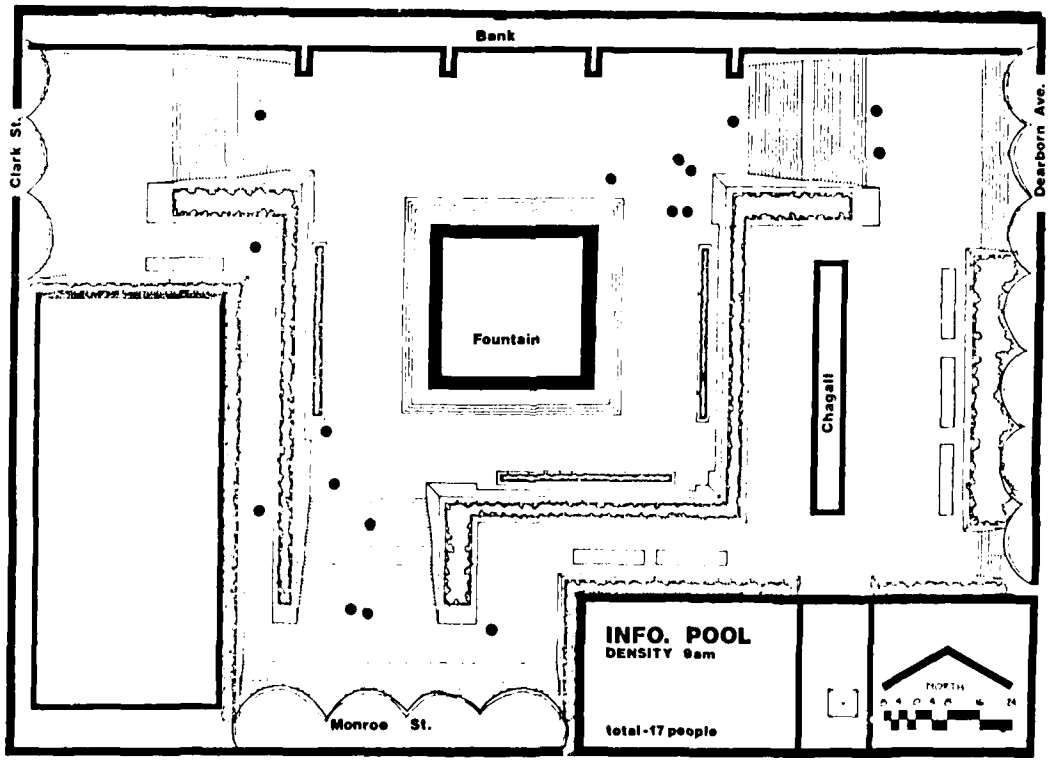

Figure A9. Density at 9 a.m.

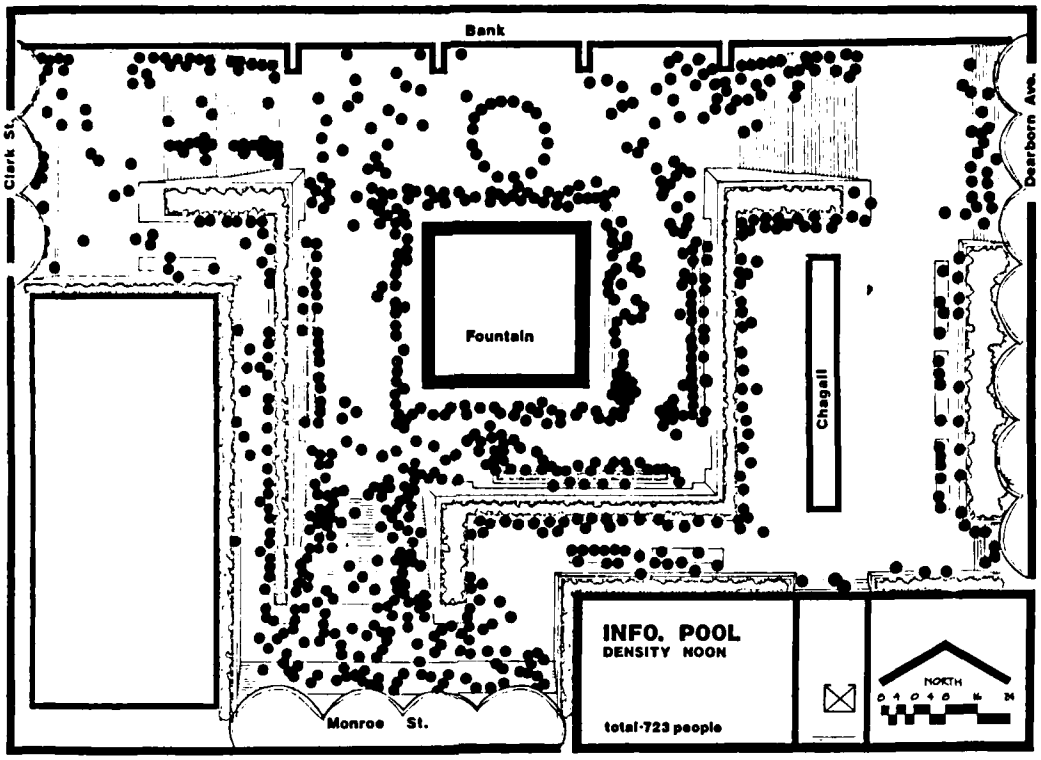

Figure A10. Density at noon

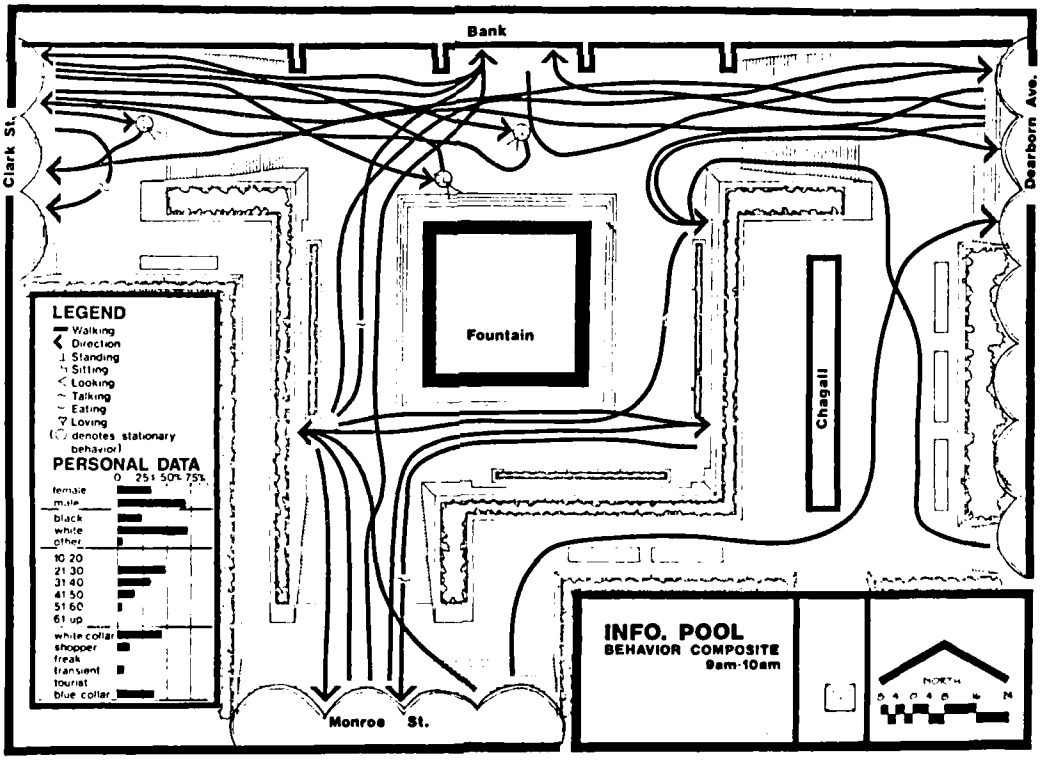

Figure A11. Behavior composite, 9:00 to 10:00 a.m.

TIME

BEHAVIORS	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	Total	%
WALK ONLY	18	19	21	14	9	12	10	19	18	6	146	52
WALK/WATCH	2			1	1	1	7	2	1	6	21	7
WALK/TALK	1	3			2	1	2	4	2	3	18	6
STAND ONLY					2		1			1	4	1
STAND/WATCH	1	3	3	1	10	2	4	2	1	4	31	11
STAND/TALK		1		1	6		2	1	1	1	12	4
STAND/OTHER			1*			2*			1*		4	1
SIT/WATCH				2	2	3	2	4	2	2	17	6
SIT/TALK				2	3	3	1	3	1	1	14	5
SIT/EAT				1	2	1	1	1			6	2
SIT/READ							3	2			5	2
SIT/LOVE						1				1	2	1
SIT/OTHER				1**							1	1

* buying food, touching water, take pictures

** listening to guide

Figure A12. Behavior summary

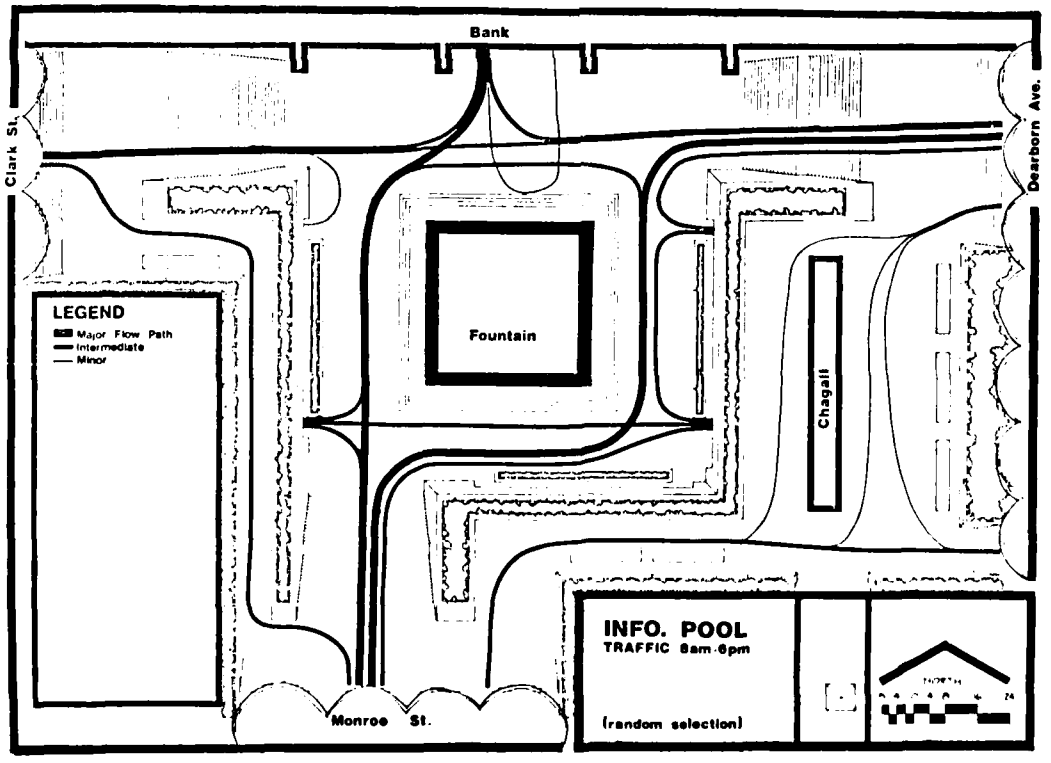

Figure A13. Traffic flow

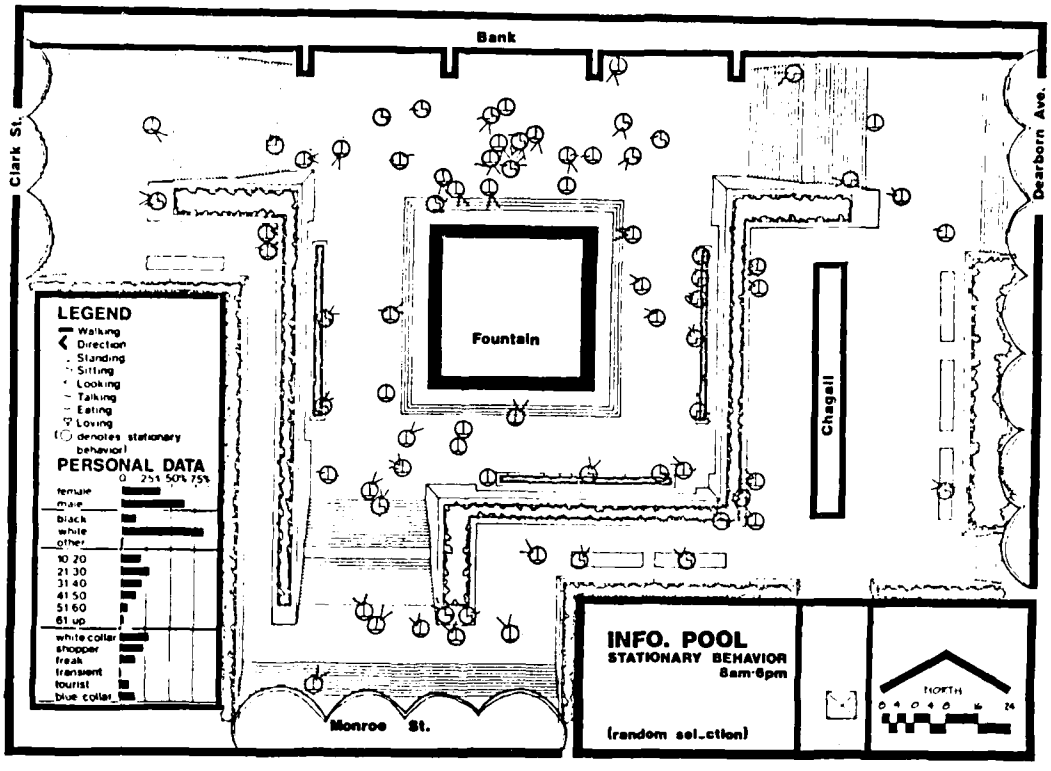

Figure A14. Stationary behavior

BEHAVIOR

		WALK ONLY	WALK/WATCH	WALK/TALK	STAND ONLY	STAND/WATCH	STAND/TALK	STAND/OTHER	SIT/WATCH	SIT/TALK	SIT/EAT	SIT/READ	SIT/LOVE	SIT/OTHER	TOTAL	%
SEX	FEMALE	53	6	10	2	11	4	1	5	6	4	1	2		105	37
	MALE	93	15	8	2	20	8	3	12	8	2	4		1	176	63
RACE	BLACK	41	3	4		4	5	1	5	1		1			65	23
	WHITE	98	18	14	3	25	6	3	12	13	6	4	2	1	205	73
	OTHER	7			1	2	1								11	4

Figure A15. Behavior by race and sex (tabulated)

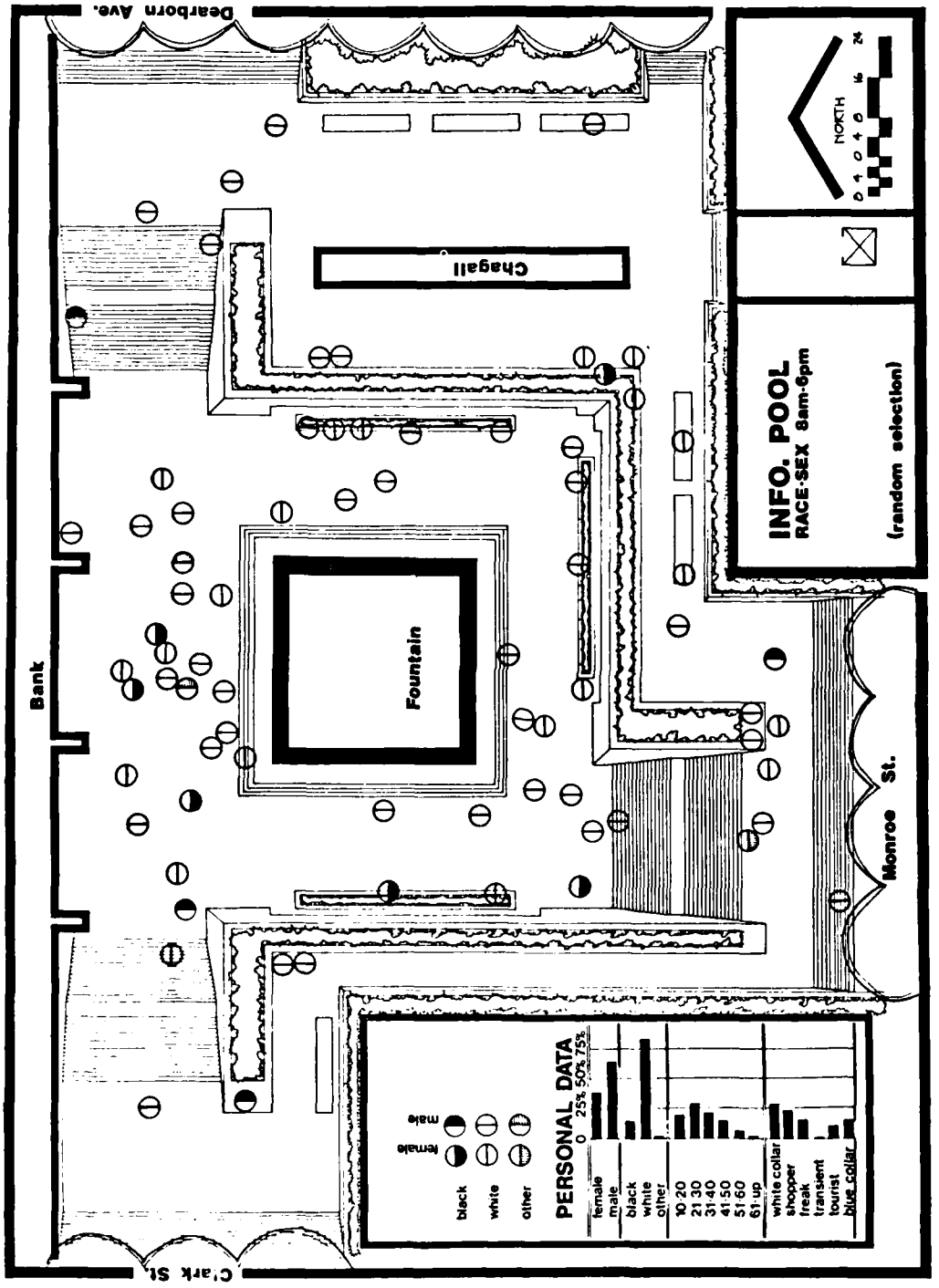

Figure A16. Behavior by race and sex (map)

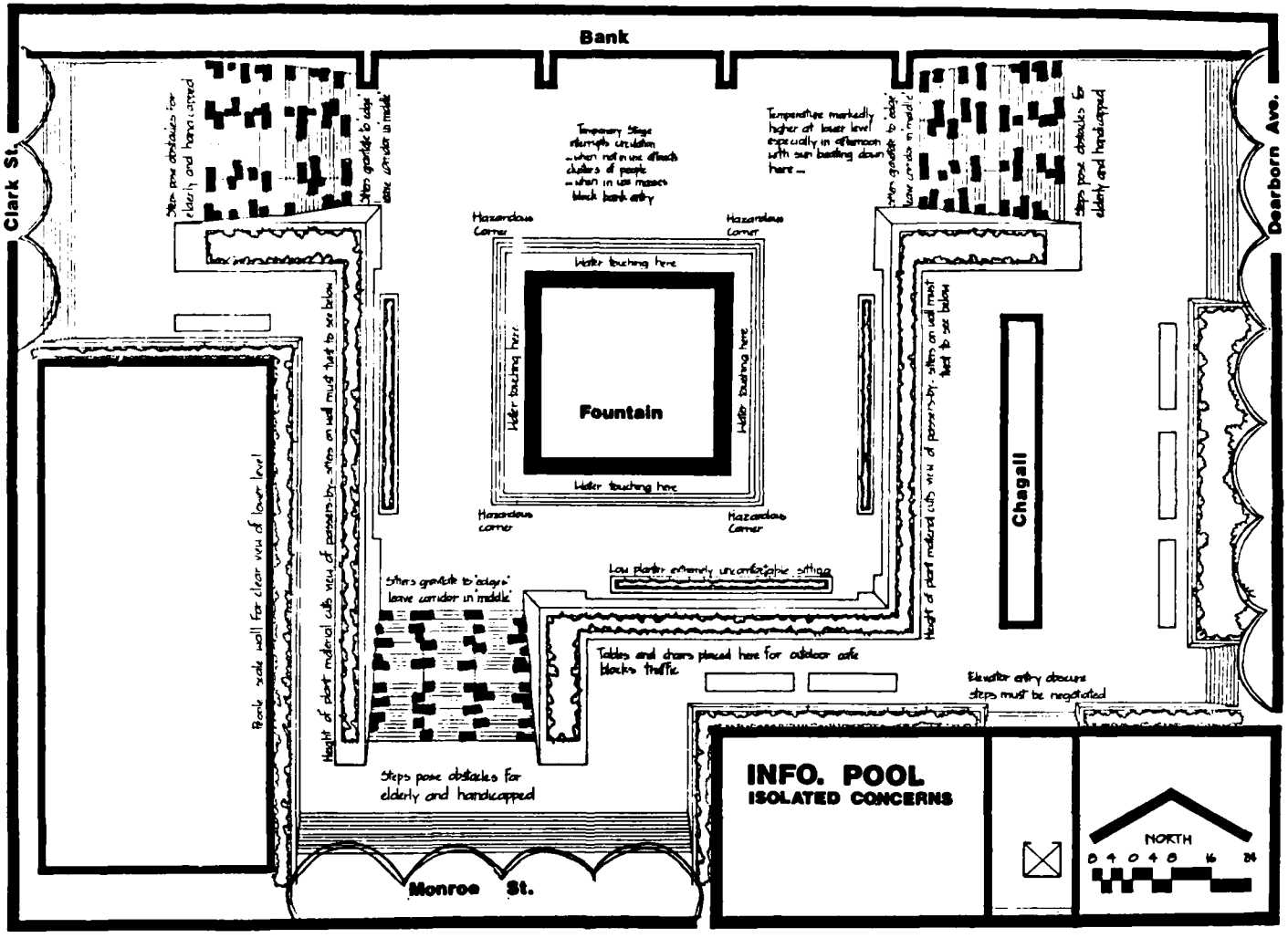

Figure A17. User-environment confrontations

EXAMPLE 3

The following excerpt from "Audience Attention as a Basis for Evaluating Interpretive Presentations," by Dick, Myklestad, and Wagar, illustrates the observation of audience response during an interpretation program.

Procedures

Because interpretive presentations are continuous, ongoing communications, questions to an audience would either interrupt this ongoing process or would investigate it as a past event. Therefore, five nonverbal indicators were selected for analyzing fluctuations in audience attention: percentage watching the presentation, fidgeting, talking, leaving during the presentation, and response to instructions given during the presentation.

Initial observations quickly showed that the percentage of the audience watching the presentation, hereafter called "percent watching," was the most workable measure of audience attention for the interpretive presentations studied. Although individuals sometimes watch a presentation while thinking of other things, percent watching appeared to correlate well with general audience responsiveness to a speaker or presentation.

Observing visitors' eyes was possible only with small audiences (under 20), good lighting conditions, and with the observers facing the audience. When conditions were less than ideal, the orientation of people's heads toward the presentation was used as an operational definition of audience attention. This introduced an additional source of error but did not obscure the great differences that occurred in percent watching.

By observation of either visitors' eyes or the direction of their heads, data were collected to determine (1) the consistency of results obtained by two observers, (2) how many people were actually paying attention at different points in the presentation, and (3) factors having positive or negative effects on audience attention.

At preselected intervals, two observers recorded the number of people in the audience and the number actually watching the presentation. The usual frequency of scanning was once a minute for programs of 20 minutes or less and once every 2 minutes for longer presentations. Persons too well hidden to be observed were not considered to be part of the audience. The two observers began each scan at exactly the same time and used the same scanning patterns—e.g., front to back, left to right.

Differences in measurement inevitably occur when two observers examine the same segment of the audience at slightly different times. Fortunately, differences from this source were slight relative to the substantial differences found in percent watching. The two observers scanned for attention or nonattention—depending on which was the less predominant. If more people were paying attention than not, observers counted those not paying attention, and vice versa.

Results and Discussion

Direct observation of an audience can provide reliable feedback on visitor attention to an interpretive presentation. Although the two observers in this study did not always record exactly the same "percent watching" scores, they consistently recorded the same patterns of fluctuation in audience attention (Figures A18-A20).

Methodical observation can identify differences in audience attention within a presentation (Figures A18-A20) and between presentations (Figure A21). In addition it permits evaluation of efforts to increase attention to interpretive presentations. For example, Figure A22 shows attention levels for a puppet show before and after distracting noise from a nearby exhibit was eliminated. An exhibit demonstrating pulleys created much clatter, especially when chords were released, permitting weights to drop. Observers' remarks for one puppet show

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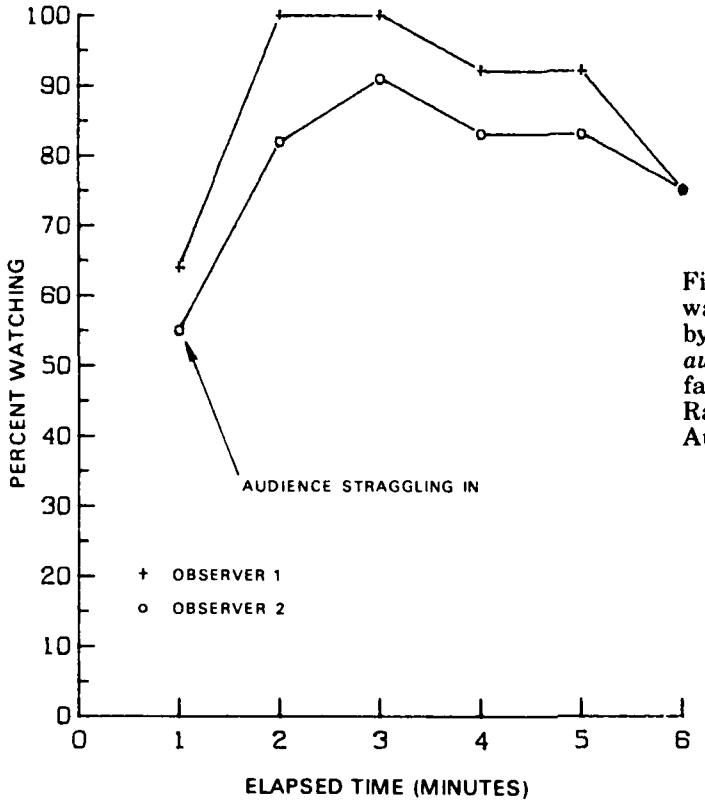

Figure A18. Percent of audience watching presentation, as determined by observation of visitors' eyes—*audiovisual* presentation on Park fauna, Paradise Visitor Center, Mount Rainier National Park, 3:45 p.m., August 13, 1973

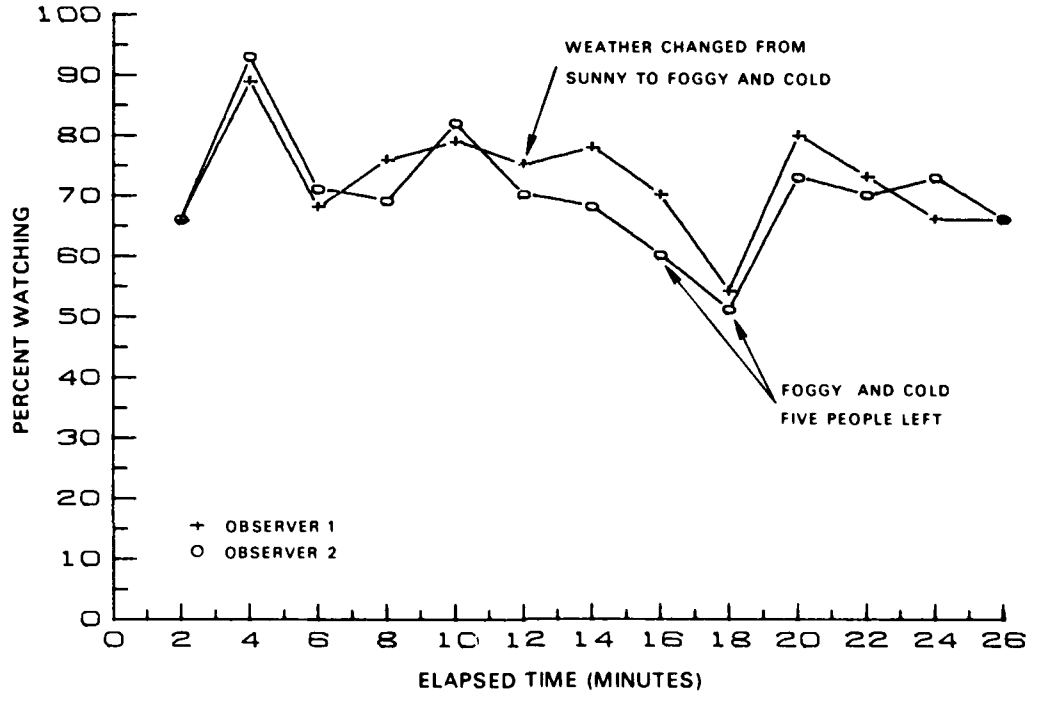

Figure A19. Percent of audience watching presentation, as determined by observation of visitors' eyes—lecture on terrace at Hurricane Ridge Visitor Center, Olympic National Park, 1:30 p.m., August 22, 1973

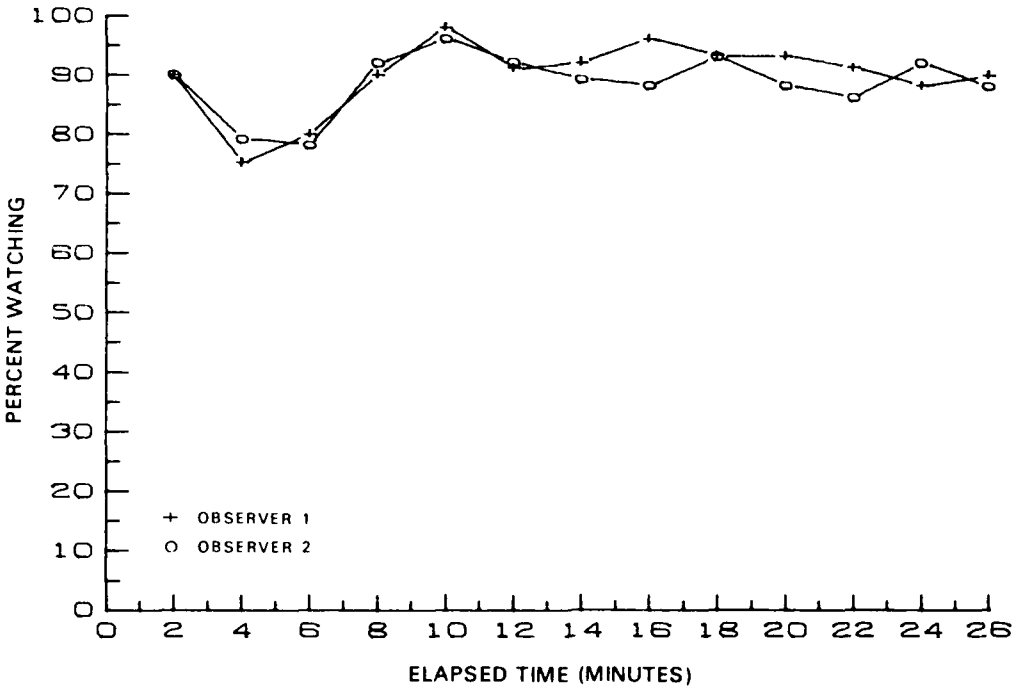

Figure A20. Percent of audience watching presentation, as determined from direction of visitors' heads—campfire talk at White River Campground amphitheater, Mount Rainier National Park, 8:00 p.m., August 13, 1973

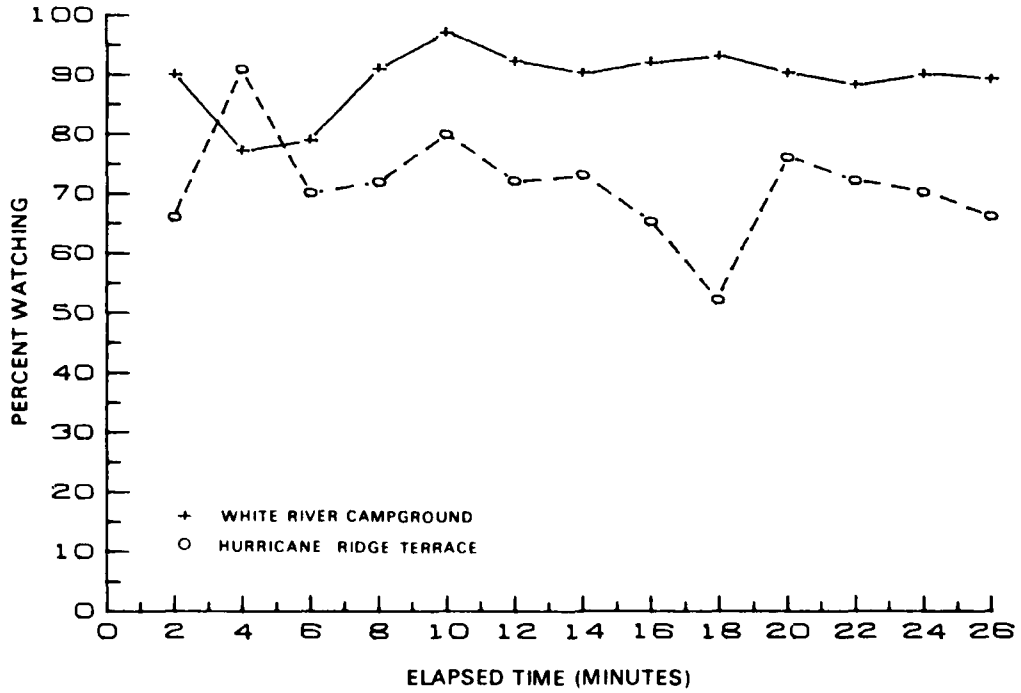

Figure A21. Comparison of percent of audience watching presentations at Hurricane Ridge Visitor Center (Figure A19) and White River Campground (Figure A20). (Data from the two observers have been averaged.)

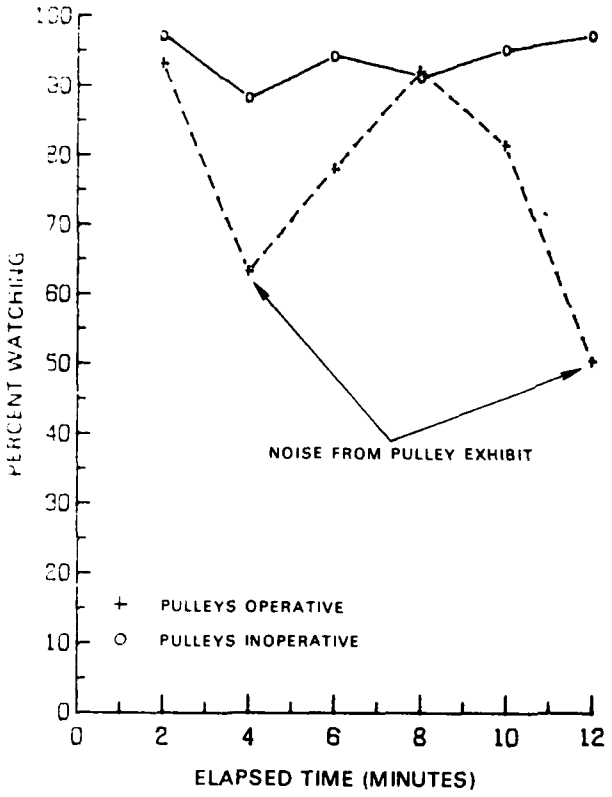

Figure A22. Percent of audience watching puppet show before and after noise from a nearby pulley exhibit was eliminated, Pacific Science Center, Seattle, Washington, 1:30 p.m. (pulleys operative) and 3:30 p.m. (pulleys inoperative), August 8, 1973. Percent watching determined by observation of visitors' eyes

identified low attention levels at the 4- and 12-minute points as resulting from distracting noise at the pulley exhibit. During the second show, the pulley exhibit was inoperative and attention levels remained consistently high.

Application

The ideal position for observers is to one side of the audience, near the front, elevated, and at least partly screened from view by the audience. Because conditions seldom are this ideal, observers must select or develop the best position available.

For complete records, observers should use a printed form (Figure A23). Records are easiest to interpret when graphed. In conjunction with remarks on the observation form, a tape recording of a presentation may permit fluctuation in attention to be associated with factors either within or outside the presentation. Videotaping the presentation might be even more helpful.

One trained observer can usually observe attention in audiences up to about 40 people. Two or more observers can divide a larger audience into two or more observation zones. Or a single observer can let one part of the audience represent the total. In doing so, he should be careful to avoid a preponderance of similar people—such as youth groups, those who sit in front rows, tour groups, etc.

Observers should be trained in small groups so they can compare results and develop reliability. During training, all observers should synchronize their scanning intervals and patterns so that they observe the same people at approximately the same times. Also during training, each observer should examine the same people; that is, people hidden from any observer should be ignored by all.

With practice, observers will be able to score audience attention by looking at entire sections of the audience rather than sequentially observing each individual.

RECORD OF AUDIENCE ATTENTION TO INTERPRETIVE PRESENTATION

Title and description of presentation: Naturalist talk with Rivers (campground) HFNP

Attention defined as: Eye contact ___ Head direction ✓

Observer: B. L. Hall

Date: 8/13/73

TIME Started 8:07 pm Plus	ATTENTION Number showing attent.[1]	inattent.[1]	AUDIENCE SIZE[2] At beginning 41 arrivals	departures	Subtotal	Percent giving attention	REMARKS
01 02	43	4			47	91	Building campfire
02 04	36	12	1		48	75	Campfire smoke on audience
03 06	46	10	2		50	80	" " "
04 08	45	5			50	90	Beginning of fading legends
05 10	51	1	2		52	98	
06 12	58	6	12		64	91	
07 14	57	5		2	62	92	
08 16	64	3	5		67	96	
09 18	64	5	2		69	93	
10 20	64	5			69	93	
11 22	63	6			69	91	
12 24	63	9	3		72	88	
13 26	65	7			72	90	
14 28							
15 30							
16 32							
17 34							
18 36							
19 38							
20 40							
21 42					Ck		
22 44							
23 46							
24 48							
25 50							
26 52							
27 54							
28 56							
29 58							
30 60							

Ended 8:32 pm

Audience size at end: 72

Additional remarks (Identify by time interval and use back of form if necessary):

[1] Record attention or inattention, whichever is smaller.

[2] Subtotals and percentages should be computed in office with calculator.

Figure A23. Form for recording audience attention to interpretive presentations

EXAMPLE 4

Observation can be used to unobtrusively compare groups of visitors, such as participants in interpretive activities and nonparticipants. The following observation recording form and instructions were taken from "Visitor Observations for Interpretive Programming," by Hanna and Silvy.*

Sampling

The observation of selected parts of a total population is a sample. Sampling permits you to gather information about a total population while only looking at a few pre-designated cases. This saves time, money, and effort.

Only a few social groups are sampled from a larger observational category; therefore, those few must be selected carefully. Accuracy of sample selection is the most critical part of this process. When you implement the following Sampling Guide (Figure A24), your sample should provide representative data about your population.

Three basic elements go into sampling for the two observational techniques:

(1) **Where to sample**—Sample a variety of interpretive programs and all major visitor concentration zones.

(2) **Who to sample**—Social groups, units of people whose members are interdependent, are the primary unit of observation. Estimate the total number of social groups in your observational category (Participants, Non-Participants, or All Park Visitors), and divide by the number of observations you can collect in the time allotted (up to 25 per hour). This is your sampling rate. If your rate is 5, observe every 5th group, starting with the first. Sample at least 30 social groups in each category.

(3) **When to sample**—Select observation periods to represent different times of the day, week, and interpretive season.

The following Sampling Guide (Figure A24) will give specific guidance to implement the two observational techniques. The top half of the guide provides details for the Participant/Non-Participant Technique and the lower half addresses the Participant/All Park Visitor Technique. Information is given on where, who, and when to sample. Example situations are also provided.

Observation Data

Three types of observation data will be collected: activity locations, visitor characteristics, and times (when interpretive or other park user activities occur).

Activity locations are the recording of the location and the activity the group is engaged in at the time of observation (i.e., relaxing, eating, and attending interpretive activities). This provides data on how the visitor is using the park.

Visitor characteristics include the observation of the age and sex of all group members. This observation forces you to pay attention to each member of the group, allowing you to categorize the social group accurately. Most visitors to park areas attend in some sort of group structure such as family, peer group, or couple. Therefore, we first attempt to determine the nature of the social group.

The type of group structure often has a relationship to the kind and level of participation and the location of the activity engaged in by the group. For example, young peer groups may be more inclined to active recreational pursuits than those couples having very young children. Understanding of group/activity relationships is useful for for interpretive planning. Also, it is desirable to observe race, license plate information, handicaps, language barriers, and any other information that might be important to interpretive planning.

Time data is the recording of when the observation occurs. Time of day, day of the week, period during the interpretive

* Reproduced with the permission of the author.

SAMPLING GUIDE

PARTICIPANT NOT PARTICIPANT TECHNIQUE

	WHERE TO SAMPLE	WHO TO SAMPLE	WHEN TO SAMPLE
PARTICIPANTS	[illegible]	Sample social groups as they arrive to take part in an interpretive activity.	Sample arriving social groups during the 30 minutes to one hour prior to an interpretive activity.
NOT PARTICIPANTS	[illegible] areas that are [illegible] the interpretive activity [illegible] Participants are passing by [illegible] this sample at the same [illegible] that of Participants. If not, [illegible] from Participants.	Sample social groups not attending the above activity.	Sampling should be conducted when the interpretive activity is in progress, a period usually lasting 1 hour.
EXAMPLE	Your park offers a daily walk and evening program during the summer season. You decide each of these program types will be sampled once a month in June, July, and August. These 6 programs will be evenly divided among weekend and weekday periods. To sample the evening program, you may estimate 50 groups will attend, and in the 30 minutes prior to the program you can observe 10 groups. Therefore, you observe every 5th group that arrives beginning with first group. At the beginning of the program, you move into the adjacent campground (the only nearby visitor concentration zone) and estimate the number of groups there at 75. You decide that in the one hour before the evening program is over, you can sample 25 groups. You then travel the campground observing every 3rd group.		

PARTICIPANT ALL PARK VISITORS TECHNIQUE

PARTICIPANTS	Collect the sample at the interpretive activity site. (Participant data from above may be used)	Sample social groups as they arrive to take part in an interpretive activity.	Sample arriving social groups during the 30 minutes to one hour prior to an interpretive activity.
ALL PARK VISITORS	Collect this sample in one of two places (1) Select a location where most visitors will pass such as a major intersection or visitor center. (2) Travel a designated route through the park sampling all major visitor concentration zones such as overlooks, campgrounds, and parking areas.	Collect a sample of all social groups in the park.	Collect this sample at a variety of times when visitors are congregated in park activity areas and no interpretive activities are in progress.
EXAMPLE	Your park offers year-round cave tours throughout the day and weekend evening programs in one of two campgrounds. You decide to sample each program type once a month, alternating the tours between morning and afternoon hours. The evening programs are alternated between Friday and Saturday. To sample a tour, you may estimate 5 social groups will attend. During the arrival time, you observe all groups. To collect data on All Park Visitors, you decide to sample two hours per month, alternating between morning, afternoon, and evening hours. You select a route that takes you through the two campgrounds, a picnic area, a swimming beach, and the cave overlook (all the major visitor concentration zones in the park). At the beginning of your observation period, you may estimate the number of social groups in the park to be 250. Traveling your route, you decide you can make 25 observations in your 2 hour period. This means you complete an observation on every 10th social group you encounter along your travel route.		

Figure A24. Sampling guide

season, and changes in climatic conditions relative to time all have important implications for interpretive scheduling. Time permits an understanding of the visitors' schedules, the interpretive schedule, and the relationship or lack of relationship between the two.

Observation Form

The sample data can be quickly recorded by completing one observation form **for each social group observed** in the sample (Figure A25). The form will lead you through observation of characteristics that have been shown to relate to interpretive planning. You are encouraged to be complete in your observation. If some categories seem in need of modification, or if other categories are needed, adapt the form to your specific use.

The Sample Description (top half of the form) will stay the same during a given sampling period, with the possible exception of Location of Sample. You can save sampling time by completing this information on the first observation form and leaving it blank on the remainder of the forms collected during that sampling period. At the end of the sampling period, copy the missing information on the incomplete forms. Also, record the sampling rate that was used. Show how many social groups were encountered for each one sampled (i.e., 1/5 indicates one group was sampled from each five groups encountered).

The recording of Visitor Group Characteristics (bottom half of the form) is more complex. Social groups require the observation of age and sex of all the members in each group. This will require you to observe the group carefully before categorizing it into a social group. The age of each individual is estimated, coded according to the age chart, and that code number entered into the column corresponding to the sex of the individual. This chart handles 20 people. From these age and sex descriptions, use the social group definitions to determine the correct description of the visitor group. Enter the appropriate number in the column adjacent to social group. Reference to the example observation form may clarify the process. A blank copy of the observation form is included in the back of this report. It can be duplicated for use as your field observation forms.

Suggestions for Observers

While observation is generally intended as an unobtrusive method of data collection, visitors often noted our presence and would ask questions about the project. This resulted in additional information about visitor characteristics but occasionally proved to be distracting and interrupted sampling schedules or caused incomplete observations. Avoid sampling while in uniform. Try to select sampling locations where the visitors will have to go out of their way to talk with you.

The quality and quantity of data collection are improved with two persons working together. This permits you to check one another on the accuracy of ages, group classification, race, and other observations. Also, one person can serve as observer, the other as recorder, speeding the data collection process.

In certain park settings, the use of binoculars will provide detailed observations from remote locations.

Keep a notebook handy for other observations. Relevant comments should be recorded such as traffic flow and information system influences on interpretive activities.

VISITOR OBSERVATION FORM

SAMPLE DESCRIPTION

1 Participant
2 Non Participant
3 All Park Visitors
OBSERVATION TYPE

1 Morning (until noon)
2 Afternoon (noon until sunset)
3 Evening (after sunset)
TIME

1 Below 60°
2 60-90°
3 Above 90°
TEMPERATURE

1 Historical
2 Recreational
3 Natural
PARK TYPE

Park Name

Interpretive Activity Being Sampled

Date and Month

Location of Sample

VISITOR GROUP CHARACTERISTICS

1 **Alone**—one person, not visibly associated with a group
2 **Young Couple**—one male, one female, approx same age, under 22
3 **Middle Couple**—23-65
4 **Old Couple**—Over 65
5 **Peer Group**—Two or more persons approx same age, not meeting other group criteria
6 **Nuclear Family**—Mother, Father and Children
7 **Extended Family**—Parents, children and apparent relatives
8 **Single Parent Family**—One parent with children
9 **Family w/Friends**—Family with others not apparently related
10 **Multi Family**—Two or more families
11 **Tour**—Organized group
12 **Other** (describe)
SOCIAL GROUP

Age and Sex of Group Members

1 Under 6 years
2 6-12 years
3 13-17 years
4 18-24 years
5 25-50 years
6 51-65 years
7 Over 65 years

Female Age

Male Age

TOTAL NO IN GROUP

1 Anglo
2 Black
3 Mex Amer
4 Oriental
5 Mixed
6 Amer Indian
7 Other
RACE

State of Residence/Auto License

Describe Activity of Group

Location of Group

SAMPLING RATE

VISITOR OBSERVATION FORM

SAMPLE DESCRIPTION

1 Participant
2 Non Participant
3 All Park Visitors
OBSERVATION TYPE 1

1 Morning (until noon)
2 Afternoon (noon until sunset)
3 Evening (after sunset)
TIME 2

1 Below 60°
2 60-90°
3 Above 90°
TEMPERATURE 2

1 Historical
2 Recreational
3 Natural
PARK TYPE 1

Fort Vie N.H.S.
Park Name

Fort tour
Interpretive Activity Being Sampled

7/28/77
Date and Month

Fort entrance
Location of Sample

VISITOR GROUP CHARACTERISTICS

1 **Alone**—one person, not visibly associated with a group
2 **Young Couple**—one male, one female; approx same age, under 22
3 **Middle Couple**—23-65
4 **Old Couple**—Over 65
5 **Peer Group**—Two or more persons approx same age, not meeting other group criteria
6 **Nuclear Family**—Mother, Father and Children
7 **Extended Family**—Parents, children and apparent relatives
8 **Single Parent Family**—One parent with children
9 **Family w/Friends**—Family with others not apparently related
10 **Multi Family**—Two or more families
11 **Tour**—Organized group
12 **Other** (describe)
SOCIAL GROUP 2

Age and Sex of Group Members

1 Under 6 years
2 6-12 years
3 13-17 years
4 18-24 years
5 25-50 years
6 51-65 years
7 Over 65 years

Female Age 4

Male Age 4

TOTAL NO IN GROUP 2

1 Anglo
2 Black
3 Mex Amer
4 Oriental
5 Mixed
6 Amer Indian
7 Other
RACE 1

Tx - Ok.
State of Residence/Auto License

Fort tour
Describe Activity of Group

Fort
Location of Group

SAMPLING RATE 1/5

Figure A25. Visitor observation form

INTERPRETATION FOR MANAGEMENT

A Supplement to

A GUIDE TO CULTURAL AND ENVIRONMENTAL
INTERPRETATION IN THE
U.S. ARMY CORPS OF ENGINEERS

Abstract

This supplement summarizes the results of three studies of the effectiveness of interpretation in addressing depreciative behavior, boater safety, and carrying capacity. Each study is discussed in terms of objectives, audience analysis, interpretation message, interpretation media, evaluation procedures, and results. Copies of the interpretation materials and evaluation instruments are provided.

The supplement also contains a Bibliography which covers depreciative behavior, vandalism, carrying capacity, and related management problems.

INTERPRETATION FOR MANAGEMENT*

A Guide to Cultural and Environmental Interpretation in the U.S. Army Corps of Engineers

INTRODUCTION

Background

When placing a value on interpretation, many cite its usefulness in solving management problems. This usefulness, however, is generally based on judgment rather than fact. There have been quite a number of studies done on different aspects of interpretation, but very few have attempted to document its effectiveness in terms that managers can use. Furthermore, there are few guidelines on how to develop interpretation messages or to select interpretation media (guided walks, exhibits, brochures, etc.) to achieve the desired visitor response.

Scope

In an effort to address these needs, three studies were conducted during the summer of 1981. The purpose of these studies was twofold. First, they were to test whether interpretation could be used effectively as a tool for managing project resources and visitors. Second, they were designed to evaluate a variety of media in terms of their usefulness in communicating the interpretation message.

Three problems were selected for study** that were considered to be both significant and widespread: depreciative behavior, boater safety, and carrying capacity. The studies were conducted by contractors at Corps lakes in Oregon, Pennsylvania, and Virginia. The contractors were to:

- Analyze the site and user groups.
- Design an interpretation message.
- Select media for communicating the message.
- Develop an evaluation strategy.
- Implement and evaluate the interpretation program.

Their work and results are summarized in this supplement to (a) encourage Corps personnel to use interpretation as a management option, (b) serve as examples for those who would like to implement and evaluate interpretation programs at their projects, and (c) provide some guidance on the types of media that are most effective in selected situations.

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* This supplement was written by Ms. Janet Akers Fritschen, Michigan State University, East Lansing, Michigan, under an Intergovernmental Personnel Act Agreement with the U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.

** These problems were selected based on recommendations made by Corps field personnel.

Organization

This supplement is one of a series of supplements to "A Guide to Cultural and Environmental Interpretation in the U.S. Army Corps of Engineers" (Propst and Roggenbuck 1981),* intended to provide field personnel with guidelines for designing, implementing, and evaluating interpretation programs. Because of the nature of this supplement, it also serves as an example of the interpretation planning process, from the development of objectives to program evaluation. To make this process clearer, each study is presented in a format which follows the contractor's own steps: goals, audience analysis, interpretation message, interpretation media, evaluation procedures, and results. These same steps should be followed by Corps personnel at their own project when setting up an interpretive program.

Following the study summaries is an annotated bibliography developed by the three contractors during their review of related literature. It contains references on the problems studied, as well as on interpretation for management in general.

DEPRECIATIVE BEHAVIOR**

Background

The effect of interpretation on depreciative behavior was studied at John H. Kerr Dam and Reservoir† on the Virginia-North Carolina border. The study was conducted in one of four subareas within the largest fee campground. The area was selected because it has three separate camping loops with differing amounts of development. Every campsite has a picnic table, fireplace with grill, and trash can. In addition, Loop 1 has drinking water and pit toilets. Loop 2 provides running water, flush toilets, hot showers, gravel parking and camping pads, electricity, and lantern hangers. Loop 3 provides running water and both pit and flush toilets. Loop 2 has been rehabilitated and hardened to reduce the impacts of campers.

The project managers at Kerr reported a variety of depreciative behaviors in the campgrounds, including lantern burns on trees, limbs cut and bark removed from grown trees, nails driven into trees, carving on trees, parking off the prepared camp pad, excessive noise late at night, littered campsites, and pets off leashes. For the facilities alone, maintenance and repair was estimated to cost $30 per campsite per year. Costs not included in this estimate are those incurred by litter pickup and rehabilitation or removal of damaged trees.

Goals

The primary goal of the study was to "test the effectiveness of interpretation in reducing impacts upon the natural environment and camper experiences." More specifically, the goals were:

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* Instruction Report R-81-1, U.S. Army Engineer Waterways Experiment Station, CE, Vicksburg, Miss.

** The Principal Investigator for this study was Dr. Joseph Roggenbuck, Department of Forestry, Virginia Polytechnic Institute and State University, Blacksburg, Va.

† South Atlantic Division, Wilmington District.

a. To identify the amount and nature of depreciative behavior in campsites.

b. To determine the relative effectiveness of various interpretive messages and channels of communication in reducing depreciative behavior.

c. To determine whether site or user group characteristics influence response to interpretive messages.

Audience Analysis

Information was gathered on campers at Kerr Dam both prior to and during implementation of the interpretation message. Discussions with project personnel at the beginning of the study revealed that the project receives visitation from a number of large cities in Virginia and North Carolina. In addition, visitors participate in such activities as boating, sailing, skiing, fishing, swimming, camping, and picnicking. Camping equipment includes tents, trailers, and pickup campers.

During the study, the contractors gathered additional visitor information on length of stay, party type and size, type of camping equipment, state of origin, and previous camping experience in that campground. This information was obtained from camper registration cards and informal conversations.

Interpretation Message

The message was designed to address three depreciative behaviors: damage to trees, litter, and excessive noise. Specifically, it covered tree damage in terms of axe and knife wounds, lantern burns, nails driven into trees, girdling due to wire and rope, cutting trees and limbs, and bark removal; litter in the form of paper, cans, pop tops, and cigarette butts; and loud noise due to television, radios, stereos, and parties.

The interpretation message described the impacts camper actions would have on current and future campers, the environment, and project management. It also included a list of things campers could do to help. The message was carefully worded so as to be nonthreatening and noncondescending. Furthermore, it was related directly to the camper, calling the campsite his or her "home in the woods." In some instances the message included an enforcement note asking campers to report to the rangers anyone they saw vandalizing trees, littering, or making too much noise. A copy of the brochure can be found in Appendix A.

Interpretation Media

Two methods were used to communicate the message: a brochure and personal contact. The brochure was a simple threefold, printed on yellow paper with black ink. It contained all of the information described above except the enforcement note. The brochure was designed to provide sufficient information on the problems and alternative courses of action, without being too detailed or lengthy. It also contained a number of small sketches.

In addition to the brochure, the message was sometimes delivered through personal contact. One of the researchers (wearing a Corps cap, shirt, and name tag) contacted campers shortly after they arrived. She introduced herself, *briefly* reiterated the message in the brochure, and asked the campers to take a few

minutes to read it over. In certain instances she also asked them to contact a ranger if they observed other campers vandalizing, littering, or making too much noise.

Evaluation Procedures

Interpretation strategy. The brochures and personal contact were tested in three combinations to determine which was the most effective:

Combination 1: Brochure only
Combination 2: Brochure and personal contact
Combination 3: Brochure, personal contact, and enforcement message.

In Combination 1, the brochure was handed out to each party as they registered. In Combination 2, the brochure was distributed by the uniformed researcher shortly after each party arrived at their campsite. She discussed the brochure contents and asked the campers' cooperation. Combination 3 was handled in the same manner as Combination 2, except that the enforcement message was added.

Types of data gathered and methods. To be able to compare the response of different types of visitors, the contractors obtained the following visitor characteristics from the camper registration card: length of stay, party size, state of residence, and type of camping equipment. For those parties who were contacted by the researcher (Combinations 2 and 3), party type and previous camping experience were obtained through informal conversation. General weather data were recorded for each study weekend.

Two techniques were used to measure the effectiveness of the interpretation message: observation of behavior traces and direct conversation. One form was developed to record information from both techniques. Using the form, each campsite was inventoried twice to determine type and amount of tree damage and litter. The first inventory took place on Thursdays, prior to the arrival of the campers, to document existing damage and litter. A follow-up inventory was conducted on Mondays, after the campers had left. This two-inventory system ensured that only that damage and litter caused by the party was attributed to them. A copy of the inventory form is also contained in Appendix A.

To further measure compliance, the researcher walked through the campground on Thursday, Friday, Saturday, and Sunday evenings from 9:00 until 10:00. A record was made of those campsites where lanterns were hung on trees or inappropriate noise occurred. Inappropriate noise was considered to be that which the researcher could hear from the nearest adjacent campsite.

Sampling design. The study was conducted on 13 weekends from June through September 1981. To serve as a control, no interpretation was given on certain weekends. Each of the three combinations and the control were tested at least three times during the summer. Actual testing dates were randomly assigned to eliminate bias.

All campers who arrived between noon on Thursday and noon on Saturday, and departed by noon on Monday were included in the study.

Results

A summary of the data revealed that interpretation was effective in reducing some types of depreciative behavior. The brochure by itself reduced tree damage and littering by about 50 percent. When the brochure was supplemented by a personal contact, these behaviors were reduced by 80 percent. However, with the addition of an enforcement message, the reduction was only 60 percent. This final statistic seems to indicate that campers did not want to become involved in policing their neighbors.

Interpretation did not prove effective in reducing paper litter left in the fireplace. Campers apparently did not believe this was inappropriate behavior. The contractors speculated that paper may have been left because it burns (and so would be appropriately disposed of) or because the campers believed it would assist the next party in starting a fire. In any case, if the managers wanted to change this behavior, additional interpretation would be needed.

Due to the small number of violations, even on control weekends (no interpretation), the contractors were not able to determine if interpretation was successful in reducing inappropriate noise or tree burns due to lanterns. However, by comparing lantern burns in campsites with and without lantern poles, they did discover that the poles themselves were effective.

Comparisons were made to determine if the character of the camping group or type of location of site had any effect on message compliance. The results indicate that they do not. This suggests that interpretation will be successful in reducing damage to trees and litter in a variety of settings and situations.

BOATER SAFETY*

Background

The study on boater safety was conducted at Detroit Lake,** near Salem, Oreg. Located around the lake are two private concession areas, campgrounds operated by the U.S. Forest Service and Oregon State Parks, and a small resort community. Detroit Lake receives a large amount of boating use.

Boat ramps at two locations served as study sites. These are situated in a Forest Service campground and a state day-use park.

Objective

The major objective for the study was to test various interpretation strategies to increase compliance with boating safety rules and regulations. Specifically, the objectives were to test the effectiveness of interpretation in:

- Reaching the intended audience.
- Increasing knowledge of boating safety rules and regulations.
- Changing visitor boating behavior.

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* The Principal Investigator for this study was Dr. Michael Freed, Department of Resource Recreation Management, Oregon State University, Corvallis, Oreg.

** North Pacific Division, Portland District.

Audience Analysis

An audience analysis was conducted prior to and during the implementation stage. Analyses of past studies revealed that Detroit Lake receives a high percentage of use from the urban areas of Salem and Portland, Oreg. Most of the users come in family groups. Water-based recreation includes waterskiing, fishing, power boating, canoeing, and swimming.

During evaluation, additional visitor data were gathered on point of origin, prior visits, day versus overnight use, and group size. Information was also obtained on the user's boat, including type, size, presence or absence of a motor, and length of ownership. These data were collected through direct observation and formal interview.

Interpretation Message

A number of safety problems were identified as a result of discussions with the Corps of Engineers, Forest Service, Oregon State Parks, County Sheriff Marine Patrol, and State Police Marine Deputies. From this list of problems, nine interpretation topics were developed: (a) boating safety equipment, (b) emergencies, (c) weather watch, (d) danger zones on the lake, (e) marker recognition, (f) boating right-of-way rules, (g) boat wakes, (h) boating courtesy, and (i) conflicts with other water users.

Interpretation messages provided boaters with the necessary information to comply with boating safety rules and regulations. This included information on rules, lake depths and danger zones, markers, boating equipment, and emergency services.

Interpretation Media

One or more nonpersonalized* interpretation media were selected to transmit each message. These included maps, flyers, brochures, posters, decals, signs, radio broadcasts (short range message repeaters), and a newspaper.** Different media were used to provide different types of information. Newspapers and brochures are more appropriate for detailed messages, while posters, flyers, decals, and signs are suitable for short, attention-getting phrases or reminders.

All materials were designed to attract visitor attention. Graphics, bright colors, and cartoons were used in much of the printed media. The radio message began with a fog horn. All messages were carefully worded so as to provide the desired information in a format that was easy to read (listen to) and understand. Reproductions of some of the interpretation materials can be found in Appendix B.

Evaluation Procedures

Interpretation strategy. The interpretation materials were distributed or displayed in a variety of locations around the lake. In the marina area, posters, maps, flyers, and brochures were placed at boat launch ramps on bulletin boards

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* Nonpersonalized media are those which do not require the presence of an interpreter, e.g., brochures, signs, self-guided trails.

** The Forest Service regularly publishes a newspaper at Detroit Lake. In cooperation with the study, one issue was dedicated to boater safety. The majority of the articles were written and submitted by the researchers.

and specially designed kiosks. Decals and some flyers and brochures were distributed from special booths at the camps. Finally, signs were posted at various points around the marina. The newspaper was dispensed at local restaurants and Forest Service and State Park offices. The radio repeater was placed along the highway which leads to the lake.

Types of data gathered and methods. Some data on visitor and boat characteristics were gathered during evaluation. Direct observation was used to determine group size, boat registration number, boat type, and presence or absence of a motor. Through personal interviews, data on point of origin, prior visits, day versus overnight use, preferred recreation activities, boat size, length of boat, and ownership were gathered.

Personal interviews were also used to test visitor knowledge of boating rules and regulations as well as measure familiarity with the boater safety materials. Compliance with danger zone restrictions was measured through direct observation of boats on the lake. Finally, cars and trailers in the boat launch parking lot were counted to obtain an estimate of boating use over time.

Sampling design. Evaluation was conducted in July and August during two 1-week periods, one before and the other after placement of the interpretation materials. The data gathered prior to placement provided a base against which to compare visitor response.

Interviews were administered at the launch sites during randomly selected time periods between 6:00 a.m. and 9:00 p.m. Every third boater was contacted prior to launching. If possible, the boat owner was interviewed, otherwise the boat driver or someone assisting with the launch was interviewed.

Boaters on the lake were observed from selected vantage points in systematically selected 1-hr periods. Counts of cars and trailers were also made at systematically selected times during the day.

Results

Analysis of the observation data indicated that interpretation was effective in increasing compliance with certain boating safety rules. In marked danger zones, the total number of boats decreased by 22 percent, the number of speed boats decreased by 53 percent, and the number of boats with waterskiers decreased by 77 percent. In interviews, boaters also demonstrated an increased knowledge of established danger zones after interpretation materials were placed.

Except in the case of danger zones, interpretation did not appear to increase boater knowledge of safety rules and regulations. Both preinterpretation and postinterpretation interviews indicated that:

a. Less than 10 percent of the boaters could correctly identify the standard boating safety symbols.

b. Only one fourth (one fifth prior to interpretation) knew what PFD (personal flotation device) stood for.

c. Almost all boaters knew that they must have at least two people in the boat while someone was waterskiing.

d. Three fourths knew that they were liable for damage caused by their boat's wake.

e. An average of 85 percent of the boaters knew right-of-way rules.

The apparent lack of change in visitor knowledge could be due to inability of the evaluation procedures to measure such changes or incorrect placement or wording of messages.

Of the interpretation media used, more boaters reported seeing posters and signs (51 percent) than decals (13 percent), the newspaper (10 percent), or other kinds of safety information, such as flyers and brochures (13 percent). Few people heard the radio message (3 percent). The media were evaluated in terms of exposure rather than their ability to transmit the message, so their effectiveness in this regard can only be inferred. Furthermore, distribution locations for the printed materials likely had an effect on whether they were seen or not. Presumably, a higher percentage of boaters were exposed to signs posted at boat ramps than newspapers distributed at park entrance stations. Finally, the researchers cite two possible reasons for the low number of radio message receivers. The message was broadcast at a frequency which is above that received by some car radios (1610) and it alternated with a 6-min Forest Service message. Some boaters listened to part of the Forest Service message, but did not continue long enough to hear the boating safety message.

CARRYING CAPACITY*

Background

Shenango River Lake,** near Sharpsville, Pa., was the site of the carrying capacity study. Two carrying capacity problems were addressed: competing *recreation uses and redistribution of use.*

Competing use. Project Management believed there was a serious problem with bicyclist/motorist accidents, near-misses, and general complaints in Shenango Campground. The campground has rest rooms with showers, a dump station, and 322 campsites with picnic tables and fire rings. A boat launch ramp and picnic area are located nearby.

Use redistribution. Some of the recreation areas at Shenango receive high visitation, while others receive relatively low visitation. Project management wanted to disperse use to these low use areas. Though less developed, they provide opportunities for boating, fishing, picnicking, and hiking.

Objectives

The research objectives were to:

a. Influence the attitudes and behaviors of campers in regard to bicyclists and motorists in the campground.

b. Change visitation patterns so that a great number of visitors select the low use areas.

c. Determine if visitor characteristics have an effect on attitudes toward bicyclists and motorists in the campground or on use patterns.

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* The Principal Investigator for this study was Dr. Gabriel Cherem, Interpretation Central, Ann Arbor, Mich.

** Ohio River Division, Pittsburgh District.

Audience analysis

Past records showed that Shenango received 1.7 million recreation days of use in 1980. Visitors participated in a variety of recreation activities including camping, boating, fishing, picnicking, and sightseeing. Much of the reported use was from local communities. Through observation, project staff concluded that Shenango Campground users tended to be in family groups and most bicyclists were children.

Visitor data were also collected throughout the study period. Age, sex, education, occupation, point of origin, group type and size, prior visits, and type of vehicle and camping equipment were obtained through questionnaires and personal interviews.

Interpretation Message

The message conveyed by the bicyclist/motorist interpretation materials was designed to make visitors aware of their fellow campers. It was directed toward changing both attitudes and behaviors. There were three target groups: children, motorists, and parents. A set of behavior suggestions was aimed at each group. Children were given a few rules for riding in roadways. Motorists were given suggestions for driving carefully in the vicinity of bicyclists. Parents were encouraged to read the bicycling rules to their children and observe the driving suggestions themselves. The major appeal was to "share the road."

In use redistribution, it was felt that providing information on the low use areas was the key to increasing their visitation. To this end, each site was described, emphasizing its attractions.

Interpretation Media

A handout sheet was developed to communicate the bicyclist/motorist message. It contained short messages aimed at all three target groups (children, motorists, and parents). Cartoons were used to attract attention and present the information in a nonthreatening, nonauthoritative manner. The handout layout was also used in an enlarged form as a poster.

The redistribution message was communicated through three media: flyers, newspaper articles, and radio announcements. The flyer was arranged in the form of a letter from Shenango staff to the visitors. The low use areas were offered as good alternatives to the more crowded recreation areas. The message was worded in a friendly tone, making it appear to be a helpful suggestion from Shenango staff. Attached was a map of the lake with the recommended areas marked. The radio and news releases contained virtually identical information.

Copies of the bicyclist/motorist handout and the redistribution flyer can be found in Appendix C.

Evaluation Procedures

Interpretation strategy. The bicyclist/motorist handouts were given to campers as they registered at the campground office. Posters were displayed on ten bulletin boards throughout the campground.

The use redistribution flyer was distributed at three major Shenango recreation areas, the project office, and various local restaurants, recreation-related shops, and other businesses. The news releases were sent to three local newspapers and four local radio stations.

Types of data gathered and methods. For the bicyclist/motorist portion of the study, a questionnaire was used to collect selected visitor characteristics: age, sex, education, occupation, point of origin, group type and size, length of stay, previous visits to the campground, type of vehicle, and type of camping equipment. The questionnaire also served to measure visitor attitudes toward bicyclists in campgrounds, bicyclist/motorist interactions, and knowledge of bicycle traffic rules.

To measure the number of bicycle accidents in the campground, an incident checklist was developed. For each incident reported by a camper or observed by project staff, the following items were recorded: date, time, location, rule violated (if any), and certain information about the individuals involved: age, sex, day user or camper, and entering or exiting the campground.

Effectiveness of the redistribution materials was measured through personal interviews. Visitor data were collected in the form of age, sex, and type and size of group. The remainder of the questions gathered data on reasons for visiting the area, sources of information about the area, satisfaction with the area, and prior visits to any day-use areas.

Sampling design. Both portions of the study were conducted over an 8-week period from July to September 1981. The study period was divided into three phases. In all three, information was collected via questionnaire, incident checklist, and personal interview. Phase 1 was a preinterpretation period. The interpretation strategy was implemented during Phase 2 and discontinued at the beginning of Phase 3. Phases 1 and 3 served as controls to ensure that results obtained during Phase 2 were due to interpretation rather than other influences. Phases 1 and 3 lasted 2 weeks; Phase 2 lasted 4 weeks.

The bicyclist/motorist questionnaires were distributed every other day of the study period. During their regular evening patrol (5:00 p.m. to 9:00 p.m.), project staff stopped at every fifth site, following a random start. If campers were present, a randomly selected member of the group was given a questionnaire and asked to complete and return it to the campground office.

Personal interviews were administered at the day-use areas at randomly selected time intervals. The head of each group arriving at the site during the time period was interviewed.

Results

Conflicting use. In the bicyclist/motorist portion of the study there was little indication that interpretation caused a change in behaviors or attitudes. During all three phases (interpretation present or absent), most of the campers who responded to the questionnaire gave correct answers on bicyclist and motorist traffic rules. The questionnaire results also indicated that:

a. 90 percent of the respondents disagreed that bicycle riders should be kept off campground roads.

b. 65 percent agreed that motorists and bicyclists seem cooperative in using campground roads.

c. 61 percent agreed that parents seem to have urged their children to be careful on campground roads.

Furthermore, during the entire study period, only 11 bicycling incidents in the campground were recorded. Of these, only three involved motorists. Data from the questionnaires and the incident checklist seem to indicate that there was no major conflict between motorists and bicyclists. If there continue to be many bicycling incidents, then interpretation should address safe bicycling practices rather than cooperation with motorists.

Redistribution of day use. One third of the day users interviewed had been exposed to the interpretation materials, mainly the flyers. Since the message was uniform across media, there could be two reasons the flyers were more effective. First, they could have been more successful in reaching the desired audience. Second, users may have been more easily persuaded by flyers than radio or newspaper.

Of those who saw the flyers, two thirds saw them in local restaurants or bait shops. If these redistribution efforts are to continue, then future interpretation efforts should concentrate on these commercial locations.

CONCLUSIONS

The three experimental studies indicate that interpretation can be used effectively to address management objectives by influencing visitor behavior. However, success seems to depend on the message, media, and situation. To ensure that the most effective strategy is used, the problem and potential audience should be carefully analyzed. After implementation, the interpretation program should be routinely evaluated.

ADDITIONAL REFERENCES*

The following references are provided to help in planning interpretation programs for management purposes. Some address interpretation specifically, others provide background information.

The references are divided into four categories: general, depreciative behavior, boater safety, and carrying capacity. Those under "General References" cover interpretation for management in a general way and topics not included in this supplement, or are applicable to a variety of management problems. References were placed in the other categories according to their main topic. Some of these may be applicable to other situations as well.

General References

Burch, W. R., Jr. 1964. Two concepts for guiding recreation management decisions. J. For. 62 (10):707-712.

Stresses the need to understand the connection between types of resource decisions and their behavioral consequences. Suggests further understanding of this relationship will aid the resource manager in directing recreation decisions to better accomplish management goals, to improve public service, and to continue resource conservation.

* Compiled by the researchers as part of the contract agreement.

Fazio, J. R. 1979. Communicating with the wilderness user. Univ. of Idaho College of Forestry, Wildlife and Range Sciences Bulletin No. 28. 65p.

This thorough paper analyzes three studies conducted to aid managers to make better use of communication as a management tool. First, a test of "wilderness knowledge" was conducted with the results compared by user groups and socio-economic characteristics, information sources, and channels of communication. Second, the effectiveness of various channels was evaluated; and third, mailed responses to backpackers' requests for information were analyzed for speed of reply, content, readability and graphic quality. Questionnaires, sample tests, a category criteria for content analysis of wilderness literature, and a graphic quality scale used to evaluate wilderness-related publications are included in the appendix. An extensive literature review also exists.

Feldman, R. L. 1978. Effectiveness of audio-visual media for interpretation to recreating motorists. Journal of Interpretation 3(1):14-19.

The study compared two media—the brochure and the tape cassette—to determine their effectiveness in educating recreationists and prompting them to walk on suggested trails. The brochure was more effective than the cassette in increasing visitors' knowledge. However, for first-time visitors, the cassette was superior. Both media significantly increased visitors' knowledge over that of the control group. Neither the cassette nor the brochure was significantly better than the other in inducing motorists to use trails, but the cassette treatment was more effective than the control.

Gebler, C. J. 1979. Reaching your publics through television. Pp. 312-313 In: R. Ittner, et al. (eds.), Recreational impact on wildlands. USDA Forest Service and USDI National Park Service R-6-001-1979.

This study discussed the use of television as an interpretive tool to solve management problems. This technique appeared to have been effective in the Pacific Northwest region of the country, where the content of messages was visitor hiking safety and crime prevention.

Lime, D. W. 1979. Visitor observation: A tool for appraising interpretive activities, In: Proceedings, 1979 AIN Workshop, Bloomington, MN. pp. 49-54.

This study used systematic observation techniques to collect data and analyze human behavior at two U.S. Forest Service visitor centers. Observation can be carried out by personnel as part of their normal work routine, and can provide data on how and why interpretive facilities are used. The study found that visitors used a variety of interpretive facilities; many did not visit exhibit rooms; many did not listen to recorded messages in their entirety; almost no one asked questions about the interpretive displays; few visitors used nearby nature trails, and littering and vandalism were not a problem.

Lukens, A. J., and D. T. Taylor. 1979. Backcountry information posters: A pilot project evaluating winter information displays. Appalachian Mountain Club. 40p.

This report evaluates the use of posters, placed in equipment stores and information centers, to teach readers appropriate backcountry camping behavior in the winter. Responses to questionnaires indicated that the display was effective, although it perhaps should have been smaller and more brightly colored.

Moeller, G. H., et al. 1974. Opinions of campers and boaters at the Allegheny Reservoir. 33p.

Interviews with 157 campers and 281 boaters near the Allegheny reservoir on the Allegheny National Forest revealed that their perceptions of management problems differed from those of managers. Different users had different attitudes toward recreation use controls, fee policies, recreation zoning, law enforcement, and facility development needs. This diversity indicates that changes in recreation management policy will not affect all recreation users equally; their impact will depend on how active the users are, the number of activities they participate in, and how familiar they are with the area.

Ross, T. L., and G. H. Moeller. 1974. Communicating rules in recreation areas. USDA For. Serv. Res. Pap. NE-297. 9p.

Camping groups were sampled randomly and given questionnaires in the Allegheny National Forest to determine the degree to which they actually knew about existing rules. Campers were not well informed about rules. In addition, increased communication efforts should be directed toward the adolescent, first-time, non-local, and tent camper segments of the recreation audience. Communication media should be located according to observed social interaction and activity patterns. Communication strategies should be designed and applied in a manner that will stimulate camper interest.

Schoenfeld, S. S. 1971. Evaluating some aspects of VIS activities in the national forest. J. Forestry 69(5):281-284.

This paper takes an analytical approach to evaluating visitor information services. By improving their understanding of forest communication situations, managers can improve VIS media and methods. Knowing better who the recreationist is, what he knows, and how well he is being reached will enable Forest Service personnel to better prepare for what users will say and in what context. Suggestions are included for developing effective interpretation methods.

Sharpe, G. W., and G. L. Gensler. 1978. Interpretation as a management tool. Journal of Interpretation 3(2):3-9.

The authors contend that interpretation is a viable and often an indispensible means of accomplishing management goals. The manager should implement a team approach with the interpreter as a member in order to successfully carry out management objectives. The authors present an extensive list of examples that show interpretation assisting in management problems. Some examples are: meadow rehabilitation, backcountry use, controlled burning, wildlife preservation, historical site management, site preservation, visitor protection, depreciative behavior, and vandalism.

Taylor, D. T., and R. D. MacKoy. 1978. Backcountry information and education recommendations. Appalachian Mountain Club, Res. Dept. 11p.

By contacting over 1500 backcountry visitors, mainly in the White Mountains of New England, it was found that users perceive a lack of information about basic topics such as trails and weather, but do not feel a need for information about topics such as safety, management restrictions, or appropriate backcountry behavior. Given this they do not actively seek out this kind of information. Recommendations are presented.

Depreciative Behavior References

Alfano, S. S., and A. W. Magill. 1976. Recommendations. P. 3 In: S. S. Alfano and A. W. Magill (eds.), Vandalism and outdoor recreation: Symposium proceedings. USDA For. Serv. Gen. Tech. Rep. PSW-17.

Summary of recommendations to reduce vandalism are:

1. Explain to visitors how various activities violate human rights or damage or destroy facilities and natural resources.
2. Develop programs to show visitors how to use various recreational facilities and related natural resources in a manner that increases their enjoyment without damaging property and resources or violating the rights of others.
3. Use schools and mass media to inform all levels of the public about proper and considerate uses of outdoor recreation areas. The success of educational programs is dependent on succinct messages that avoid professional jargon, on proper audience identification, and on selection of the best media or other conveyance to reach the desired audiences.
4. Initiate news coverage by recreation personnel on items of public concern without relying on the news media to write the articles.

Burke, J. F., R. Schreyer, and J. D. Hunt. 1979. Behavior modification. Trends 16(4):33-36.

The authors discuss behavior modification as a tool to reduce depreciative behavior in recreation settings. The nature of behavior modification, various reinforcement strategies, past and potential uses of behavior modification in park settings, and ethical considerations are presented.

Campbell, F. L., J. C. Hendee, and R. Clark. 1968. Law and order in public parks. Parks and Recreation. December, 28-31, 51-53.

This brief article discussed some initial findings on depreciative behavior in three intensely developed campgrounds in Washington state. Observers gathered data through informal talks with users, daily inspection tours for new damage, periodic observation of congested locations, and briefing sessions with campground personnel. The authors found that depreciative behavior was much more extensive in public parks than interviews with recreation managers and campers had led them to expect. The article goes further and discusses some possible underlying causes and possible solutions to the problem of theft, damage, and violations of camping rules.

Christensen, H. H., and R. N. Clark. n.d. Understanding and controlling vandalism and other rule violations in urban recreation areas. Pacific Northwest Forest and Range Exp. Stn., Seattle, Washington. 45p.

The purpose of this report was to describe why vandalism and other rule violations occur and how to control them. Both urban recreation problems and nonurban problems are discussed since causes and solutions may be related in both areas. Five issues are included: the depreciative behavior problem, conflicting definitions of depreciative behavior, identification of the conformer and the rule violator, causes of depreciative behavior, and approaches for controlling rule violations.

An extensive list of approaches for controlling rule violations is presented giving the strengths and weaknesses of each. Vandalism and other rule violations are very complex problems, and in order to minimize their occurrence managers must utilize a variety of approaches. This report also outlines the role and needs of research.

Clark, R. N. 1976. Control of vandalism in recreation areas—fact, fiction or folklore? In: S. S. Alfano and A. W. Magill (eds.), Vandalism and outdoor recreation: Symposium proceedings. USDA For. Serv. Gen. Tech. Report PSW-17, pp. 62-72.

This in-depth paper on vandalism offers education, among other tools, as a solution for the prevention and control of vandalism. Through instilling proper attitudes and values regarding vandalism, the assumption is that proper behavior will result. However, the paper indicates that this is not always true. Key points discussed are: an effective educational program that will require that the manager understand user motives and desires; users must also understand the manager's motives; attempts to control vandalism or other problems with messages lacking appropriate rationale are often doomed to fail. An extensive reference section is included.

Clark, R. N., J. C. Hendee, and F. L. Campbell. 1971. Values, behavior, and conflict in modern camping culture. Journal of Leisure Research 3(3):143-159.

This study of campers employed three data collection methods: participant observation, questionnaires distributed to campers, and questionnaires mailed to recreation managers. Research findings indicate that campers and managers subscribe to similar goals associated with camping, but they disagree about the types of activities appropriate to obtaining those goals. The two groups also differ in their perception of the behavioral problems in campgrounds. A strategy is recommended to avert problems resulting from the changing nature of the camper population.

Fazio, J. R., and W. W. Bramlette. 1977. Communicating with the wilderness user—Final report to the Pacific Northwest Regional Commission, Forest, Wildlife, and Range Exp. Stn., University of Idaho. 167p.

The purpose of this study was to provide information to wilderness managers at a local level to aid them in using education more effectively. The study was conducted in two parts. The first part included a questionnaire which provided information on characteristics and the wilderness-related knowledge of wilderness users. For each knowledge question in the test, the respondents were asked to recall the source of their answer and through what channels they received the information.

The second part of the study was an analysis of literature mailed to potential wilderness users by various managing agencies. The study concluded that improvement in agency literature (one form of communication) is greatly needed to help in the reduction of user impacts on the environment. An extensive list of recommendations is provided for managers in this study.

Harris, J. 1979. Are park managers part of the problem? Trends 16(4):30.

Reasons why visitors perform illegal acts and management actions that may aid in decreasing illegal behavior are presented in this article. Reasons for illegal acts may be incorrect visitor perceptions of the area, visitor ignorance, visitor boredom, inappropriate park employee behavior, low maintenance standards, unnecessary temptation or opportunity, or inadequate site planning. A park agency can reduce its contributions to abusive behavior of visitors by self-examination and taking action to correct the situations described above.

Harrison, A. 1982. Problems: Vandalism and depreciative behavior. Pp. 473-495 In: G. W. Sharpe (ed.), Interpreting the environment. John Wiley and Sons, New York.

This text chapter discusses the definition and history of vandalism and depreciative behavior. Approaches in solving the problem depend upon the particular situation. Factors of concern include: what is vandalized, where and when the incident occurs, who the vandal is, the motive, and other situational factors. The problem of depreciative behavior involves both internal and external aspects. Internal controls of people can be effected through educational activities. The external aspect is dealt with by proper planning, design, and maintenance of facilities. An effective enforcement program is needed when vandalism persists. New preventive techniques should be constantly tested by interpretive area staff.

Lahart, D., and J. Bailey. 1975. Reducing children's littering on a nature trail. The Journal of Environmental Education 7(1):37-45.

The objective of this study was to compare incentives and other educational methods in reducing amount of littering and in increasing frequency of litter pickup on a nature trail. Only the incentive treatment resulted in litter pickup. The educational materials were effective in reducing the amount of litter left on the trail.

Magill, A. W. 1976. The message of vandalism. Pp. 50-54. In: S. S. Alfano and A. W. Magill (eds.), Vandalism and outdoor recreation: Symposium proceedings. USDA For. Serv. Gen. Tech. Rep. PSW-17.

To reach the public resource managers must send messages that are more attention-getting, more clearly written, and precisely directed toward well-identified audiences. They must avoid irrelevant attempts at regulation, and must recognize real human needs. The manager must not only transmit, but listen also. An excellent literature review is provided.

Marler, L. 1971. A study of anti-litter messages. Journal of Environmental Education 3:52-53.

This brief article presents a study that compared the effectiveness of three themes in informational leaflets on increasing knowledge, motivation, opinion, and behavior to reduce

littering. The three themes included a reward-oriented theme, a punishment-oriented theme, and a factual theme. The themes discussed the problems of litter and vandalism from campers and picnickers. The effectiveness of each theme was determined from questionnaire responses on campers' opinion of litter, their motivation to keep an area clean, their awareness of the litter problem, and their knowledge of the litter problem. The negative, punishment-oriented theme was most effective.

Matheny, S. J. 1979. A successful campaign to reduce trail switchback shortcutting. Pp. 217-221 In: R. Ittner, et al. (eds.), Recreational impact on wildlands. USDA Forest Service and USDI National Park Service R-6-001-1979.

Various management strategies to prevent switchback shortcutting on a heavily used trail is presented. Although personal contact was the most reliable method, it was too expensive. Both revegetation efforts and wise use of signs were found to be effective if users understood the detriments of shortcutting and management's commitment to correct it.

Muth, R. M., and R. N. Clark. 1978. Public participation in wilderness backcountry litter control: A review of research and management experience. USDA For. Serv. Gen. Tech. Report PNW-75, 12p.

This paper deals largely with the "incentive system" for controlling litter. Rangers addressed the litter problem via verbal appeals to visitors to help and become involved in the program. The approach was effective in removing litter.

Schreiner, E., and B. B. Moorhead. 1979. Human impact inventory and management in the Olympic National Park backcountry. Pp 203-212 In: R. Ittner, et al. (eds.), Recreational impact on wildlands. USDA Forest Service and USDI National Park Service R-6-001-1979.

This study explains the development of a human impact inventory system which surveys impacts on wildlands and the relationships between visitor use, trampling impact, and ecological patterns are also presented. Some practical findings on campsite restoration are offered. Positive rather than negative sign messages are recommended for interpreting management actions onsite to the public.

Shay, R. 1979. Management problems in off-road vehicle recreation. Pp. 314-317 In: R. Ittner, et al. (eds.), Recreational impact on wildlands. USDA Forest Service and USDI National Park Service. R-6-001-1979.

In the past, ORV management has concentrated on repairing damage rather than preventing it. This report explains the need for managers to minimize the incidence of damage through land-use planning and education of ORV users.

Sutton, R. W. 1976. Vandalism in the Channel Islands National Monument. Pp. 12-14 In: S. S. Alfano and A. W. Magill (eds.), Vandalism and outdoor recreation: Symposium proceedings. USDA For. Serv. Gen. Tech. Rep. PSW-17.

Managers at Channel Islands National Monument found that a strong personal contact program between rangers and the visiting public prevented many vandalism acts. Law enforcement was not as effective. If an understanding can be created within the visitor of his new park environment, he will not be so likely to destroy it. Information cannot be left simply to signs and handouts. If a regulation is posted, it must be interpreted and enforced.

Whelan, N. 1976. Law enforcement and vandalism in our national parks. Pp. 27-29 In: S. S. Alfano and A. W. Magill (eds.), Vandalism and outdoor recreation: Symposium proceedings. USDA For. Serv. Gen. Tech. Rep. PSW-17.

The author believes that if managers could gain the visitor's interest and provide information, chances are good that they would have no problems with either deliberate or inadvertent vandalism. The author contends that any form of positive communication with a visitor,

whether it's talking about the values of an area, or even just reminding him of the more commonly violated rules and regulations, stands a good chance of ensuring that the next contact will not be a law enforcement one. Ultimately, those visitors who understand what managers are trying to provide in an area, are the ones who will help to lessen the problem of vandalism. The author believes that law enforcement by itself will never be enough.

Boater Safety References

Keigley, K., and C. E. Kegerreis. 1976. Making safety fun. Grist 20(4):25.

Flug, the safety sea monster, was developed to make safety messages for children more memorable and fun. She visits campgrounds and shopping malls and has appeared in local newspapers to promote safe visits to a national seashore.

Keller, R. 1978. The rivers run down to the sea: Safety for small boats. 27p.

Part of a series of home literacy readers with conversational text and sketches, this booklet addresses water safety in the Alaskan summer environment. Boaters must be alert enough to face sandbars, logs, eddies, and sweepers, and water so cold that in early summer a person can stay alive in this water only 15 to 20 min. Even swimmers with lifejackets can become overchilled and die of hypothermia. Storms should be waited out and boats tied securely. Boats should have the correct motor size and low, even loads, including both packs and/or people. Boaters should always carry sufficient tools, fire extinguishers, lines, paddles, anchors, bailers, flashlights, first aid kits, and personal flotation devices for each passenger.

Marshall, M. and O. Herrera, Comps. 1979. New Mexico boating education resource manual. 31p.

Resources for individuals and organizations interested in teaching and promoting boating safety are listed in this directory of films, speakers, publications, and boating courses. Although some information is specific to New Mexico, most is of general interest. An annotated list of 40 films provides sources for obtaining the films, all free of charge on a loan basis. Topics include navigation, boating regulations, accident prevention, emergency procedures, and boating hazards. Emphasis is on outboard boating but white water running and sailing are also covered. An annotated list of 26 books and pamphlets includes information for ordering.

National Transportation Safety Board. 1969. Study of recreational boat accidents, boating safety programs, and preventive recommendations. Washington, D.C. 62p.

Evaluation of the boating safety problem; Safety board's analysis of available boating statistics; Evaluation of present boating safety programs; Recommendations.

Sager, E., et al. 1978. Educational alternatives for boating safety programs. Final report. Not available in hard copy due to reproducibility problems. 385p.

The Coast Guard has undertaken research to identify educatinoal alternatives in its long-term efforts to improve the safety of recreational boating. Other organizations involved in boating safety education may find the illustrative approaches valuable in designing their boating safety education efforts. This report consists of three major parts. Part One is background research covering an assessment of materials from the areas of boating education and education in comparable recreational areas. Research was also conducted to review educational and mass media methods suitable for conducting boating educational programs. Output from this research (when combined with boat accident cause analyses) provided information for planning and conducting a boater educational program. Part Two is the presentation of a prototype educational program utilizing mass media, formal boating courses, Coast Guard visitations, and home study methods. The program is directed to reducing collision and loading related accidents (and fatalities). A video tape supplement to this report was produced to present the prototype program in the perspective of an actual educational effort. Part Three is the report of two evaluations of mass media type messages using experimentation methods.

One experiment tested three levels of participatory response on the part of the viewers of a specially prepared television public service announcement for boater education. The version evoking highest participatory response levels produced greater recall of information given in the announcement. Another experiment compared a "model" pamphlet design to a "typical" pamphlet design used in other boating educational materials. Recall of pamphlet information was greater for the "model" design. (Appendix materials, which comprise about one half of this document, include, among other things, mailing lists for private and government agencies, and publishers relevant to boating and boating education.)

Carrying Capacity References

Berrier, D. L. 1980. The effectiveness of information on dispersing wilderness campers. Unpubl. M.S. thesis. Dept. of Forestry, Virginia Polytechnic Institute and State University, Blacksburg, Va. 118p.

This extensive study tested the effectiveness of information, and determined the influence of various communication channels and recipient characteristics on the effectiveness of information in redistributing camping use away from a heavily used area. The provision of information significantly dispersed campers; however, groups new to the area, smaller groups, or non-formally organized groups were more inclined to disperse. The two communication channels, the distribution of brochures through personal contact and the use of leaflet dispersal boxes located at major trailheads, were not found to be significantly different overall. However, the personal contact of a Forest Service representative inside the area was more effective for groups new to the area, with children, of three to six people, or arriving early in the day. Other intervening variables tested were sex distribution, rain, and camping density encountered. A thorough literature review and implications for management are presented. Also included in the report is a theoretical framework of communication principles.

Bradley, J. 1979. A human approach to reducing wildland impacts. Pp. 222-226 In: R. Ittner, et al. (eds.), Recreational impact on wildlands. USDA Forest Service and USDI National Park Service. R-6-001-1979.

Through educating the public in town, at wilderness trailheads, and on the trail, the author has used the interpretive approach to reduce visitor impacts. A discussion of the communication channels and mechanisms used is included.

Brown, P. J., and J. D. Hunt. 1969. The influence of information signs on visitor distribution and use. J. of Leisure Research 1(1):79-83.

This study focused on two questions: (1) Do information signs help distribute visitors more evenly? and (2) Do information signs stimulate greater use of a previously unsigned roadside rest area?

The results show that information was instrumental in helping the resource manager in achieving the desired control of visitor movements.

Fazio, J. R. 1974. A mandatory permit system and interpretation for backcountry user control in Rocky Mountain National Park. Unpublished Ph.D. dissertation, Colorado State Univ., Fort Collins, Colo. 246p.

Visitor reaction to a mandatory permit system coupled with rationing of use through campsite quotas was studied. Secondly, an experimental test of selected interpretive techniques was made to determine which could be used to improve visitors' attitudes toward the permit system and increase visitors' knowledge of low impact camping procedures. Visitors generally perceived the necessity of the rationing program and their attitudes were supportive of its procedures. No interpretive technique improved the already high attitudes toward the permit system. Knowledge of low impact camping procedures were increased by a slide tape program, but not by a brochure. Television and newspapers were ineffective in increasing knowledge.

Hart, P. 1980. New backcountry ethic: Leave no trace. American Forests 86(8):38-41, 51-54.

This paper points out the increasing impacts of wilderness use and the need for visitor education programs to change behavior. Several visitor education programs are presented, and a simple "How do you rate as a no-trace camper" test is provided.

Hendee, J. C., and R. C. Lucas. 1973. Mandatory wilderness permits: A necessary management tool. J. Forestry 71(4):206-209.

This study points out that through the use of a mandatory permit system, wilderness users would have a better opportunity to ask questions, obtain maps, and improve their trip through better information. The system can provide essential management information, thus producing substantial benefits for users.

Hendee, J. C., G. H. Stankey, and R. C. Lucas. 1978. Wilderness management. USDA For. Serv. Misc. Publ. 1365, No. 001-001-00438-3, Washington, D.C. 381p.

This text points out that information dissemination is of value, because it does not place stringent regulations upon the user and can increase visitor satisfaction through an understanding of use levels, alternative trails and campsites, etc. The information can provide the visitor with more options to heighten his recreation experience. Thorough literature review.

Lime, D. W., and R. C. Lucas. 1977. Good information improves the wilderness experience. Naturalist 28(4):18-21.

A brochure that describes past BWCA use in the Superior National Forest was sent to a portion of past users of the area. This thorough study attempted to reduce crowding and congestion by providing visitors with information on crowded areas and peak-use periods. The brochure was mailed well in advance of potential use, so people had ample time to study it and develop plans. At the end of the season, questionnaires were mailed to a sample of brochure recipients. Results indicated that an overwhelming majority of people were able to avoid crowded situations through the information on the brochure. Respondents were pleased that they were able to plan ahead of time. The brochure was also useful in understanding rules and regulations, providing information on where to observe fish and wildlife, and suggesting safety procedures.

Stankey, G. H., R. C. Lucas, and D. W. Lime. 1976. Crowding in parks and wilderness. Design & Environment, Fall.

The authors stress the importance of using management regulations which are as non-authoritarian and subtle as possible so as to reduce the disruption to the visitors' fragile experience, arguing that excessive regulation and control can be just as damaging to the visitors' experience as resource deterioration, overcrowding, or litter.

Urban Research and Development Corporation. 1980. Recreation carrying capacity facts and considerations. Report No. 10: Somerville Lake Project Area, U.S. Army Engineer Waterways Experiment Station, CE, Vicksburg, Miss. 112p.

This report provides selected recreation carrying capacity related information for the Somerville Lake Project. The information is based upon user and management surveys conducted at Somerville Lake, and Urban Research and Development Corporation's observations and perceptions of the situations at the project's activity areas. The report provides information regarding activity situations, user characteristics, carrying capacity findings, and other findings; it then focuses on selected problem situations and their possible solutions.

APPENDIX A: DEPRECIATIVE BEHAVIOR BROCHURE AND CAMPSITE INVENTORY FORM

YOUR CAMPSITE

Will it be here tomorrow?

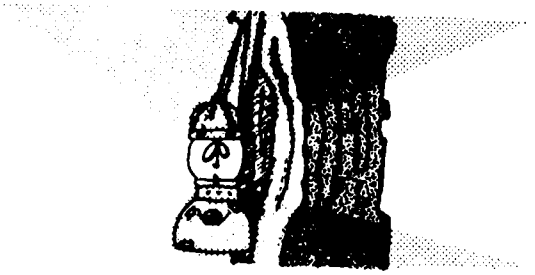
CARE FOR YOUR CAMPSITE

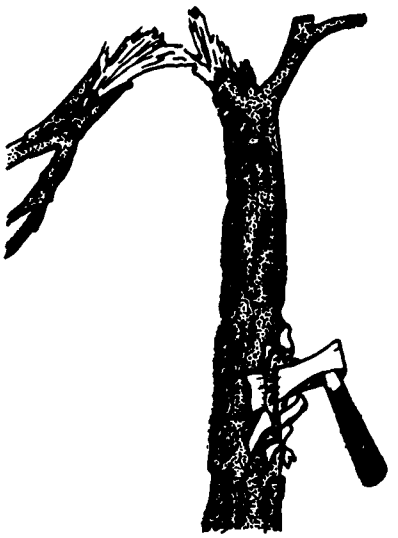
Campgrounds are your home in the park. Flowers, trees, birds, and wild animals share your home. Together they give beauty, peace, and enjoyment to you, your children, and those who come after you. Care for your home before it's too late. Before you act, consider the damage that your activities and equipment can do to your home.

These campers didn't think before they acted. How has their home changed?

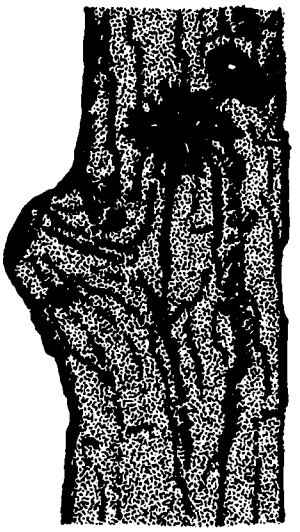
What happened to the trees and the wildlife? Where is peace, beauty, and relaxation?

Many campers enjoy their home by lantern-light. Some hang their lanterns on the nearest tree. They don't realize that trees have skin too. Lantern heat burns the bark, kills the inner wood, and opens sores. The tree struggles, and a slow death begins.

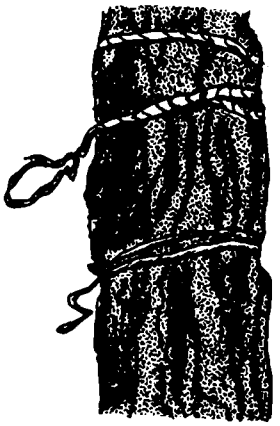




Axes and knives wound trees. The open sores bleed, attract disease, decay, and insects, and are unsightly. When infected, such wounds often become larger, and the tree may die. The dead tree becomes a safety hazard and has to be removed. That costs you money and steals shade, song, and peace. Your home is changed!



Pounding nails into trees punctures their skin. Disease, decay, and insects can then creep in and weaken the tree. During time of stress—such as from drought or soil compaction—the tree may die. Your home is changed!



Wire clothesline, if left behind, will hang the trees of your home. Some kinds of rope or cord will also choke your trees.

A littered home is ugly—for you, your children, and those who will share your home after you leave. Also, litter cleanup costs money—money that could be better used to provide facilities and services for your enjoyment. Care for your home. Don't throw paper plates, napkins, cans, pop tops, and cigarette butts on the floor.

We built your campsite home to give you peace and privacy—a place to escape the noise of mechanized man. Loud televisions, radios, stereos, and parties can destroy the sounds of nature, your neighbors' experience, and your home.

PROTECT YOUR CAMPSITE

Your campsite may be your home for only a day or two, but others share your home. By your actions you can protect or destroy your home. If you act without thinking, you can kill the trees in your campsite and destroy its beauty and peace.

Maintenance costs are high and require a majority of all recreation funds. Fewer tree injuries, less litter, and less noise will provide more money for facilites and services for your enjoyment.

HOW YOU CAN HELP!

1. Hang lanterns on posts, when provided; otherwise set them on a picnic table or on the ground.
2. *Purchase firewood from stores in the area.* Do not remove limbs and bark from trees in the campground.
3. Don't pound nails into trees.
4. Remove all wires, ropes, and cord from trees when you break camp.
5. Place all litter and trash in the cans provided. Don't put beverage cans, bottles and aluminum foil in your fireplace.
6. Enjoy the sounds of nature; keep noise at a minimum. Be considerate of your neighbors, especially after hours.

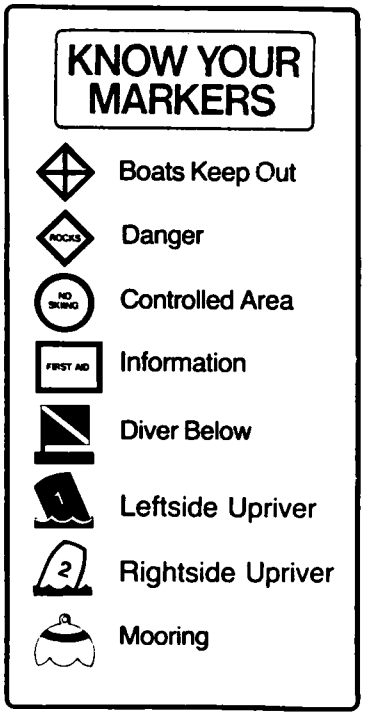
NOTE: This brochure has been prepared by the Department of Forestry, Virginia Polytechnic Institute and State University, in cooperation with the U.S. Army Corps of Engineers as a service to you.

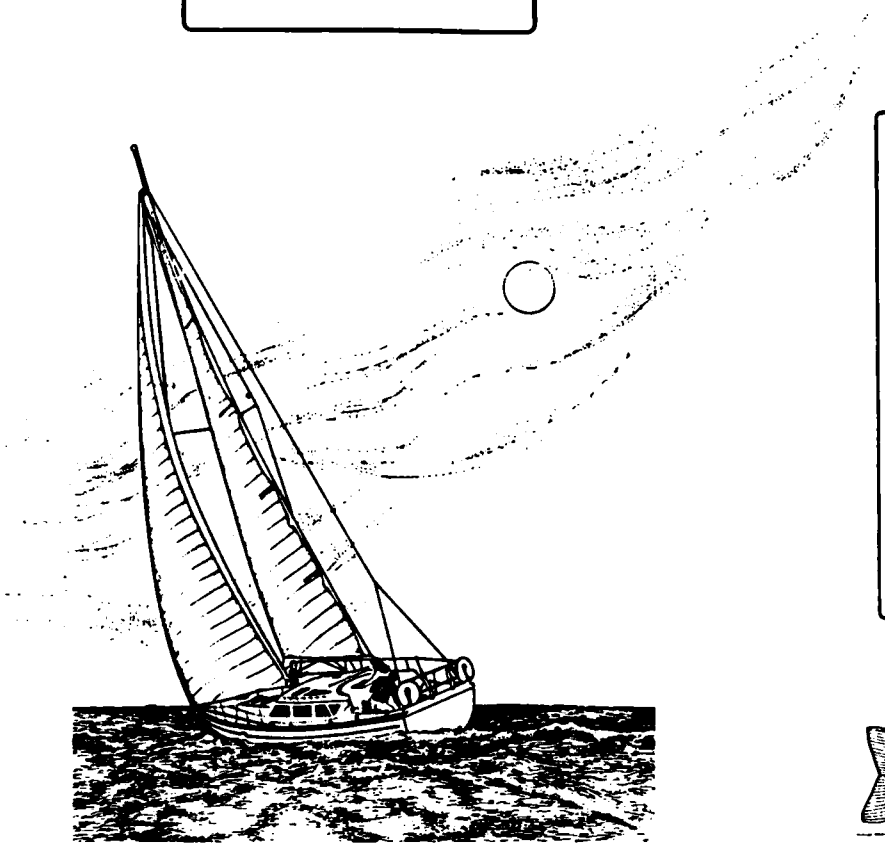
Campsite # _____ Loop _____ Date _____
Treatment _____ Time _____

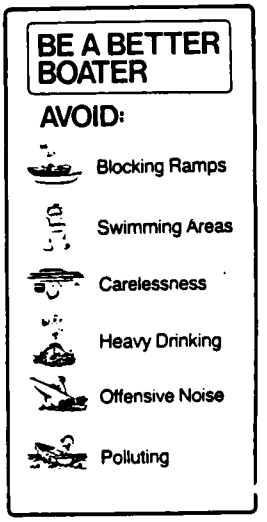
Length of Stay _____ Party size _____
License # _____ State _____
Party type _____
Camper type _____
Experience _____

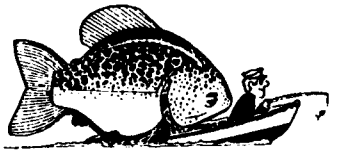
Tree #	Lantern Burns	Nails	Wires/ Cords	Limbs Removed	Bark Removed	Carving	
						Axes/Knives	Initials

APPENDIX B: SELECTED BOATER SAFETY POSTERS, DECAL, AND NEWSPAPER







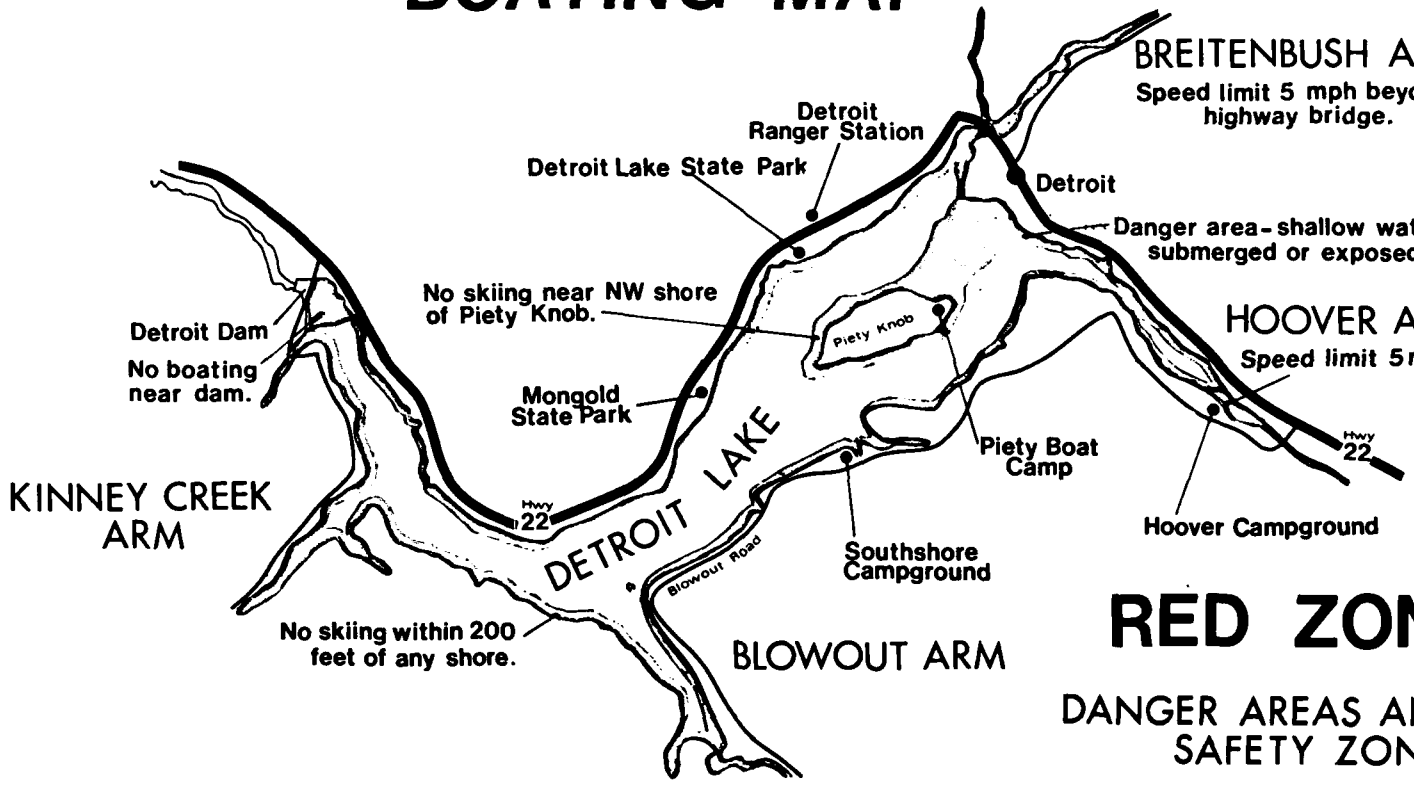


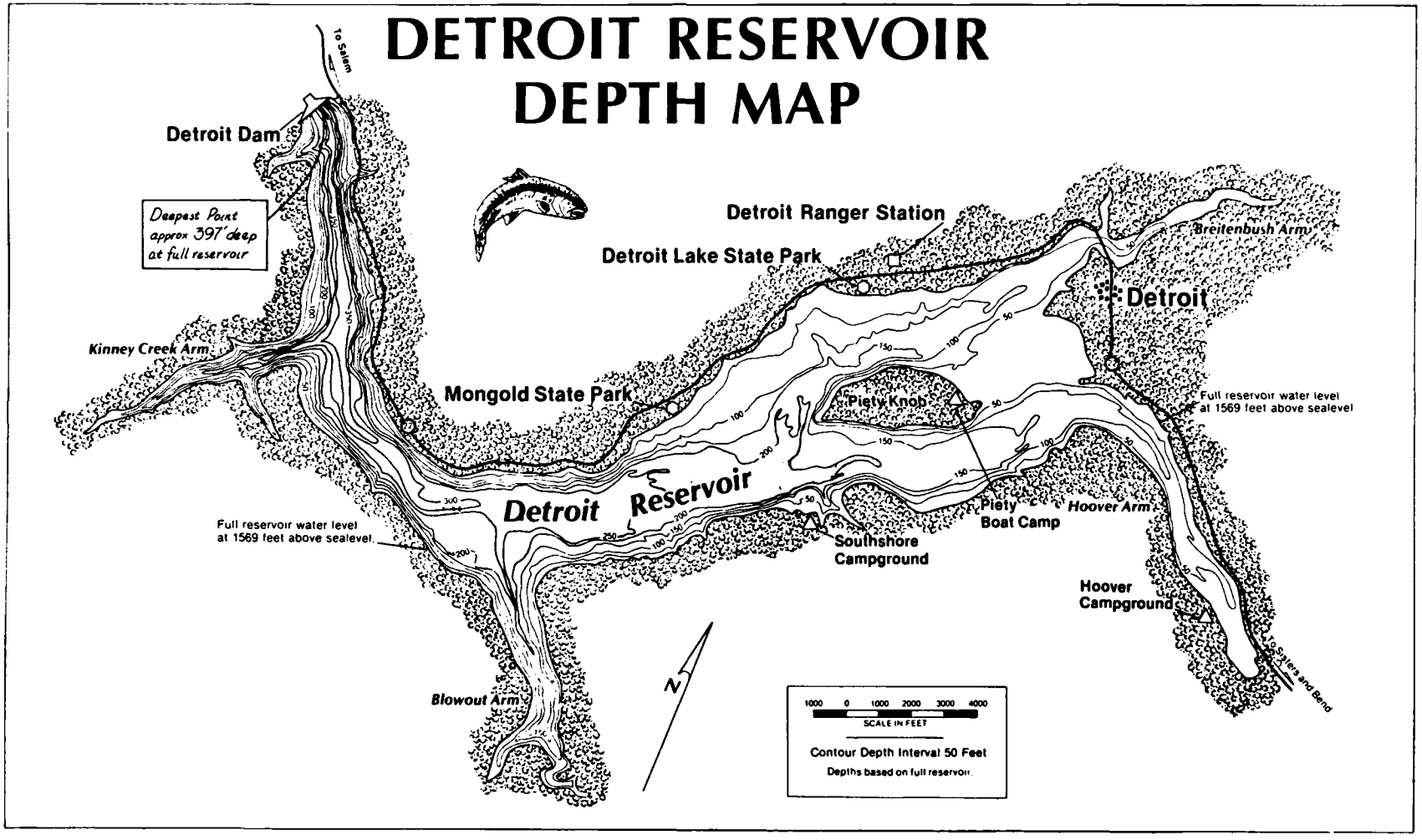
Going for a Swim?

Sitting on the side or the back of your boat is illegal...

...and dangerous.

DETROIT RESERVOIR BOATING MAP




DETROIT RESERVOIR
DEPTH MAP
To Salem
Detroit Dam
Deepest Point
approx 397' deep
at full reservoir
Detroit Ranger Station
Detroit Lake State Park
Breitenbush Arm
Detroit
Kinney Creek Arm
Mongold State Park
Piety Knob
Full reservoir water level
at 1569 feet above sealevel
Detroit Reservoir
Full reservoir water level
at 1569 feet above sealevel
Piety
Boat Camp
Hoover Arm
Southshore
Campground
Hoover
Campground
Blowout Arm
Salters and Bend
N
1000 0 1000 2000 3000 4000
SCALE IN FEET
Contour Depth Interval 50 Feet
Depths based on full reservoir.

United States Department of Agriculture

DETROIT LOG

Pacific Northwest Region
Willamette National Forest

SPECIAL BOATING ISSUE

Welcome to the Detroit Ranger District of the Willamette National Forest. It is our pleasure to invite you to enjoy the many recreational opportunities which are available on National Forest System land.

Your choice of a camping experience at Detroit may range from the full service campground at Detroit Lake State Park, to an "on-your-own" hiking trip to the backcountry. There are several Forest Service campgrounds which provide different experience levels in developed sites.

Possibilities for pursuing outdoor activities are abundant: nature study, backpacking, sightseeing, swimming, photography, hunting and fishing, boating, orienteering, picnicking.

During your visit to the Forest, please remember that, as Federal land, the National Forests are owned by all citizens of the United States. Since it is a joint ownership, there are many regulations which cover the use of Forest resources so that everyone's rights are protected. Please become familiar with the rules by reading the bulletin boards, pamphlets, and asking questions at the District office, or of personnel in the campgrounds and the general forest.

Our office is located on Highway 22, two miles west of Detroit.

Detroit Ranger Station Summer Office Hours (Memorial Day through September)
7:45 a.m. to 5 p.m., seven days a week
Telephone (503) 854-3366
Mailing Address
Detroit Ranger District
Willamette National Forest
Star Route, Box 320
Mill City, OR 97360

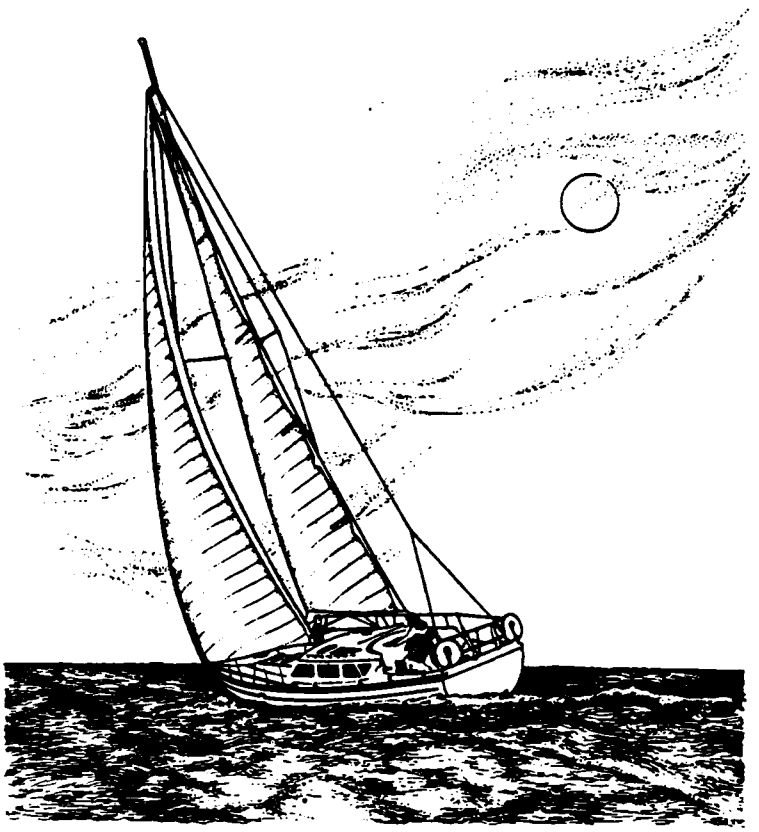
Services Area Information, Brochures

Map Sales
Maps of Pacific Northwest National Forests and Wilderness Areas are available.

Group Camping
Reservations may be made for the use of Hoover Group Site for up to 50 people.

Firewood Permits
When woodcutting areas are open, permits are issued for personal home use firewood.

Other
Commercial woodcutting opportunities, purchase of cedar for shakes and posts, rock permits, plant and shrubbery collecting, forest resource information.



INDEX

Detroit Reservoir Boating Map	2
Know Your Markers	2
Boating Equipment Checklist	3
Emergency Services	4
National Forest Campground Directory	4
Area Map	5
Captain's Quiz	6
Detroit Lake State Park Camping	6
For the Junior Captain	7
Captain's Quiz Answers	8
No Trace Camping	8

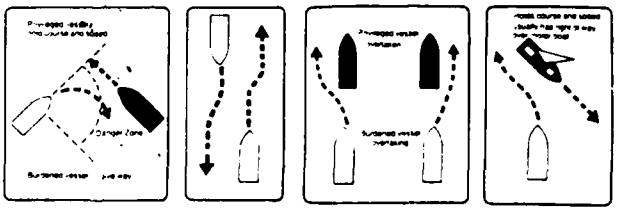
US Army Corps of Engineers

This special edition of the Detroit Log is in cooperation with an OSU research project funded by the Corps of Engineers.

RULES of the ROAD

Right Of Way

Crossing | Meeting | Overtaking | Sailboats



Be Alert

Watch for other boats, swimmers or obstacles
Booze and boats don't mix

Restricted Areas

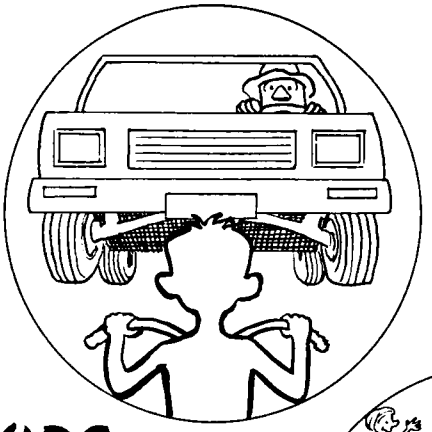
Check local and state regulations before departing
Watch for no wake zones

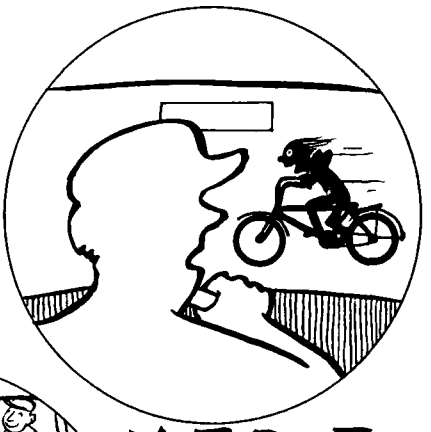
Speed

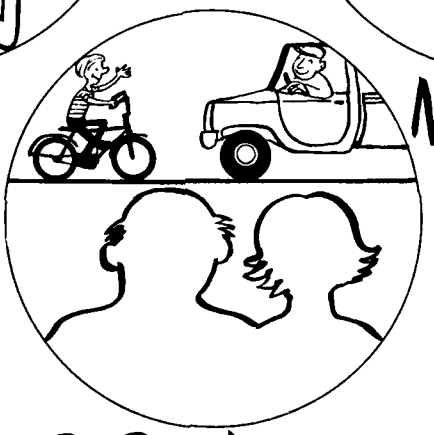
Watch your wake
You are legally responsible for wake damage
Obey posted speed limits

APPENDIX C: BICYCLIST/MOTORIST HANDOUT AND USE REDISTRIBUTION FLYER

LET'S SHARE THE ROAD







KIDS-

Remember:

1. RIDE ON THE RIGHT-HAND EDGE OF THE ROAD.
2. USE HAND SIGNALS BEFORE TURNING.
3. DON'T DART OUT IN TRAFFIC.

MOTORISTS-

Remember:

1. SLOW DOWN WHEN YOU SEE A BIKE.
2. BE CAUTIOUS WHEN PASSING BIKES.
3. USE EXTRA CARE AT INTERSECTIONS.

PARENTS -

- READ THE <u>LEFT</u> LIST TO YOUR KIDS.
- OBSERVE THE <u>RIGHT</u> LIST WHEN DRIVING CAMP ROADS.

REMEMBER-COOPERATION BEGINS WITH YOU.

Dear Recreator:

We'd like to call seven of our day-use areas to your attention. Not only do these areas offer you good opportunities for shore-fishing, they offer other recreational attractions as well. In addition, they are less heavily used than some of our major facilities.

We think you will find that each of these seven areas has something special to offer in the way of outdoor recreation. The attached map will show you where each area is located:

PARKER'S LANDING -- Offering a concrete boat launch, this area is ideal for canoes, small sailboats, and other craft wishing to use the "electric motors only" zone. You'll find good crappie and bass fishing here.

HARTFORD ROAD LAUNCH -- An exceptional area for crappie fishing, and only a short distance from the shore, this area also offers a boat launch.

ALLISON BEACH -- A small area, but a good spot to picnic and to watch others water ski.

ROUTE 846 ACCESS AREA -- This area offers extensive shoreline and good fishing success. In addition to easy access off Route 846, you'll find this a welcome area for sunbathing. It's also close to the Chestnut Run Swimming Area.

ROUTE 18 CAUSEWAY -- With good access to the shore for fishing, this area is also close to a mini-store and rest facilities. It's easy to get to off Route 18.

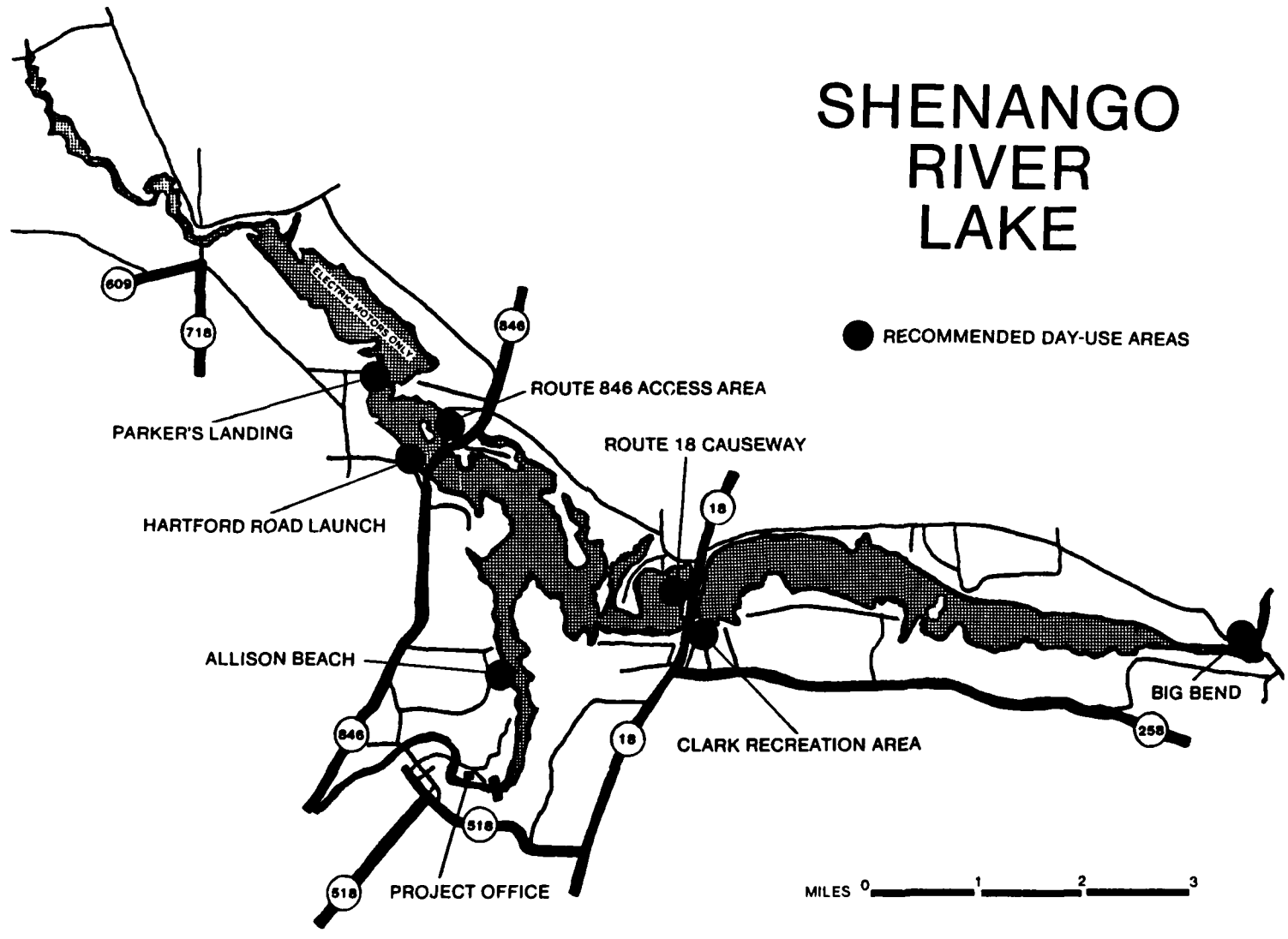
CLARK RECREATION AREA -- A good area for picnicking and fishing, with easy access off both Route 258 and Route 18. Close to a public boat rental as well.

BIG BEND -- One of the most attractive of our day-use areas, this site offers plenty of woods and feeder streams. You'll find the Shenango hiking trail here, and good fishing opportunities in the evenings.

If you have questions, or would like more information on any of these seven areas, please contact the Shenango River Lake Project Office at 2442 Kelly Road, Sharpsville, PA 16150; telephone 412/962-7746.

Sincerely,

Corps of Engineers
Shenango Lake


SHENANGO
RIVER
LAKE
RECOMMENDED DAY-USE AREAS
ELECTRIC MOTORS ONLY
609
718
846
ROUTE 846 ACCESS AREA
PARKER'S LANDING
ROUTE 18 CAUSEWAY
18
HARTFORD ROAD LAUNCH
ALLISON BEACH
BIG BEND
258
846
18
CLARK RECREATION AREA
518
518
PROJECT OFFICE
MILES 0 1 2 3

SELECTED INTERPRETIVE WRITING GUIDELINES

A Supplement to

A GUIDE TO CULTURAL AND ENVIRONMENTAL INTERPRETATION IN THE U. S. ARMY CORPS OF ENGINEERS

Abstract

This supplement provides principles and guidelines for writing effective and rewarding interpretation materials. Pertinent characteristics of recreationists are discussed as the basis for the structure and style of interpretation tests. Several writing structures are described and examples of each are given. The supplement also contains a discussion of writing styles. Suggestions for writing clearly and for developing a personalized writing style are presented.

SELECTED INTERPRETIVE WRITING GUIDELINES*

A Guide to Cultural and Environmental Interpretation in the U. S. Army Corps of Engineers

INTRODUCTION

This is a supplement to "A Guide to Cultural and Environmental Interpretation in the U.S. Army Corps of Engineers" (Prospt and Roggenbuck 1981). It is designed to provide writing guidelines for interpretation, whether it be on human or natural history, safety, environmental protection, or the Corps itself. It does not cover the basics of the English language—grammar, punctuation, or word usage. Instead, it covers writing for specific audiences, structure, and style. These guidelines can be applied to writing text for a variety of interpretive and informational materials, including:

- Self-guided trail signs and brochures.
- Exhibit materials.
- Project pamphlets and flyers.
- Project signs.

Why a writing guidelines supplement? Writing is at the base of all but the most spontaneous and informal interpretation. Even mediated interpretation and guided programs are written at some point during planning and production.

Perhaps most communication with visitors is through writing: signs, labels, notices, instructions, field guides, books, news releases, and public service announcements, for example. Written interpretation is durable. Visitors take it away with them to refer to later. Therefore, it may have a more lasting impact than spoken interpretation or interpretation with electronic media.

This supplement contains guidelines to help you select the organizations and styles most appropriate to the particular interpretive writing tasks you will encounter.

WRITING FOR SPECIFIC AUDIENCES

Writing is the process of organizing words so that they stimulate images in the minds of readers, to affect the readers' thoughts, feelings, and behavior. Words themselves are only symbols; the meaning of a word depends on the things it has come to be associated with in the experience of the reader. Explain the taste of

---

* This supplement was written by Dr. Ronald W. Hodgson, California State University-Chico, and Ms. Janet Akers Fritschen, Michigan State University, under Intergovernmental Personnel Act Agreements with the U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.

boiled snails to someone who has never tasted them. How would you do it if you and they had never chewed a rubber band or tasted salt and garlic?

Writers select words for the images the words cause them to see. To be certain that the reader sees the same images, it is necessary to know the reader. It is not enough to know his or her socio-economic characteristics, average party size, type of camping equipment, or even place of residence. If you want to write effectively, take the time to visit with and listen to project visitors.

Getting to know your readers means sharing some of the experiences that shape their concepts and values. If you write for campers, you should occasionally camp. If you write for off highway vehicle users, you should sometimes ride with them. If you write for people whose ideas are shaped by the sight, sounds, and tempo of the city and suburb, you should also experience these things. If your communications with visitors are limited to law enforcement, fee collection, or giving directions, you will not learn much about the visitors. By encouraging visitors to talk about themselves and their experiences, you will learn what information they want and need. Most importantly, you will learn something about how they view the world and the kinds of messages to which they will respond. Knowing your visitors will also provide you with the information necessary to select the most effective writing styles and structures.

People at Leisure

Most visitors to Corps projects are at leisure and are participating in some kind of outdoor recreation. People engaged in outdoor recreation share certain characteristics that will strongly influence their desire for and response to written and oral communication. Among these are:

- A desire for freedom from obligations.
- A desire for immediate satisfaction from the things they do.
- A desire to come and go on their own schedules and freedom to change their schedules whenever they wish.
- Unfamiliar or novel environments and social setting.
- Changing information needs.

Freedom from obligation. People participate in recreation activities as a break from their normal day-to-day living. To a great extent they expect to escape, at least temporarily, from their usual obligations and responsibilities. This will extend to interpretation. Where they may have felt obligated to read materials at home or on the job, they may not feel obligated to do so at the project.

Immediate satisfaction. Peoples' perceptions of the recreation environment as being different from their normal environment also extend into their desire for satisfaction. Project visitors are consumers, not investors. When they attend interpretation programs, they are not learning for the future as they do in school, they are enjoying the present. Therefore, interpretation must be rewarding to visitors during their recreation experience, rather than provide a basis for future satisfactions.

Self-imposed schedules. Project visitors are masters of their own schedules. If something is interesting and rewarding, they will devote time to it. If it is not interesting or if something else promises to be more rewarding, they will abandon the first thing for the next. If interpretation is to become a part of the visitors' activities, it should appear to be at least as rewarding as their other options.

Unfamiliar environments. First-time visitors to a project need basic orientation information which will acquaint them with the area. They are seeking information which will enable them to decide where to go and what to do. At this point they do not need a history of the project nor detailed information about the ecology of the lake.

Changing information needs. The recreation experience begins with a choice among alternative sites and activities. This is followed by anticipation of the experience, travel to the site, the onsite experience, travel home, and recollection. Visitors' interests and needs are different at different times in their recreation experience.

To select among alternatives in planning a recreation trip, the visitor needs data about the project resources and facilities. At this stage they need information that is short and precise. During the anticipation stage visitors are interested in a wide range of topics and they have time to read. This may be the best time for more detailed interpretation materials.

During the travel stages, visitors are mostly interested in directions and other information related to the trip itself. While at the project, information needs and time to read vary. When just arriving, the visitor needs basic subsistence information: where to camp; where stores, restaurants, and rest rooms are located; and how to find them. They usually need the information in a hurry. Later, when camp has been set up or the launch ramp or picnic area has been reached, visitors have more time to read.

During the last stage of the recreation experience visitors remember the events at the project. Research shows they are more likely to tell friends and associates about their experiences at this time rather than to seek out other information. Perhaps take-away literature should be written as much for these friends and associates who may be planning a future visit to the project as for the visitor who actually carries the publication home.

Interpretation for Recreationists

People at leisure will react to communication differently than those not at leisure. Those who write for interpretation should design materials to be:

- Interesting and rewarding to the visitor.
- Of immediate rather than future benefit.
- Pertinent to various stages of the visitor's recreation experience.

Achieving these goals depends on the type of information communicated, the manner in which it is graphically presented, and the structure and style of the

text itself. Different types of structure and style and the circumstances in which they are most appropriate will be covered in the remainder of this supplement.

STRUCTURE

Good writing is structured writing. The structure selected depends upon your reasons for writing and your reader's needs. A consistent and obvious structure helps your readers focus a larger part of their attention on the content and less on sorting out the evidence and arguments.

Structured material is not only easier to read, but easier to write. If you have the objectives and reader clearly in mind and have collected and sorted the things to be written, then the writing task will flow more easily and the rewriting, reorganization, and number of interesting but irrelevant tangents will be reduced.

Some of the most common structures are: definition, description, comparison, cause/effect, persuasion, and news style. Shorter, simpler pieces may have only one purpose and, therefore, only one structure. A display caption or identification label on a self-guided trail are examples. Longer compositions will have a general purpose that determines the overall structure, but will also incorporate several subpurposes and substructures. Each structure is described in more detail in the following pages.

Definition

A definition is a rule that allows readers to categorize objects and events. For example:

> Redbud is a small tree occurring under the other forest trees. It ordinarily reaches 25 to 50 feet in height and 6 to 12 inches in diameter.

Definitions are structured so as to successively reveal the differences between the thing being defined and everything else. They should start with the greatest distinctions first and progress toward finer differences. If you want to define basalt, first describe it as a rock. Next, you might say that basalt is produced by volcanos—that it was molten rock that cooled near the earth surface. This second step sorts basalt from many other kinds of rocks. A third, fourth, and fifth step would successively narrow down the characteristics of basalt until it could not be confused with other rocks.

Definitions usually describe what something is rather than what it is not. Sometimes, however, a definition is stated in the negative. It is difficult to define a vacuum except as what is left when you take everything else away.

There is a tendency to try to write definitions as single sentences. For instance, "A cube is a three-dimensional figure, all the sides of which are bounded by straight lines of equal length, which join at right angles." This is not necessary and is generally undesirable. Unless the reader is already familiar with the concept, the described image may be impossible to call up with only a few words. If all the qualifiers are collected together in one sentence, the sentence will be complicated and hard to read. Definitions written as several short sentences are

more effective. A sketch or photograph accompanying the text will reduce the need for written definition and leave more space for interpretation.

Description

Definitions are usually somewhat abstract. Once, however, more detail is added to the definition, it becomes more of a description. For instance, a definition would be "Brass button is a low-lying herb particularly abundant in brackish marshes." A comparable description is

> Brass button—This low-lying herb is particularly abundant in brackish marshes and is an important food plant for waterfowl. Its common name, brass button, is attributed to its brassy yellow flowers. The flowers bloom during the summer and into winter and resemble daisy centers without rays. Its succulent stems have alternate leaves.

Descriptions may also be used to establish a setting or to create within the reader a sense of empathy or identification. An interpreter might describe a flood scene, the ancient environment that produced the coal beds of Ohio, the hidden interior of a dam, or the pioneer village now represented only by archaeological evidence.

Whatever the purpose of the description, it must be organized and written in a logical sequence. Each part must be described in relationship to neighboring parts and to the larger thing as a whole. The sequence followed will depend on the arrangement of elements to be emphasized. The description of a scene as part of the interpretation of a civil war battle will focus on different elements than the description of the same scene as part of the interpretation of woodland ecology. No matter what order is selected, it should be used consistently throughout the description.

As a general rule, it is effective to begin a description by establishing the reader in space relative to the subject, then to proceed with a detailed "tour." For example, if you were describing a dam, you would begin from a vantage point where the entire structure can be seen and describe the dam generally. Then you might focus on the elevator towers, describe the ride down and the doors opening on the power house scene. You could continue the description as you would experience it on a walking tour, ending back at the top of the elevator towers.

Even the description of a simple object, such as a pottery artifact, must be described by following a continuous line from point to point. A narrative description that jumps randomly from point to point will fail to elicit an accurate image.

Remember, too, that the narrative does not have to stand alone. Use pictures to help the reader understand the scene. Pictures and words work together; neither one alone is as effective as the combination.

Comparison

Freeman Tilden (called the father of interpretation) wrote that interpretation that did not relate to something in the personality and experience of the visitor would be sterile. Comparisons of the unfamiliar with the familiar are an important part of interpretive writing.

Comparisons are organized as two or more coordinated descriptions. The descriptions of each object are organized in a logical path. The same path is followed for both objects. If you are comparing the daily life of a frontier village with modern daily life for a young audience, the description might be written by tracing the activities of a school boy and girl from the time they wake in the morning until they go to sleep at night. Both the pioneer and modern children would be followed through the same activity sequence as far as possible. Breakfast for the pioneer children would not be described without comparing it to breakfast for the modern children. By the same token, recreation of modern children would not be compared with work for the pioneer children.

Comparisons can be made in two ways. Either one object is described completely and the second compared to it, or the two objects are described alternately, one feature at a time. If the second method is used and the comparison involves many features, an introduction of the first type of comparisons will provide the overview necessary for readers to construct the two side-by-side images.

Cause/Effect

The cause/effect structure is used to explain how something happened, how something works, what happens when..., and why something happened. Most interpretive writing falls into this category.

Fortunately, cause and effect writing is easy to organize. Events occur in a natural time sequence which may be followed when writing the text. The general rule is to begin with what is at hand and familiar, then build to the hypothetical or remote. The beginning, then, will always be the present. From here, the text may continue in one of three ways. It could move sequentially into the future, move into the past starting with the most recent and ending with the least recent, or move into the past with a flashback. In the flashback, the description begins in the present, then, at a convenient point in the narrative, reverts to a point in the past and builds toward the present. All three methods will be described in greater detail.

Some interpretation speculates about the future. To explain what will happen as a result of some action, the cause (present) is described first, then the effects (future). If you wish to explain the consequences of disturbing the vegetation of barren dunes, you would begin with the cause: people walking across the dunes. From this would follow the effects, in sequence as they occur naturally: loss of plants from the dune, dune movement, and so on. The following safety message is another example of cause and effect projected into the future. Notice it begins with a definition.

> Hypothermia is subnormal temperature within the central body. When a person is immersed in cold water, the skin and nearby tissues cool very fast. However, it may take 10 to 15 minutes before the temperature of the heart and brain starts to drop. When the core temperature drops below 90°F, serious complications begin to develop. Death may occur at about 80°F; however, a person may drown at a higher temperature because he loses consciousness or loses the use of his arms and legs.

To describe how past actions affected the present, begin with the present (effects) and work back in time to the causes. Interpreters often make the mistake

of beginning with the past and attempting to work forward. A common example of this is the opening statement "440 million years ago, this area was a warm, shallow sea." If you wish to explain how oxbow lakes are formed, begin with the existence of an oxbow lake, then describe how the lake was created.

Cause and effect descriptions of past events can be written in one of two ways. In the first, the description starts with the existing conditions, then works backward in time to the beginning. The facts are revealed in the same manner as they would be to someone who was researching the topic. For example, a hydraulic gold mine might be described this way:

> The eroded hill you see was the headwall of a gold mine in 1860. Instead of digging tunnels, the miners blasted the hillside away with powerful streams of water from giant nozzles called "monitors." The water washed the sand and gravel through sluices that separated out the gold.
>
> The sand and gravel they washed was once at the bottom of a large river. This river flowed out of Nevada before the Sierra Nevada mountains pushed up. The sand and gravel came from rock that had veins of gold. As the rock was broken and ground smaller and smaller by the river, the gold was set free and settled into pockets in the river bottom.
>
> As the Sierra Nevada mountains rose up, the river changed course and eventually divided into several smaller rivers. The rising land lifted the old river bed up, while the new streams cut deep canyons. After three million years of mountain building and erosion, the miners were able to wash gold from the old river bed, 1500 feet above the Yuba River, one of the younger streams that replaced it.

The second method of relating the past to the present involves the use of flashbacks. The present situation is described, then the reader is taken back in time to the beginning of the events that effected the present situation. From there, the text takes the reader forward in time to the present.

> This stone exposure differs greatly from the evenly grained sandstone at Stop A. Look at it closely and you can see the different boulders, pebbles, cobblestones, and blocks of sedimentary rocks that have been cemented together into a single rock face. Ages ago, while silt and sand were being washed down rivers and deposited into the sea which covered most of Arkansas, other forces were beginning to shape this area.
>
> An earthquake began to shake the ground violently, setting into motion an underwater slide of mud, silt, and sand. The quake also broke boulders, cobbles, and pebbles off of the ancient continental shelf. These rocks were carried down the slope of the continental shelf and were mixed with the mud, silt, and sand which finally came to rest at the bottom of the sea. Here they remained as further sediments were deposited. Eventually this mixture was compressed into stone.

Whether writing about the past or the future, flowcharts and diagrams will serve two functions. First, they can be used to guide the organization of the text. Second, they can be used to increase visitor understanding. Before you write, take the time to sketch out diagrams of the processes to be described. Refer to these flowcharts continuously while you write. This will prevent you from wai dering off on tanget thoughts or skipping significant steps. Also, be sure to cover all pertinent relationships and processes; do not assume the reader can provide missing links.

Figure 1 is an excerpt from a self-guided trail brochure.* The excerpt is a somewhat more detailed example of a cause and effect text. Figures have been used to supplement the written explanation.

The authors of the *Science of Scientific Writing* (Monroe, Meredith, and Fisher 1977) recommended the following procedures before beginning to write. Their book was directed to scientists preparing research manuscripts, but the guidelines apply to interpretive writing as well.

1. Determine your overall purpose.
2. Determine what kind of structure is suitable for this overall purpose.
3. Define subpurposes.
4. Divide your paper into sections, each controlled by one of these subpurposes.
5. As you write, work from visual modes wherever possible.
   a. If you are comparing, set up the comparisons in a table before you write about them.
   b. If you are describing something chronological or sequential, prepare a flowchart as a guide.
   c. If you are presenting an argument, prepare it in the form of an algebraic proof first.
   d. If you are describing spatial relationships, diagram them first.

Persuasion

Many of the messages interpreters are asked to write are intended to change visitor attitudes and behaviors. These are persuasive messages. Some message structure appears to be more effective than others for persuasive messages.

Monroe and Ehninger (1975) suggest persuasive messages be organized to imitate the reasoning process an individual would go through to arrive at a conclusion by himself or herself. The steps in the process are (Monroe and Ehninger 1975):

1. ***Attention:*** the individual becomes aware that something is not as it should be.
2. ***Need:*** the individual identifies the things that must change to get to the desired state.
3. ***Satisfaction:*** the individual recognizes the benefits that will be experienced if the changes are made.
4. ***Visualization:*** the individual plans (visualizes) the specific steps necessary to make the change.
5. ***Action:*** the individual puts the plan into effect.

The first words in a persuasive message must attract the reader's attention and motivate him or her to read on. The first few paragraphs have to establish the fact that something the reader values either is threatened or could be substantially improved if things were different. For example, visitors may be alerted to the hazards of boating accidents or to the opportunity to greatly improve their fishing success.

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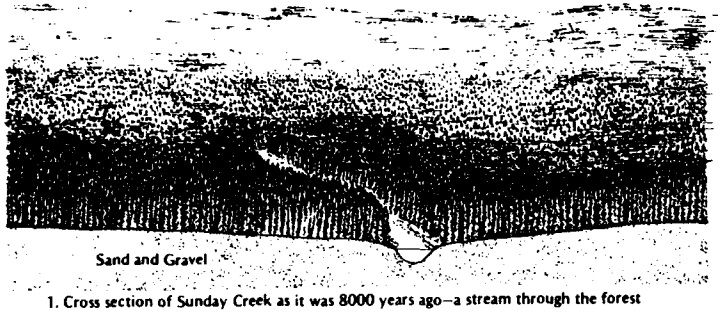
* "Spruce Bog Boardwalk," Algonquin Park, Ministry of Natural Resources, Ontario, Canada.

Post 2 Algonquin Park Archives

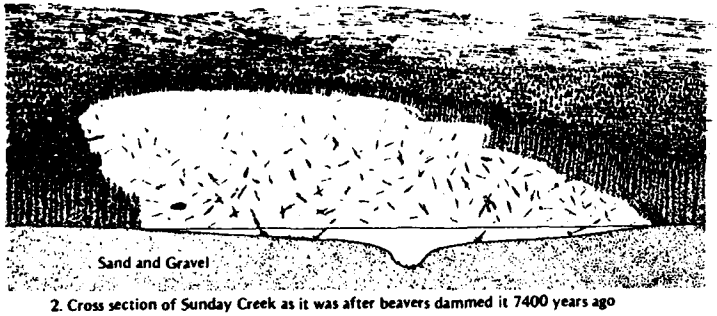
Normally we would be at quite a loss to tell you just how and when this bog got started. As we mentioned at the last post, however, two of the main features of a bog are the almost total lack of oxygen and the acidic nature of the water. Both these features mean that conditions are very poor for the bacteria which cause decay -with the result that the peat layers below you contain leaves, pollen grains, and fragments of wood which are often almost perfectly preserved even though many of them are thousands of years old.

By using a special coring tool, scientists have withdrawn samples of peat from various places in the bog. Examination of the preserved plant remains and dating them through measurements of the radioactive carbon they still contain, have enabled us to piece together the following important details of the bog's history.



1. Cross section of Sunday Creek as it was 8000 years ago—a stream through the forest

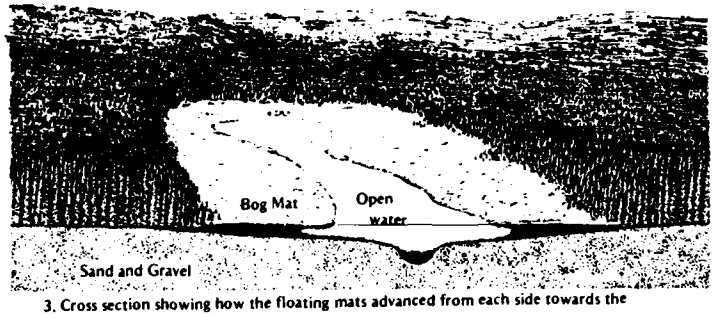
When the last glacier melted back from Algonquin Park 11,000 years ago, tremendous volumes of water were released and poured through the valley now occupied by this bog. The water carried a great deal of sand from rock which had been ground up and trapped inside the glacier. Much of the sand settled out from the river so that when the water finally subsided this valley was occupied by a flat sand plain with a small creek flowing through it. Over the next several hundred years the sand plain, now five feet below you, was invaded by plants following the northward retreat of the glacier. Eventually a forest of pine and spruce became established on the plain and this situation lasted for at least 1,000 years.



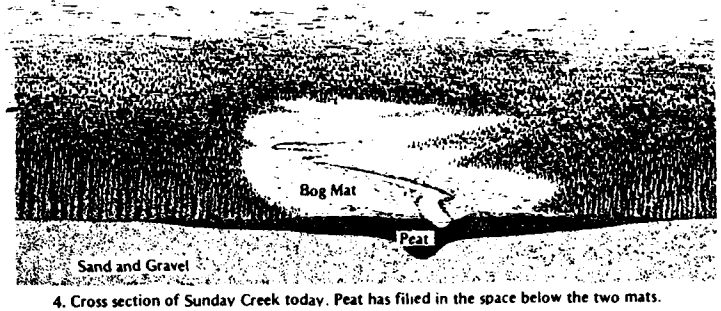
2. Cross section of Sunday Creek as it was after beavers dammed it 7400 years ago

All this changed 7,400 years ago when the plain was flooded, almost certainly by beavers damming the stream. The flooding killed the trees which eventually fell and sank to the bottom of the beaver pond. (They lie there to this day on the sandy bottom but buried under the five feet of peat beneath you.)

The beavers thus transformed a forest into a shallow lake and created the conditions which have led to the formation of the bog you are standing on. At first, water lilies and other aquatic plants grew rooted in the bottom of the pond. Then, two floating mats of bog vegetation spread inward from both shores, until almost the whole water surface was covered about 400 years later. Because the original pond was so shallow, it was soon filled in by dead plants settling to the bottom from the floating mats. In other words, only the inner or leading edges of the mat were actually floating on water—the older portions of the mat soon came to rest on a solid layer of peat.



3. Cross section showing how the floating mats advanced from each side towards the centre of the flooded valley



4. Cross section of Sunday Creek today. Peat has filled in the space below the two mats.

If this bog had been left completely on its own it would long ago have been occupied by black spruce and turned into a forest like the one you saw at Post #1. However, beavers are still present, and from time to time they have dammed the creek channel between the bog mats. Even a slight rise in the water level is sufficient to kill the spruce and keep the bog largely clear of trees.

Figure 1. An example of cause and effect writing, taken from a self-guided trail brochure

Need is established by describing the cause of the difference between what is and what ought to be. Overloaded boats may be an important cause of boating accidents; a habitat enhancement program might improve fishing.

Once the problem and need are clearly stated, the reader should be made aware of the benefits that he or she could expect if the proposed changes are made. At this point, a plan or program to achieve the changes should be described.

Finally, the reader should be told exactly what they are to do. This last step, specifying the action expected, is crucial but is often left out. Unless the means for performing the action are available and pointed out to the reader, it is unlikely that the desired behavior changes will occur.

A persuasive message works because it arouses a tension in the reader. Taking action relieves the tension. If no action is possible (or if any action is not clear to the reader), the tension remains and must be relieved some other way. There are several undesirable ways to relieve the tension including vandalism, discrediting the author or the argument, and avoidance of further messages on the subject. The following example provides the reader with several courses of action.

> Those who know the river well have acquired a deep respect for her changing waters and unseen hazards. Submerged stumps, logs, wing dams, and varying water depths necessitate a constant user vigilance. Navigation charts, showing the locations of stump fields, wing dams, islands, and the 9-foot channel are available for a modest fee by writing to the Rock Island District Office. Fishing and boating too closely to a lock and dam structure are especially dangerous due to turbulence and severe undercurrents. No boating -- restricted areas 100 feet downstream and 600 feet upstream of the dams have been designated for visitor safety. Swim and wade only where you are familiar with water depths and the bottom.

There has been some debate on whether it is preferable to present one or both sides of an issue in a persuasion message. Research gives no clear answer. Rather, it appears that the effectiveness of either method depends on many readers and situational variables. Until more definitive results are obtained, it is recommended that the audience be made aware that other viewpoints exist, though these viewpoints need not be described in detail or refuted.

The order in which arguments are presented is important. Research indicates that the points the reader is to remember should come either at the beginning or the end of the argument, not in the middle. When the issue is controversial, very interesting, familiar, or unimportant, the most effective place appears to be at the beginning of the argument. When the issue is uninteresting, unfamiliar, or very important to the reader, the end of the argument appears to be the most effective. Further information on message organization for persuasion can be found in most research-based textbooks on persuasion. The text by Bettinghaus (1980) is particularly well written.

News Style

At several points in the outdoor recreation experience, the visitor is in a situation where the need for information is high and the time to acquire it is short.

Such instances include when the visitor arrives at the project, at boat launches, at roadway intersections, and in every minor or major emergency.

There are other times when the visitor is under less time pressure, but is faced with a large amount of information to sort through. This may be the case when the visitor is searching pamphlets and guidebooks to choose among alternative hiking trails or fishing areas or when the visitor is casually browsing the displays in an interpretive center trying to decide which topic to pursue and which to ignore.

Any time the need for information is pressing or the information load is high, the most effective writing structure will be the inverted pyramid of the news story. A news story is organized so that the most important points are made first. The remainder of the story, then, contains details. This structure allows readers to stop anywhere after the lead sentence and still have a complete, if sketchy, image. The further one reads, the more fully the image is developed.

The lead paragraph (or lead) in a news story contains most or all of the 5 W's: who, what, where, when, and why (or how). In interpretive writing, the lead should contain the information the reader needs most.* Emergency instructions may begin with a statement such as "Turn the ignition off and shut off the fuel." The first words in one of a series of recreation area guides may not be a sentence at all, but a list of important area characteristics:

Showers	Electrical and water hook-ups
Flush toilets	No sewer hook-ups
Pull through spaces	Dump station
Paved roads	Boat launch

The narrative following the lead will then provide more detailed information.

The typical media for news story structure are brochures and flyers. However, this structure should be used for display captions and trail guides as well. The reader should be able to stop at any point and still know the most important points about the subjects. For example,

> Oregon oxalis or redwood sorrel (*Oxalis oregana*) is still another plant which has adapted to its shady environment. Oxalis, which carpets much of the forest floor, spreads its leaves in the shade and droops them in the sun, a technique which enables it to get the necessary amount of light and also to conserve water. Although the leaves of oxalis resemble those of clover, they are not related. The plant contains oxalic acid, a mild acid, which gives it a tart taste thus giving rise to the nickname "sour grass."

Human interest and dramatic story lines should be saved for publications to be read and enjoyed in more leisurely times.

As with all interpretive writing, news story structure writing should be exciting and provocative; there is no need for it to be dull or matter-of-fact. For further assistance on the news story structure, refer to a text on news writing. Several are listed in the reference section of this supplement.

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* To determine visitor needs, it is necessary to conduct an audience analysis. For assistance in this area, see the supplement "Audience Analysis Techniques" by Maureen McDonough.

Summary

Effective writing is structured writing. The structure used will depend on the purpose for writing and that depends, in large part, on what the reader needs. The six structures (definition, description, comparison, cause/effect, persuasion, and news style) discussed in this supplement will be applicable to many different purposes and contexts in which the writing will be read.

Short pieces may be composed upon only one structure. Larger writings will often have a major structure, within which subsections use different structures for different subpurposes.

Structured writing is not something that just happens. Rather, it is planned carefully, based on the objectives, audience analysis, and research on the subject. The time spent on structure, and more, will ordinarily be recovered during the writing process since fewer rewrites and editings will be required.

STYLE

Style is a writer's particular way of selecting words and constructing sentences, paragraphs, and papers. Some writing styles sound ponderous and heavy, such as some academic texts. Some styles sound terse and matter-of-fact, such as news writing. Some sound light and easy, as does the writing of newspaper columnists.

Michael Faraday, the 19th century physicist, wrote with a style most of us would find difficult, not because the subject is complex nor because he chose uncommon words, but because the way he put words together sounds strange to us. In the 1800's, however, Faraday's lectures were much enjoyed by the public. Here is a sample of Michael Faraday's interpretive writing (Bowen and Mazzeo 1979).

> And now, my boys and girls, I must first tell you of what candles are made. Some are great curiosities. I have here some bits of timber, branches of trees particularly famous for their burning. And here you see a piece of that very curious substance, taken out of some of the bogs in Ireland, called *candle-wood*, a hard, strong, excellent wood, evidently fitted for good work as a register of force, and yet, withal, burning so well that where it is found they make splinters of it, and torches since it burns like a candle, and gives a very good light indeed. And in this wood we have one of the most beautiful illustrations of the general nature of a candle that I can possibly give. The fuel provided the regular and gradual supply of air to that place of action—the means of bringing that fuel to the place of chemical action heat and light—all produced by a little piece of wood of this kind, forming, in fact, a natural candle.
>
> (from *The Chemical History of a Candle*)

Bertrand Russell interpreted science for more contemporary popular audiences. His style would probably not be appropriate for the typical visitor to Corps of Engineers reservoirs and yet his writings have a large popular readership. In this sample of Russell's style, note again that, although the words are not peculiar and the concept is commonplace, the way the words sound on paper seems unfamiliar.

> There were two traditional conceptions of matter, both of which have had advocates ever since scientific speculation began. There were the

> atomists, who thought that matter consisted of tiny lumps which could never be divided; these were supposed to hit each other and then bounce off in various ways. After Newton, they were no longer supposed actually to come into contact with each other, but to attract and repel each other, and move in orbits round each other. Then there were those who thought that there is matter of some kind everywhere, and that a true vacuum is impossible... (Bowen and Mazzeo 1979, from *The ABC of Relativity*).

James Watson chose a different style to write about DNA. Compare the way this writing about science sounds with the sounds of Faraday's or Russell's writing. Here the words are much more difficult and yet the style seems simpler. It is a storyteller's style.

> Despite the messy backbone, my pulse began to race. If this was DNA, I should create a bombshell by announcing its discovery. The existence of two intertwined chains with identical base sequences could not be a chance matter. Instead it would strongly suggest that one chain in each molecule had at some earlier stage served as the template for the synthesis of the other chain. Under this scheme, gene replication starts with the separation of its two identical chains. Then two new daughter strands are made on the two parental templates, thereby forming two DNA molecules identical to the original molecule... (Bowen and Mazzeo 1979)

The above passage is from *The Double Helix*, a popular best-seller.

The sounds of Rachel Carson's writing are familiar to most who are involved with the environmental movement. Her readable style is, in part, responsible for the success of *Silent Spring*, probably the most influential book of the environmental movement. Compare her writing style with that of Watson.

> It took hundreds of millions of years to produce the life that now inhabits the earth—eons of time in which that developing and evolving and diversifying life reached a state of adjustment and balance with its surroundings. The environment, rigorously shaping and directing the life it supported, contained elements that were hostile as well as supporting. Certain rocks gave out dangerous radiation; even within the light of the sun, from which all life draws its energy, there were shortwave radiations with power to injure. Given time—not in years but in millennia—life adjusts, and a balance has been reached. For time is the essential ingredient; but in the modern world there is no time. (Bowen and Mazzeo 1977 from *Silent Spring*)

Each of these writers has used a different style with excellent success. Carson's style is the closest of the four presented to the writing style most often used by interpreters. This does not mean, however, that it is the only style that can be used. There is no one best style. Faraday's style would be generally inappropriate today and Watson's would have seemed just as peculiar at the Royal Institution in the 1800's. Similarly, Watson's story-telling style would not fit the message of *Silent Spring*.

Style is an individual thing acquired through experience in writing and particularly reading. The best way to develop a style is to read well-written interpretation. If you read extensively and if you write regularly, your style will improve naturally. Some guidelines can be recommended, however, that will

hasten the evolution of your style and make it appropriate to the special context of interpretation to outdoor recreation resource users.

The following is not a complete set of guidelines. However, when interpretation fails, it often does so because one or more of these guidelines has been ignored. For additional information about style, read *The Complete Plain Words* by Sir Ernest Gowers, *The Elements of Style* by William Strunk, Jr., and E. B. White, and *The Technique of Clear Writing* by R. Gunning.

The guidelines presented below will make your writing clear and understandable. Start with these guidelines, then use creativity to develop your own writing style. This will make the text you write not only understandable, but interesting and enjoyable.

Simple Writing

The surest way to communicate is to write simply. Simple writing is achieved by:

- Writing short sentences.
- Constructing short paragraphs.
- Avoiding unnecessary words.
- Selecting familiar words.

Display caption writers customarily put everything to be said into one sentence. The result is often confusing, even if the reader tries to sort out the meaning.

Sentence Construction

Sentences have two basic parts, a core and modifiers. The core, composed of the subject, verb, and object, expresses the main relationship among objects or states existence. Modifiers qualify the relationships expressed in the core. They can be applied to any of the three core elements and can be comprised of a single word or groups of words. In these simple sentences, the cores are in italics, while the modifiers are underlined. The core in the first example contains no object.

> Two types of *ferns can be seen* in front of you.
>
> Decaying *vegetation forms humus* which assists the growth of living plants.

Compound sentences can have multiple subjects, verbs, or objects. The first example contains two verbs, the second contains two objects.

> The hard-shelled, tasty nuts which this plant produces *ripen* in the fall and *are* a favorite food of squirrels and chipmunks.
>
> No single answer explains the awesome *height* and *age* attained by the redwood.

Three processes are employed in constructing sentences: naming, predicating, and modifying. Naming refers to the selection of a word to identify a concept. Modifying describes the selection of appropriate modifiers. Predicating is the process of choosing verbs and modifiers to describe the subject of the sentence.

Naming. Objects and ideas have more than one name and actions can be expressed by more than one verb. A tree might be called a conifer, a pine, a white

pine, or *Pinus strobus*. An animal may flee, run away, scurry, or scamper.

The choice of a name is a balance between the familiar and the exact. The name selected should project the desired image, while remaining easy to understand. Avoid unneccessary, complex, or unfamiliar words. Do not, for instance, describe the "lumpy protuberance" or state that streams "originate." Such words add nothing to the text, yet make it hard to read.

There are some instances where unfamiliar words are necessary or desirable. The goal of much interpretation is education, which includes teaching new words and concepts. Unfamiliar terms may also be necessary where there are no simpler substitutes. If an unfamiliar name is to be used, it must be defined the first time it appears. Thereafter, it may appear alone.

Latin names are a special case. Interpreters are often hesitant to use Latin names for fear that the text will appear too technical. However, Latin names need not and should not be avoided. There are some user groups who desire this information and there are some cases when it is necessary in order to distinguish between closely related or misnamed species. When using Latin names, place them in parentheses following the first reference to the object. In following references, the Latin name may be omitted unless needed for clarification:

> This large vine is an excellent example of one of the various forms in which poison oak (*Rhus diveriloba*) may grow... Poison oak, a plant...

Modifying. Modifiers qualify the relationship expressed in the sentence core. In doing so, they make the image communicated to the reader more precise. For example, in the summer, the hills around Black Butte Lake are covered with brittle, dry, yellow grass. "Brittle, dry, yellow grass" presents a different image than "grass." Writing that poison ivy has three waxy green leaves is more precise than writing that it has three leaves.

Although modifiers are valuable in developing the proper image, they may obscure the image if improperly used. In such instances, the modifiers may be unnecessary, repetitive, too complex, or misused in places where active descriptions should be. If a modifier does not add to the image, do not use it. Little is gained by calling a topaz "quite hard" or "very hard" as opposed to simply "hard."

Use modifiers to restrict the meaning of a verb or noun, not to repeat the meaning. Seldom is it useful to call a crisis an acute crisis, an emergency a real emergency, or a marsh a soggy marsh. Modify only to clarify meaning; do not use modifiers to decorate the text.

Modifiers should not be unnecessarily complex. Instead of saying, "mining was not done with the aid of machines," say "mining was done by hand." Instead of "the bark in which tannin is contained," say "the tannin-rich bark." Simpler modifiers usually produce shorter and more powerful sentences.

In some cases, active descriptions should be used instead of modifiers. Because of the greater detail, descriptions provide a stronger image. For example, describing the actions that make pioneers self-reliant is more powerful than merely calling them "self-reliant pioneers." Active descriptions are also more effective in creating empathy or setting a certain mood. Describing the devastation caused by

a flood will set a mood, while calling a flood "devastating" will not.

To describe a person, give examples of his or her behavior or pieces of conversation. In real situations, people form opinions about another person by observing that person's reactions to situations and events. Descriptions of people will be most effective if the descriptions mimic this process.

Predicating. The predicate is made up of the core verb and object as well as all modifiers. Predicating is the process of selecting and arranging these words. Monroe, Meredith, and Fisher (1977) list four common predication problems:

- An invalid core relationship.
- Unnecessary complexity.
- Core ideas not in the sentence core.
- Too many modifiers separating the core elements.

An invalid core relationship is expressed when the verb describes an action or association that cannot really exist. For example, one Corps of Engineers publication states that, "various aquatic plants have come in from nearby water bodies and have rapidly spread since then." In reality plants seldom move on their own as this sentence implies. Make sure that the relationship is stated correctly; water might be trapped in a marsh but marshes do not trap and release water. Plant species do not march or invade.

Sentences are often made less effective by unnecessary complexity. The simplest and most direct form is usually preferred. There is nothing to be gained, for instance, by writing that the redwood "is capable of attaining heights of over 300 feet," rather than that the redwood "can grow more than 300 feet tall."

Readers focus on the idea expressed in the sentence core; therefore, it should contain the most important relationship. Through improper predication, this relationship may be made a modifier rather than the sentence core.

In the following example, the important point is that "the bridge will be removed." In the first sentence, it is a modifier because it is preceded by "that." The sentence cores are in italics.

> Poor: *It is possible* that the bridge will be removed.
>
> Improved: The *bridge may be removed* in the future.

Normally, the elements of the sentence core should not be separated by modifiers. If they are, the reader may have a difficult time finding the most important point. The following example illustrates the point.

> Poor: Many ornamental *forms* of the magnolia, with its large, showy flowers and tropical appearance, *are used* in landscape plantings.
>
> Improved: Because of their large showy flowers and tropical appearance, many of the magnolia's ornamental *forms are used* in landscape plantings.

Modifiers should, however, be close to the words they modify. Does "off the path to the right these two plants grow at the drier edge of the salt marsh" mean that the two plants are off the path to the right, or that the drier edge of the salt marsh is off the path to the right? Sometimes a misplaced modifier can create improbable images, as in this trail guide description: "Poison ivy does have some wildlife

value. Twenty-seven species of birds . . . eat its white berries along with muskrats, cottontail rabbits, and some mice." The sentence is not wrong, it just lacks precision.

Compound sentences. Simple sentences are those which have only one subject, verb, and object. Other sentences are classified as complex. Complex sentences, if written correctly, will add variety and interest to the text. Two common errors should be avoided when writing complex sentences. First, do not combine unrelated ideas. There seems to be a tendency to cover all information in one sentence: "Located 24 miles from Winslow, Pollock dam was finished in 1943." Unless being 24 miles from Winslow caused Pollock dam to be finished in 1943, these should be two different sentences.

A second problem to be avoided is too many modifiers. The reader should not have to search for the main point. The following example suffers from this problem. It also contains two ideas that are different enough to warrant separation into two sentences.

> Thus in December it is possible to observe a golden cast to the trees from the pollen produced by the male strobili to insure a future crop of seeds, and, at the same time, many seeds can be seen on the ground from the present year's crop.

Paragraph Construction

The manner in which sentences are arranged into paragraphs will influence the effectiveness of the text. Readers have learned to expect a certain progression of information. When one kind of information is found where another is expected, the reader will, at the very least, be momentarily confused and may receive the wrong impression.

Five elements are used to construct paragraphs: introduction, detail, analysis, summary, and conclusion. The purpose of the introduction is to attract the reader's attention and tell the reader what the paragraph is about. This sentence from a Corps of Engineers trail guide efficiently introduces the topic and draws the reader to what will be said next: "Poison Ivy is the only plant in North America that appears in all three plant forms."

Two other elements, detail and analysis, will follow logically from a strong introduction. Detail is that information which elaborates on the topic. An analysis will contain logic which supports a point. It may consist of such things as statistics, arguments, or proofs. In the preceding example, the detail and analysis sections would contain, respectively, a description of the three plant forms and an explanation of how poison ivy can exist in all three forms.

The last sentence or two of the paragraph should summarize the material and provide concluding remarks. The purpose of the conclusion is to leave the reader with a parting thought. It may be a thought-provoking question, a comment that goes above and beyond the scope of the paragraph, a theory, or an anecdote.

Not every paragraph will contain all of the elements described. Paragraphs which are part of a longer text, for instance, may have no summary. It is also not essential that the elements be presented in the order described above. However, when a paragraph does not seem to work, it can often be improved by making

certain it contains the five elements and they appear in order.

The five elements discussed in relation to paragraphs, introduction, detail, analysis, summary, and conclusion, also apply to texts containing more than one paragraph. In these texts, there may be one or more paragraphs composing each element. The elements, however, will serve the same function—attracting the reader's attention, introducing the topic, providing detail on the topic, and leaving the reader with some parting thoughts.

Consistency

Different user groups will respond differently to different writing styles. Materials written for experts in a given field may not be appropriate for beginners. Likewise, materials written for first time visitors may not satisfy repeat visitors. If different styles are necessary, do not mix them within one text. Instead, write several versions of the same text. A mixed style is at least confusing and can be insulting. A pamphlet for adults that refers to rotting logs as "nature's fertilizer factory" and competition among saplings as a "tree battlefield" nonverbally communicates something to the reader about the writer's estimate of his or her intelligence. That impression is reinforced if the pamphlet is illustrated with fantasy drawings of elves and battling trees.

Mixing writing styles for adults and children seems to be a major problem with interpretation. If you are writing for children, the entire manuscript should be written at a child's level using images and relationships children can understand (see Machlis and McDonough 1978). When writing for adults, use mature language and adult images. You can test the clarity of your writing for adults using either Gunning's Fog Index or the Flesch Readability scores. Both are discussed in Fazio and Gilbert (1981).

Summary

Style contributes to writing effectiveness the way that a musical score contributes to the effectiveness of a motion picture or a slide tape. It adds emphasis, sets a mood, reinforces emotional impact, and cues the reader about things to come. Just as the most effective musical score is one that is unobtrusive, so the best style is one that creates its effects without being noticed. A style that is too assertive draws attention to itself at the expense of the message.

SUMMARY

Visitors to Corps recreation areas receive a tremendous amount of verbal and nonverbal communication, much of it through interpretation. To be effective, the structure and style of this communication must reflect visitor needs and interests.

People have different information requirements and exhibit different behaviors at a recreation area than in their normal working or living environment. They expect to be free from obligations and often demand immediate satisfaction from their activities. In addition, they are often exposed to unfamiliar environments and situations. These and other characteristics of recreationists should be considered when any type of interpretation is developed.

The purpose of the interpretation and the intended audience will direct the selection of a structure and style. Structure refers to the way the material is organized. Some common structures are: definition, description, comparison, cause and effect, persuasion, and news style. Each text should have one overall structure, but lengthy texts may be written using different structures for different sections.

Style is the particular manner of selecting words and arranging them into sentences and paragraphs. There is no one style that is best in every situation. However, an effective style has the following characteristics:

- It is unobtrusive.
- It is written simply, using as many words as necessary to create the desired effect, but no more.
- It does not overuse metaphor nor understate.
- It relies on action and detail rather than adjectives and adverbs.

"Everything we write—except the occasional pieces we scribble just for the joy we find in putting words together—should take account of the reader's comfort, interest, and capacity to understand" (The Royal Bank of Canada 1980).

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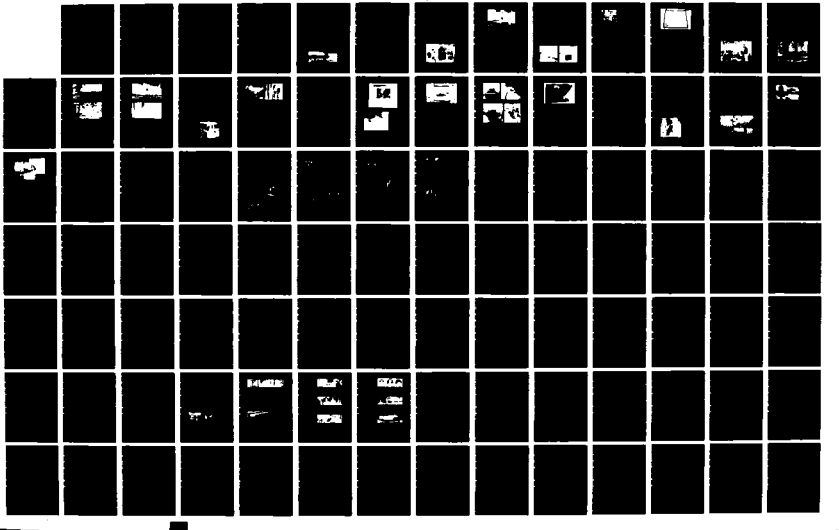

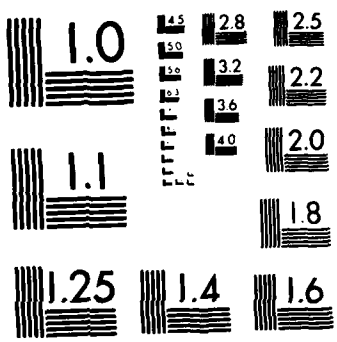

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DESIGN GUIDELINES FOR BULLETIN BOARDS, AMPHITHEATERS, AND SELF-GUIDED TRAILS

A Supplement to

A GUIDE TO CULTURAL AND ENVIRONMENTAL *INTERPRETATION IN THE* U.S. ARMY CORPS OF ENGINEERS

Abstract

This supplement provides detailed guidelines for designing bulletin boards, amphitheaters, and self-guided trails. Location and site considerations, materials, and potential users are discussed in regards to each facility.

DESIGN GUIDELINES FOR BULLETIN BOARDS, AMPHITHEATERS, AND SELF-GUIDED TRAILS*

A Guide to Cultural and Environmental Interpretation in the U.S. Army Corps of Engineers

INTRODUCTION

This publication is one of a series of supplements to "A Guide to Cultural and Environmental Interpretation in the U.S. Army Corps of Engineers** (Propst and Roggenbuck 1981). During field review of early drafts of the Interpretation Manual, Corps personnel noted information needs beyond the guide's scope, one of which was design guidelines for certain interpretive facilities. Design guidelines are covered only in a general way in the Interpretation Manual. This supplement will provide more detailed guidelines for bulletin boards, amphitheaters, and self-guided trails.

The purpose of this supplement is not to teach Corps personnel how to be designers, but rather to provide some basic guidance in this area. Design is a creative problem-solving process. There are too many different environmental, social, and managerial situations to allow for the specification of rigid design criteria. Each situation (e.g., design of a new amphitheater) requires a separate evaluation based on particular needs. As such, this supplement provides basic guidelines which the creative interpreter may adapt to meet his/her own particular needs. Corps interpreters may also use this information to communicate their ideas and needs effectively to those involved in the actual design of interpretive facilities (landscape architects, planners, etc.). For each type of facility, sources of additional information are also provided in the Bibliography for those who want to pursue a particular topic in more detail than has been provided herein.

Design as Part of a Larger Process

The effective design of interpretive facilities can proceed only after decisions have been made regarding the objective of the facility, characteristics of the intended audience, budgetary constraints, and physical resources. It is a waste of time and money to design an interpretive facility without any consideration of what objectives that facility is intended to achieve. Furthermore, without objectives, it is impossible to evaluate how effective a facility has been. Thus, the objective(s) of any interpretive facility should be given primary consideration.

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* This supplement was written by Dr. Dennis Propst, Shepherd College, Shepherdstown, W. Va., and Ms. Janet Akers Fritschen, Michigan State University, East Lansing, Mich., under Intergovernmental Personnel Act Agreements with the U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.

** Hereafter referred to as the "Interpretation Manual."

Audience characteristics will also heavily influence the design of interpretive facilities. Visitors in outdoor leisure settings usually expect informality and free interactions among group members. Amphitheaters could be designed to create an informal atmosphere by providing movable seating or an open grassy hillside instead of straight rows of fixed benches (Figure 1). Other examples of incorporating audience characteristics into design will be presented in the sections to follow.

Of crucial importance to the design of interpretive facilities are the physical resources of the site itself. Factors such as amount and type of vegetation, soil erosion potential, natural hazards, and endangered or fragile species should be considered in the early stages of design. Locational and site factors for consideration in interpretive facility design will also be discussed in this supplement.

Interpretation must compete with other uses of a project's limited budget. Although this supplement will not provide a detailed cost breakdown, where the information is available, the *relative* costs of the materials used in building interpretive facilities are presented. Such costs are an important aspect of the design decisionmaking process. The trade-off between construction costs and operations and maintenance costs should also be considered. It is often better to invest heavily in quality, durable construction materials now than to spend a large portion of the budget in the years ahead on costly maintenance and replacement.

Evaluation

The process of design does not end with the construction of an interpretive facility. The effect of the design on visitors' behaviors should be evaluated. Did the design accomplish the stated objective(s)? Could the facility have been located in a better area? How much maintenance is required? Is it used by a substantial number of visitors? These are the types of questions that must be answered so that existing and future designs can continually be improved.

Figure 1. An informal feeling can be created in the amphitheater by leaving a grassy hillside for seating rather than providing benches

Other Sources of Information

Several chapters of the Interpretation Manual provide information useful in the design of bulletin boards, amphitheaters, and self-guided trails. In addition, a number of the other supplements to the manual contain detailed information on different aspects of the design process. These supplements should be consulted during the planning, implementation, and evaluation of interpretation facilities.

Design guidelines for each of the three interpretive facilities and recommendations for interpretive materials are discussed in the following paragraphs. Interpretive facility designs can be found in *Design*,* landscape architecture journals and magazines, and the Engineering-Design element at District Offices.

BULLETIN BOARDS

Bulletin boards act as a project newspaper, providing valuable information to the visitor. They are always available, unlike many other sources of information, and do not require constant supervision by Project staff. Properly designed, bulletin boards foster communication from the Corps to the visitor, visitor to the Corps, and visitor to visitor. Bulletin boards may be the source of first impressions that visitors form in terms of the Corps' "image." Therefore, attention should be paid to their location, design, and layout.

Types of Bulletin Boards

Information which bulletin boards could contain includes: safety messages, emergency phone numbers, lake maps, Title 36 rules and regulations, announcements of interpretive programs (e.g., conducted walks, amphitheater programs), visitor center hours, available activities in the area, the lake information phone number, visitor messages, and a suggestion box. The staff at Lake Shelbyville categorize their bulletin boards into four different types based on information content (U.S. Army Engineer District, St. Louis 1980):

General lake information boards contain area maps, rules and regulations, welcome letters, emergency phone numbers, and other general information. This information rarely varies. General lake information boards are primarily located near the visitor center, the dam overlook, and at entrances to recreation areas.

Safety and information boards contain safety tips and materials, fishing regulations, "no swimming" and "no fishing" notices, and emergency phone numbers. This information is checked each month and updated when necessary. Boat launching areas are the most common locations for these boards.

Campground activities boards are used to post information on interpretive programs and are updated weekly when programs are offered. Typical locations for campground activity boards include fee booths, comfort stations, shower houses, and boat launch, playground, and picnic area comfort stations.

Facility reservation boards contain reservation dates for a specific facility. Information on these boards is changed weekly or as needed. Common locations

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* *Design* is a quarterly publication of Park Practice, a cooperative effort of the National Park Service and the National Recreation and Park Association.

include the visitor center, picnic shelters, skating rink shelter, boat launch lot, and group camp areas.

Location Guidelines

In general, bulletin boards should be located in areas where people congregate, such as entrance st ations, boat ramps, overlooks, and visitor centers (Figure 2). If near a road, space should be allowed for vehicles to pull out of traffic.

Design

The keys to bulletin board design are sturdiness and simplicity. The structure should blend in with the natural surroundings and not detract from the information being presented. The site and the type and amount of visitor use should be taken into account. It may be desirable to harden the area around the base of the board with materials such as wood chips or concrete (Figure 3). Hardened areas will accommodate heavy use and wheel chairs, while keeping a neat appearance. The base of the board should be left open so that windblown litter and snow do not collect. If the bulletin board is an area that receives heavy use at night, lighting should be considered. Some consideration should also be given to the landscaping of the area so that it is an attractive site. Finally, the bulletin board can be integrated into a larger visitor use area that could provide benches, telephones, and trash receptacles (Figure 2).

An overhanging roof should be provided to keep rain off bulletin board materials, reduce the amount of sun glare, and keep the sun from fading photographs and colors. Protect the display board with either glass or Plexiglas. Glass does not scratch easily and is resistant to most cleaning fluids, but can be broken. Plexiglas is less brittle, with some types being nearly shatterproof, but is more expensive than glass, can be easily scratched, and is vulnerable to many chemicals and insect sprays.

Figure 2. Locate bulletin boards where people will encounter them during regular activities

Figure 3. A hardened area around the base of the bulletin board will accommodate heavy use

Display Materials

Webster (1980) provides some suggestions for bulletin boards and outdoor exhibit materials:

a. Natural materials tend to be less reflective.

b. There are many nonglare synthetics available including textured laminates, mat-finished plastics, nonglare glass, and satin finish paints.

c. Nonfading inks and paints should be selected (generally enamels and epoxy paints are best).

d. Black-and-white photographs last longer than color. They can be used as is or dyed (e.g., sepia tone, diatone). High contrast prints can be silk screened. Good results have been obtained with color photographs when they have been embedded in a special ultraviolet-resistant fiberglass.

e. Vinyl films for backgrounds and vinyl letters are easy to use and some are ideal for outdoor conditions. They are, however, easy to scratch. If the board itself is not covered, consider protecting the materials with clear contact paper, readily available at most variety and hardware stores. The contact paper can be cut to the proper size and smoothed over the layout to provide a nearly invisible protective surface.

The *Directory of Interpretive Materials* (Sharpe and Searles 1969) provides a list of suppliers for materials and equipment for producing signs and labels. Another list of materials and their approximate costs can be found in Appendix A.

Layout

The effectiveness of bulletin boards can be enhanced by keeping them uncluttered, brief, and to the point. This can be accomplished by a modular fashion

bulletin board layout with several major categories of information headlined in bold letters. Category heading ideas include: things to do, rules and regulations, things to remember, and personal messages (Machlis and Machlis 1974). To greet the visitors, a welcome message can be placed at the top of the board.

An advantage of this type of layout is that the entire bulletin board does not have to be altered each time a change is needed in one section. Also, this type of layout is neat and easy to read, yet allows room for photographs, pictures, and creative designs.

Things to do. This section should include activities that may be of interest to a wide variety of visitors (children, older adults, fishermen, etc.). Which facilities are accessible to the handicapped? Where and when will the eco-meet be held? When does the bass tournament start? Other posted activities may include: amphitheater programs, dam tours, conducted walks, visitor center tours, nearby trails, church services, and points of interest. Illustration of the activities with drawings or photographs will draw attention and break the text up for easier reading. Descriptions of interpretive programs should not leave the visitor guessing, but should be complete, giving the time, date, subject, and location.

Rules and regulations. Rules and regulations are useful as management tools only to the extent that people read and understand them (Figure 4). There is some evidence that recreationists are not well informed about rules, especially adolescent, first-time, and nonlocal users (Ross and Moeller 1974). Poor wording and design are strong contributors to ineffective communication of rules (Ross and Moeller 1974). Although Title 36 regulations must be posted, they should not stand alone. It is unlikely that visitors will read columns and columns of legal statutes and punishments in fine print. There is even less chance that they will understand why the rules are necessary. Thus, some of the more important regulations should be expanded. Reword them in a positive manner, explain why they exist, and offer alternatives where possible. Consider the following regulation:

Figure 4. Carefully worded, well-designed signs will be more effective in communicating rules and regulations than pages of text printed in a small type face

Figure 5. Since they are always available, bulletin boards are a good means of providing information or information sources to the visitor

> Destruction, injury, defacement, removal, or any alteration of public property, including but not limited to constructed facilities, natural formations, historical and archeological features, and vegetative growth, is prohibited without the written permission of the District Engineer.

A portion of this regulation may be clearly and briefly reworded to state that the destruction of plants is not allowed. Following this statement should be a brief explanation of the need for vegetation for such reasons as erosion control, wildlife habitat, and screening between sites. Finally, alternatives should be offered. In this example, visitors may be told where they may gather dead firewood or asked to hang lanterns from laternholders, not on tree limbs close to the trunk. Due to space restrictions and restrictions on the amount of material visitors are willing to read, it will not be possible to explain all rules and regulations. Therefore, select those rules most relevant to the location (e.g., destruction of vegetation in campgrounds, water safety in swimming and boat launch areas).

Brochures stating all of the rules and regulations should be made available, but these should also be written to be explanatory, not merely in legal jargon (see "Selected Interpretive Writing Guidelines").

Things to remember. This section of the board can be used to provide important information not covered elsewhere. Such information might include safety reminders, emergency phone numbers, where to go for information (Figure 5), and suggestions on the use and preservation of the recreation area. An appropriate ending to this section may be a reminder that the project facilities are for visitors to enjoy and preserve so that others may use them.

Personal messages. Invited to or not, visitors often use bulletin boards for personal messages. To keep the board neat and orderly, provide a section for personal messages. Cards can be provided in a waterproof box. Visitors should be asked to date their messages so that they may be removed after a reasonable length of time.

Other Considerations

Some further tips on effective bulletin board layout include:

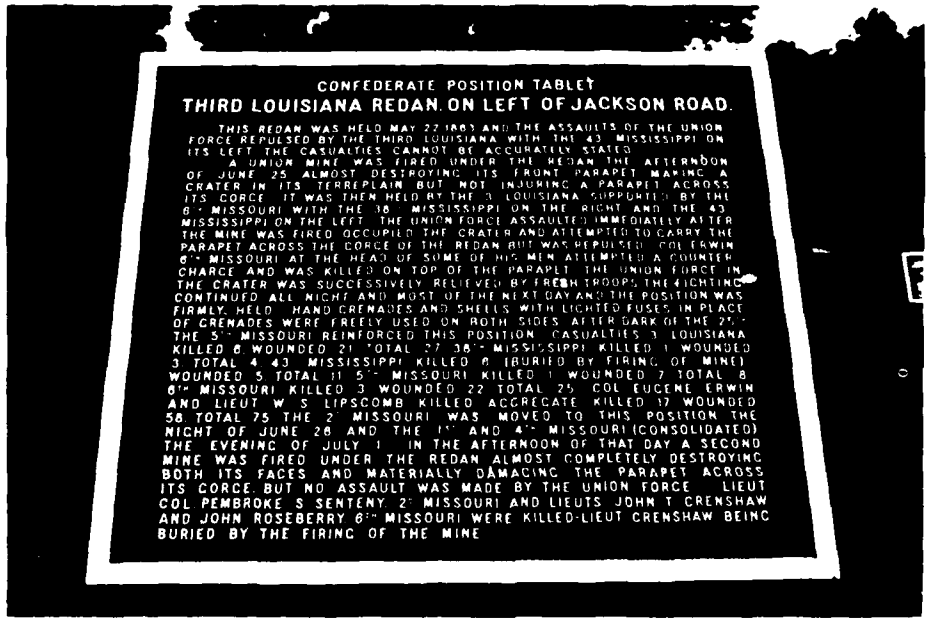

Figure 6. Masses of text in capital letters will seldom be read

a. Make the titles large and clear. Press-on letters, available at most office supply stores in various shapes and styles, are useful for this purpose.

b. Type or print all information clearly. Large sections of text composed entirely of capital letters are difficult to read (Figure 6), especially for children. Pay careful attention to spacing; narrow margins and reduced spacing between sentences decrease legibility.

c. Arrange the sections in a balanced, attractive manner. Center the text under the titles. Place items of interest at eye level on the board. Do not forget that eye level for children is different from that of adults.

d. Use drawings, photographs, maps, and cartoons for clarification and appeal. Amateur artists and photographers on the staff will often be willing to lend a hand.

e. Color can be used in the text, drawings, or background to attract and hold the visitor's attention. Take advantage of the feelings attributed to different colors when designing the interpretive message. Generally, the following colors and feelings are associated (U.S. Army Engineer District, Pittsburgh 1979):

- Red — exciting, danger, hot
- Orange — alertness, hot
- Yellow — joy, gaiety
- Green — restful, soothing, neutral
- Blue — cool, quiet
- Purple — stateliness, royalty, rich
- White — purity, cleanliness
- Black — gloom, death

Colors should complement, not obscure, the message. Neutral tones (blacks, brown, beige, gray) can be used effectively with any primary color combination. Some color combinations are more legible than others. The

following list presents these combinations in descending order, from most legible to least (U.S. Army Engineer District, Pittsburg 1979):

- Dark blue on white
- Black on yellow
- Green on white
- Blue on white
- White on blue
- Black on white
- Yellow on black

AMPHITHEATERS

Amphitheaters provide the opportunity to communicate to large groups in a relatively comfortable setting (Figure 7). Depending on their function, they can be highly developed, incorporating sophisticated audiovisual equipment, or primitive, with only a row of logs for seating. Amphitheaters may be used for a variety of purposes, including talks, slide shows, movies, puppet shows, demonstrations, roving exhibits, plays, and meetings. Since the amphitheater is essentially an outdoor auditorium, its possible uses are almost limitless.

Location Guidelines

The amphitheater should be located so that it is easily accessible, yet away from distractions such as traffic, marinas, and stores. The purpose and proposed use of the amphitheater will prescribe its location. For example, a common use is evening interpretation programs for campers. In this case, the amphitheater should be located in, or very near, the campground.

If campers will not be the primary users, it may be desirable to provide facilities outside the campground. There may be an attractive site in a day-use area or near

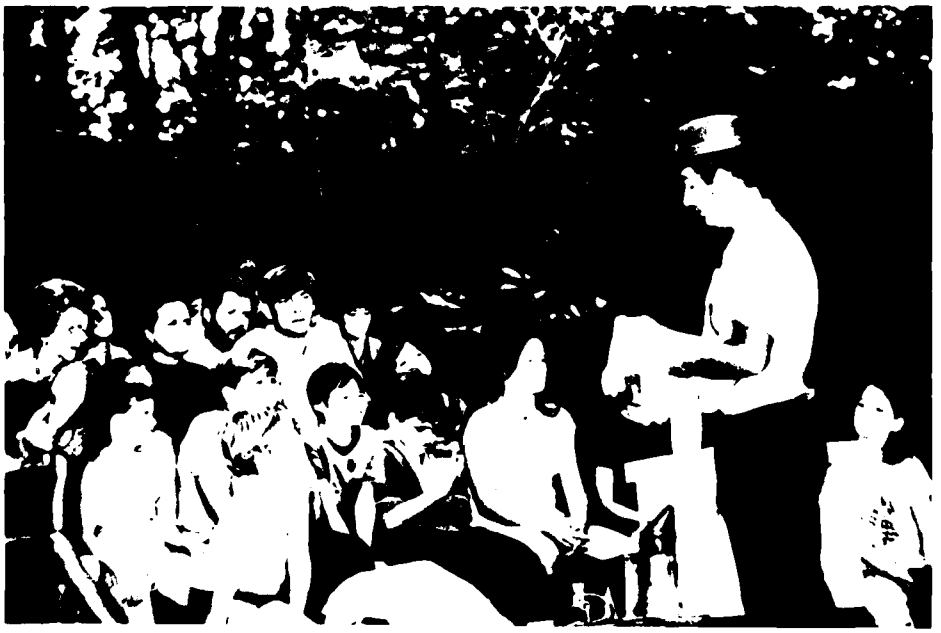

Figure 7. Amphitheaters provide the opportunity to communicate to large groups in a comfortable setting

the dam that lends itself well to amphitheater development; or, there may be a need to provide one central location for certain programs. For example, Raystown Lake (Baltimore District) has an arrangement with the theatre arts department at a local college whereby students perform demonstrations and plays during the summer months. Since these performances attract local residents as well as visitors from all over the project, the amphitheater's location in an easily accessible day-use area is most appropriate.

A small amphitheater may also be located along a trail. In this setting, it can serve a number of purposes. On a guided tour, the interpreter has a convenient place to stop to involve the group in a discussion or describe an event or concept in greater detail. The amphitheater's relatively remote location may also make it ideal for other activities such as night programs or school groups.

Site Criteria

Two of the most important factors to consider when looking at potential amphitheater sites are slope and surrounding features. Due to the potential for soil erosion and image distortion on the screen (if there is one), the slope of the audience area should not exceed 30 deg from horizontal, as measured from the bottom of the screen. For ease of viewing, it is helpful for seating to be arranged on an angle, especially if the facility is designed for large audiences (greater than 100). A naturally shaped bowl requiring little or no grading is ideal for this sort of arrangement (Figure 8).

Regardless of the slope of the viewing area, a natural background void of artificial elements is necessary to set the proper atmosphere and avoid distractions. Vegetation enhances the acoustics in the viewing area, though the

Figure 8. For a better view of the stage, seating should be placed on a slope. In hilly areas, it may be possible to use an existing slope

lake itself may also provide a pleasing backgound. A north-south orientation helps avoid light from the rising or setting sun. Locate away from wet areas where mosquitoes breed.

Parking Facilities

If parking is necessary, it should be located close to the amphitheater and provide ample spaces. In some cases, established parking areas will be available. These may be used as is or expanded to meet the additional demand. With campground amphitheaters, for instance, it may be necessary to add parking spaces to accommodate campers from distant campsites, handicapped users, and visitors from outside the host campground (e.g., other project visitors or local residents). In addition, the site design should allow for expansion as use increases.

When planning parking facilities, care should be taken that vehicle noise and headlights are not major distractions. A natural screening of trees and other plants will help. Accessibility should be considered in terms of meeting the specifications for use by persons in wheelchairs.

Amphitheater Design

Every amphitheater will provide some kind of seating; most will have a fire pit as well. One or more of the following may also be included, depending on the purpose and location of amphitheater: a screen, stage, facilities for audiovisual equipment, and lighting.

Seating. The typical amphitheater has seating placed in straight lines, fixed in the ground, and arranged in a cone-shaped pattern. However, knowing that visitors in a leisure setting expect a relaxed and informal atmosphere (Field and Wagar 1973), an alternative might be to design amphitheater facilities with no seating or some other informal seating design. In the case of no seating, visitors could be encouraged to bring their own chairs or blankets and sit where they please. Movable benches provide another informal arrangement. Finally, some combination of formal and informal seating could be provided; that is, provide a few unmovable benches in a cone-shaped pattern and allow an open area for informal seating (Figure 9).

There are very few guidelines in terms of amphitheater seating capacity. For campground amphitheaters, Malbon (1982) suggests 2.5 seats per campground unit as a general rule-of-thumb. Thus, a 100-unit campground would require seating for 250 persons. This, however, is only a general guideline and should be adjusted to fit the existing situation (e.g., consider campground occupancy rate, party size, and estimated attendance rate). Other factors to consider in the determination of amphitheater capacity are viewer distance, angle of the viewer to the screen, and type of program offered. These factors are especially important if the facility is designed with fixed seating. The seating and screen guidelines on pages 305-307 of the "Multi-image Audiovisual Presentations," supplement provide additional assistance.

Seating, where provided, should be made as comfortable as possible. Wood is best in terms of comfort and ability to harmonize with most surroundings; stone or concrete seats become cold and damp at night in northern and high elevation climates. Comfort can be enhanced by adding seat backs (Figure 10).

Figure 9. If possible, provide a combination of fixed seats and open grassy area for informal seating

Figure 10. Wood construction and seat backs help make amphitheater seating more comfortable

The seating area surface must drain well and not reflect light. Dirt, compacted crushed gravel, wood chips, or grass are adequate surfaces in most situations, but may erode and do require periodic maintenance. Loose, large gravel is too noisy and too easily thrown at the screen or other facilities. A bituminous pavement surface is initially very expensive, but is durable, requires infrequent maintenance, and weathers in time to give a fairly natural appearance. This type of surface can also be easily used by persons in wheelchairs.

Fire pit. The traditional campfire helps create an informal atmosphere and attracts visitors that may otherwise be unaware of the program. If provided, the fire pit should be off to one side so that the light will not interfere with the program (Figure 11). For the same reason, the fire should be allowed to burn down before the program starts. Keep the firewood source concealed from the visitors so that they will not be encouraged to keep feeding the fire.

Figure 11. Fire rings should be located well to the side of the screen so fire light will not interfere with the program

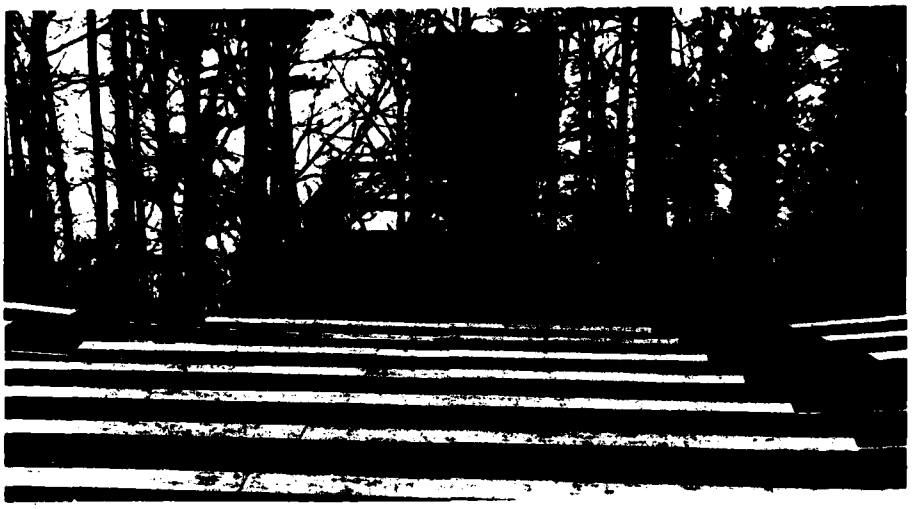

Figure 12. Screens should be protected from weather and vandalism by shutters or other means

Screen. Screen size will vary with the seating capacity of the amphitheater. It should, however, be large enough that those in the back row are able to see clearly. For an audience of 500, Grater (1976) suggests a 12-ft by 12-ft screen. The screen may be made of different types of materials, depending on whether it is to be used for front or rear projection. For front projection, it may be a roll-down screen or a painted surface. If a painted surface is used, it should be protected from the weather and vandalism. Usual methods include shutters (Figure 12), sliding doors, and roll-up doors. If a permanent roll-down screen is used, there should be a roof over the screen box to protect it from the weather.

For rear screen projection, the audiovisual equipment is located behind the screen and a special type of glass is necessary. When not in use, the screen must be protected with a hard cover, such as those described for front projection screens.

More information on screens and projection distances can be found in another supplement, "Multi-image Audiovisual Presentations" (by Robert Clark).

Stage. If seating is provided on little or no slope, the floor of the stage should be approximately 2 ft above the ground so that the speaker and screen (if there is one) are elevated enough to be seen (Figure 12). Although elevation is not necessary if the seats are placed on a slope, it would still enhance viewing. The stage should be wider than the width of the screen to accommodate both the speaker and the screen.

Facilities for audiovisual equipment. If the amphitheater is used to present audiovisual programs, the minimum requirement will be some type of power source. More sophisticated facilities may include a projection booth, additional storage space, audio speakers, and a remote control box. For the simplest front projection arrangement, electrical connections and a projector stand need to be located at the rear of the amphitheater (Figure 13). It may be desirable, however, to provide a projection booth and/or storage buildings. This eliminates the need for transporting equipment to and from the site and the hazards associated with the exposed equipment and electrical cords. A projection booth must be provided if rear screen projection is used. This may also be extended to incorporate additional storage.

If audio speakers are desired, they should be mounted on either side of the screen and high enough to discourage vandalism. They may also be covered for protection. The remote control panel if included, should be located off to one side of the screen, inset, and built to be securely locked. This panel should allow the operator to control all lights, projectors, amplifiers, and outlets. Power outlets should not be located outside the panel box because they can be easily damaged.

Lighting. Since most amphitheater programs occur at night, lighting is desirable. Lighting attracts visitors to the programs, helps staff in cleanup and location of equipment, and provides for visitor safety. Four different types of lighting are available and may be used singly or in combination: (a) low level lighting to illuminate walkways, (b) stage lighting for the speaker or performer, (c)

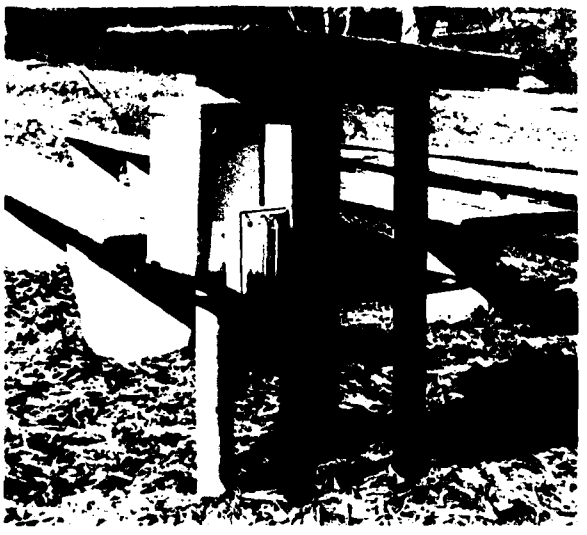

Figure 13. The simplest front projection system requires electrical connections and a projector stand

Figure 14. Lighting on pathways and aisles makes night use safer and more convenient. Overhead lighting helps attract attention and makes setting up and cleaning up easier

dim ground lights on the ends of the aisles, and (d) overhead lights to use before and after the program (Figure 14). As a minimum, stage and overhead lights should be provided for nighttime programs.

SELF-GUIDED TRAILS

This section presents some important factors to consider when designing a self-guided trail. A discussion of the advantages and disadvantages of the self-guided trail as well as different trail types is presented in the Interpretation Manual. Readers are encouraged to review the material in the Manual before beginning to design a trail. Other useful sources of information are Hanna (1975); Grater (1976); Sharpe (1982); U.S. Army Engineer District, Sacramento (n.d.); and Beechel (1975, 1979).

Location Guidelines

The location of a self-guided trail will be influenced by three factors: accessibility, trail theme and objectives, and site resources. Since decisions made about one factor will affect the other two, work should progress on all three simultaneously.

Accessibility. The trail should be located near areas of high visitor concentration so that it is easily accessible to the visitor, less subject to vandalism, and easier to maintain. Such sites include visitor centers, campgrounds, day-use areas, environmental study areas, and well-traveled recreation roads. Exceptions can be made to this rule, especially if there is an outstanding scenic, historic, or natural feature located outside normal visitor traffic.

The availability of parking should also be considered when selecting a trail location. If the trail begins near a visitor center, picnic area, or other such facilities, the parking facilities may be shared. If separate parking areas are required, they need not be large. Large parking lots encourage more use and may result in more resource damage, vandalism, and crowding.

Trail theme and objectives. As is the case for other forms of interpretation, the trail should have a well-defined theme and objectives. Depending on the purpose, the theme could be specific or general. Specific theme trails address one subject, while general theme trails address a concept or idea. Some examples of specific themes include resource management activities, the impact of the dam on the natural environment, the dam and powerhouse structures, project geology, marsh ecology, and plant succession. Conversely, environmental awareness and modern technology would be classified as general themes.

Site resources. The natural and cultural resources of the site will aid in determining the location of the trail as well as the location of individual stops along the trail (Figure 15). Thus, an inventory and map of project resources are necessary. Often these are available in the Project Master Plan. Potential sites could be inventoried in greater detail, including "sensory" features such as temperature transition zones (cool woods into a hot meadow), contrasting features (large rocks protruding from a hillside), and sounds (a waterfall, wind blowing through trees). The greater the number of senses that are stimulated, the greater the level of visitor involvement and the more favorable perceptions and memories become.

Selection of Features

The features that are finally selected for interpretation should be based on the trail's theme and objectives. Various authors list from 10 to 25 features per 1/2-mile trail as being appropriate. Due to information overload and visitor boredom and fatigue, it is suggested that the number of features be closer to 10 than to 25.

Other factors to consider in selecting features are:

a. Try to interpret a few more features on the first half of the trail than on the second half. Visitors are usually eager at the beginning, but interest and patience begin running out toward the end.

b. Try to select features that are relatively evenly spaced. They should be far enough apart to avoid crowding (Figure 16), but close enough to maintain interest.

c. Since unique features can be damaged, consider whether or not to point them out at all. If they are pointed out, consider some means of protecting them.

d. Consider interpreting one or two temporary or unusual features that visitors will naturally be curious about, such as tree diseases, migrating birds, animal paths, and high or low water levels in the lake. If temporary features are interpreted, the stations should be designed so they can be easily removed once the feature is gone.

e. Consider the addition of built features (e.g., plaster casts of animal tracks) for interpretation as long as they add to the overall theme and support the trail's objectives.

f. Incorporate features which require senses other than sight. Interpretation at a stop may encourage visitors to listen to, smell, or touch an object.

g. Many visitors carry cameras, so include outstanding photo opportunities when possible.

Figure 15. The location of cultural and natural resources helps determine the site of self-guided trail as well as spacing of individual stops

Figure 16. Interpretation points that are too closely spaced offer the potential for crowding and information overload

Trail Layout

The self-guided trail should not be developed as a segment of another trail, rather it should be a trail in and of itself. Intersecting trails may confuse the user as well as bring nonusers onto the trail accidentally. For safety reasons, the trail should not come into contact with roads or railroad tracks. The self-guided trail should have a

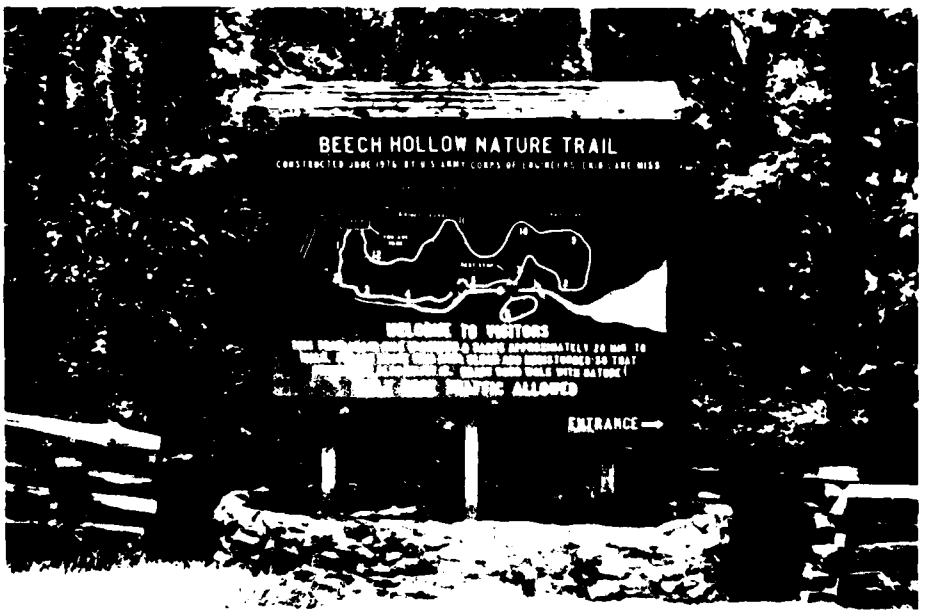

Figure 17. A self-guided trail should be designed so that the visitor knows where the entrance and exit are and how long the trail is in terms of both time and actual distance

well-defined entrance (Figure 17) and exit located within sight of each other. This will aid the visitors in orienting themselves when exiting the trail. Since people are apt to walk to the right, the trail entrance should be placed to the right of the exit (Hultsman 1982). In routing the end of the trail, make sure visitors will not have a clear view of the parking lot or other use areas, otherwise they will be attempted to short-cut. The trail length will depend on the terrain and features to be interpreted. As a general guideline, the trail should be approximately 1/2 mile long and take no more than 45 min to complete.

The trail should not be located on strenuous terrain or near potential hazards. The grade should be less than 10 percent or less than 5 percent if people in wheelchairs use it (Sharpe 1982). Steps (Figure 18) can be built to accommodate steep portions along the trail, but will present a barrier to many handicapped people. If switchbacks are necessary, the turns should be as level as possible and have a minimum radius of 4 ft (Hultsman 1982). If at all possible, the trail should start with the uphill portion.

Locating the trail where there are changes in habitat will help maintain interest. In addition, there is some evidence that messages presented just after a change will be better retained (Gustke and Hodgson 1980). Vegetation also plays an important role in incorporating anticipation and surprise into the trail. Hammitt (1980) found that visitors to a bog environment preferred interpretive trails that curved out of sight in dense vegetation (Figures 18 and 19) rather than trails composed of straight segments. Vegetation conceals not only the path, but other trail users. Ways of incorporating mystery (Hammitt 1980) into trail layout include:

a. Design the trail to turn where dense vegetation, a land form, or some object exists to obscure the view of where the trail goes.

Figure 18. Steps facilitate travel over steep trail sections but present a barrier to many handicapped people

Figure 19. The kinds of materials needed to surface a trail bed depend on the type of soil and the amount of use expected. Wood chips may be used on relatively dry, flat trails. In wet areas, a footbridge can provide access with minimum impact on the environment

b. Lay out the first turn soon after the trailhead so that visitors will be drawn to seek the hidden information around the corner.

c. Provoke visitors with partially concealed views through tree trunks or branches.

Signs and markers along the trail should be placed so that there is no question about what is being interpreted. Photographs and drawings can be used to aid in identification (Figure 20). If a leaflet and markers are used, the leaflet may be dispensed at a nearby staffed station, such as a campground office or visitor center,

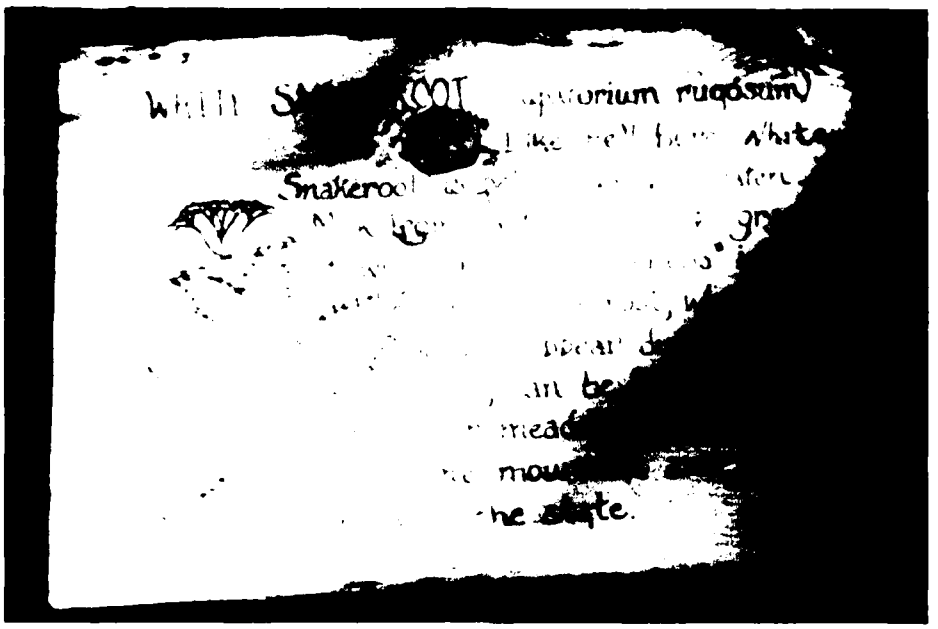

Figure 20. Where the subject of interpretation is not immediately obvious or is subject to change, drawings can aid in identification

or at the trail head. In the latter case, a closed box should be provided to protect the leaflets from the weather. If a box is used it should be kept stocked with a sufficient supply of leaflets. Whether markers or signs are used, they should be placed on the same side of the trail so that they are easier to find. Objects on the other side of the trail can be interpreted by using statements such as: "Behind you ..."

As an alternative to signs or leaflets and markers, a self-guided trail may be developed using a leaflet by itself. In this case, broad subjects, such as ecosystems or concepts, would be interpreted rather than specific objects or features. For example, on a trail that winds through an upland site and a bog, interpretation could be focused on why species exist in the two environments.

There are several advantages to trails that use leaflets alone. Visitors are encouraged to explore and learn on their own, rather than having features pointed out for them. The absense of designated stations also allows visitors to choose for themselves where they will stop along the trail. Finally, messages can be changed frequently without having to change signs or markers.

Another alternative to using signs or leaflets and numbered markers is to provide audio messages at selected stations along the trail. Audio equipment needs special protection from theft, vandalism, and weather. One means of providing such protection is to lock the equipment in a sturdy, steel cabinet. All wiring should be buried or hidden in some manner.

For the convenience of the visitor, consider placing benches along the trail and steps for children to use in looking over guardrails, into trailside exhibits, or at objects that are far off the ground. Hultsman (1982) states that most vandalism occurs within 500 ft of the entrance, so place benches and other facilities further back on the trail. Additional design suggestions may be found in Appendix B.

Information on the design of signs, markers, and trail entrance signs can be found in the Interpretation Manual, Division sign manuals, and the sources listed in the introduction to this section. General guidelines can also be found in the section on bulletin boards.

Trail Construction and Maintenance Considerations

The major activity in constructing a trail is clearing the pathway. This can be accomplished through the use of hand tools, motorized equipment, or a combination of both. According to Malbon (1982), most of the available motorized equipment requires a clearing width of 8 ft and leaves a graded base of 6 ft on which to build the trail. If the trail is to be maintained with motorized equipment, turning areas should be provided. A hand-cleared trail may be narrower than 6 ft, but should be wide enough to allow two people to walk side-by-side (sidewalks are about 5 ft). Wider trails may be required under heavy use conditions. Overhanging limbs and vegetation should be cleared to a height of 7 ft.

Another important phase of trail construction involves surfacing the trail bed (Figure 19). When selecting the surface, take into account the amount and type of use and the maintenance requirements. A low maintenance requirement is especially important in remote areas. In areas of light use where soils are not highly erodable, surfacing may not be required. However, surfacing may be more effective in keeping users on the trail and, in most cases, will be needed to make the trail more durable. Bark or wood chips, sometimes placed on top of gravel, have the advantages of reducing soil compaction and root damage, providing dry footing, and blending in well with the surroundings. Asphalt, concrete, or soil cement may be required for heavy use areas. This type of surface is expensive but requires little maintenance once in place. Some type of smooth surface may also be needed if the trail will be used by people in wheelchairs.

For low areas that are often wet, some type of boardwalk or footbridge may be necessary. These may be used for interpreting fragile areas, such as marshes or stream banks, with minimum impact on the resource. In these cases, the boardwalk may run the entire length of the trail (Figure 19).

In rainy weather, trails are apt to trap water or to suffer erosion due to rapid runoff. To avoid standing water, consider building the trail surface slightly higher than the surrounding area, sloping slightly down toward the edges. In regards to runoff, Hultsman (1982) makes two suggestions. First, trails which run perpendicular to a slope can be designed so that the uphill side is 2 to 3 percent higher than the downhill side. Water can also be directed off the trail through the use of water bars. A log 6 to 8 in. in diameter is placed at a 30-deg angle to the trail. The trail should slope slightly away from the angle so that water running down the trail hits the log and is guided off the trail. The logs may be secured with stakes, posts, or steel pins. Spacing will depend on the steepness of the slope and the amount of runoff anticipated.

Other tasks that may need to be performed in trail construction include (a) cutting and filling of slopes, and (b) building water bars, culverts, and drainage ditches to reduce erosion. Several thorough and readily available sources of information for all phases of trail construction and maintenance include Arthur (1975); Proudman and Rajala (1981); and The Appalachian Trail Conference (1980).

Trails for the Handicapped

Some of the needs of the handicapped in terms of facility design are discussed in the Interpretive Manual. An additional source of useful information is Beechel (1975). The most important point to remember is that handicapped persons may have the same goals as other recreationists, but their handicaps require some special accommodations. Thus, it is not desirable to build separate or specialized handicapped trails; such facilities may be offensive or embarrassing. Most handicapped persons simply do not want separate facilities or to feel like they are being pampered (Beechel 1975).

The following points summarize the most critical design elements described in the report by Beechel:

For the blind — special trails are rarely needed. Braille trails are generally ineffective because only a small portion of the blind can read Braille. Since most blind visitors are accompanied by someone who is sighted, special guiding devices are also unnecessary. A well-defined trail edge will serve to keep users on the trail. If trails are edged, however, the edging should have periodic breaks so that the water is not trapped on the trail. Trail stops should be designed to stimulate many senses — hearing, smelling, and touching. The use of audio recordings rather than printed material would be helpful. Trails designed to stimulate all the senses will be used and enjoyed by sighted visitors as well as blind.

Partially sighted people — can usually read signs with large print (18 point or more).

For the ambulatorily limited — signs must be the proper height to read from a wheelchair (approximately 44 in.). Trails should be hard, smooth, at least 4 ft wide, have little or no crown, have no steps, have a 5-percent or less grade, and have accessible parking and approach areas. (Figure 21). Consider, though, that trails

Figure 21. A trail built to accommodate visitors in wheelchairs should have little or no grade and a hard smooth surface.

designed to accommodate both the blind and the ambulatorily limited tend to receive complaints from the blind that such trails are not challenging enough; that is, smooth, hard, flat trails do not provide the same experiences as those left in an almost natural state.

Self-Guided Boat Tours

Self-guided boat tours can be effectively used to interpret prominent natural, cultural, and geological features along the lake (Figure 22) or river. As the Corps receives a large amount of boating use, the boat tours may prove to be very popular. Of the different types of interpretive media, leaflets and brochures are probably the best suited since cassette recorders could be damaged by water, and signs, because of the size required, would be an intrusion. Markers can be of two types: buoys or numbered signs located along the shoreline. An example of the use of the buoy system is Vicksburg District's Lake Ouachita "Geo-Float Trail." Either type of marker must be made visible from the boat by using contrasting colors, unique shapes, or large size (numbered posts like those typically used in the self-guided trail on land would be too small to be seen).

In developing a self-guided boat tour, consider the fluctuating water levels in the lake. In some cases, the features to be interpreted may be partially or totally underwater during parts of the visitation season. If signs along the shoreline are used to identify features, they may also be partially or totally submerged. Finally, during the low water periods, boaters should be warned to look for rocks and stumps near the surface.

Self-Guided Auto Trails

Self-guided auto trails offer the opportunity to interpret features that are relatively dispersed. Because of the visitors' mobility, these tours may be an

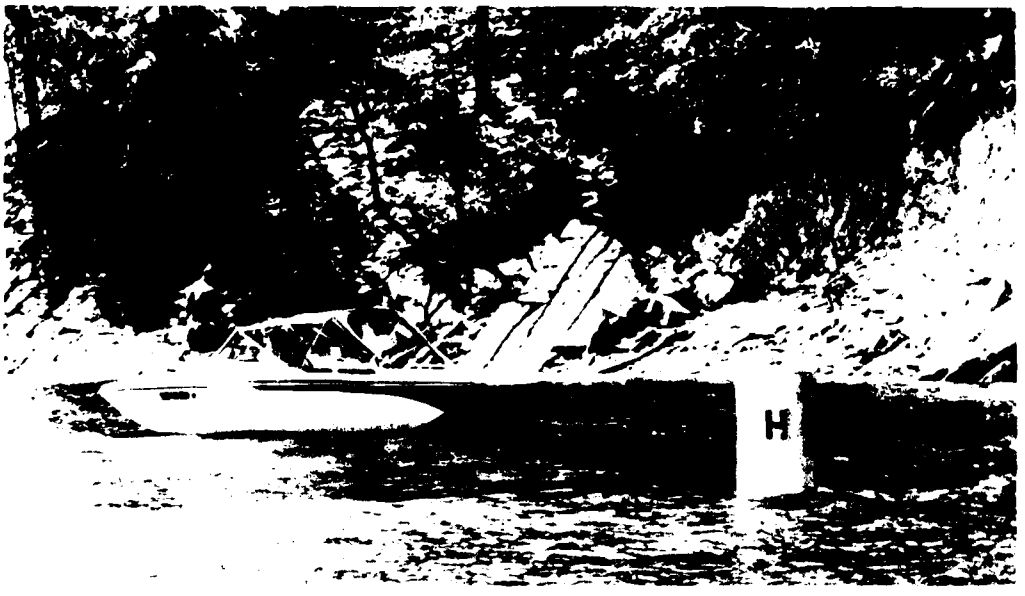

Figure 22. Shoreline features can be interpreted with a self-guided boat trail

Figure 23. Self-guided auto tours are an excellent means of interpretation where significant features are widely separated

excellent means of providing a general overview of the project. They may also reach visitors who do not ordinarily participate in interpretive activities.

It is not necessary that the visitor stay in his or her car during the entire tour. At certain locations it may be possible to provide a pull-off area where the visitor can get out of the car to inspect a feature more closely. It may also be desirable to provide short walking trails at selected points along the auto route.

Several types of interpretive media may be used for self-guided auto tours: signs, leaflets and markers, leaflets alone, and audio devices. Signs, according to Wetterberg (1982), are the least desirable of the three. They are relatively expensive, prone to vandalism, and may be overly intrusive. If signs are selected, the design and construction guidelines given in the Interpretation Manual and the section on bulletin boards herein should be consulted. Some simple sighting devices, such as a pipe with a swiveling mounting, or arrows on a board, may be helpful. At each sign location, there must be space provided for two to ten cars to pull off the roadway.

Leaflets and markers and leaflets alone offer the same advantages for auto trails as they do for walking trails. However, they may pose a safety problem for visitors traveling alone. This can be alleviated by providing pull-offs. (Figure 23).

Audio devices are used less often than signs or leaflets, but have many advantages, including the potential for adding sound effects. There are two types of audio devices that could be used by the Corps: message repeaters and cassette tapes. Message repeaters consist of a tape repeater located in a permanent structure (Figure 24). The message is activated by a push button. Like signs, this type of media requires a pull-off. With cassette tapes, the visitor may remain in the car during interpretation, an advantage on a cold or rainy day. Also, along roads with low use, the tape may be run continuously (the driver keeps the car at a predetermined constant speed) providing background or general information between stops. Where the driver's speed is apt to fluctuate, signs can inform the visitor when to turn the recorder on.

Figure 24. Message repeaters can be used to add sound effects and drama to the interpretation of features along self-guided trails

CONCLUSION

Design is a never-ending process limited only by the energy and creativity of the designer and the knowledge he or she possesses. The information presented in this supplement is intended to provide planners and interpreters with ideas, suggestions, and factors to consider when designing certain types of interpretive facilities. The information is based on current knowledge from both research and practical experience. Corps planners and interpreters should use this information to complement their own knowledge and experiences. Since every problem is different, the ability to adapt this information to meet existing needs is an important key to successful design.

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APPENDIX A: PARTIAL LISTING OF EXHIBIT MATERIALS WITH APPROXIMATE COSTS

The following list of exhibit materials, reproduced from *The Interpreter,* is intended to provide ideas on what types of materials are available and where. The prices were obtained in 1979 so they should be used only to determine relative costs.

SOME EXHIBIT MATERIALS AVAILABLE

MATERIAL	COST*	WHERE TO BUY
MASONITE	4' x 8' sheets 1/8" – $5.50 per sheet 1/2" – $7.50 per sheet	Lumber Stores
FORMICA	$.75/sq. ft. (solid colors) $.70/sq. ft. (wood grain)	Lumber Stores
PLEXIGLAS	1/8" – $1.75 per sq. ft.	Plastic Fab. Shops
PLATE GLASS	Contract item for most types of glass. Check with area office for sizes and prices.	
DURAPLY (OR CREZON) (2-sided)	4' x 8' sheets 3/8" – $14.00 per sheet 1/2" – $17.00 per sheet 5/8" – $19.00 per sheet	Lumber Stores or U. S. Plywood Co.
CARDSTOCK	32" x 40" $2.50 per sheet	Art Supply Stores
FOAM CORE	3/16" thick 30" x 40" sheet – $4.00 40" x 60" sheet – $8.00	Art Supply Stores
DOUBLE-COATED TAPE	1/2" wide x 36 yards $2.50 per roll	Art Supply Stores
3M FOAM TAPE (2-sided)	1/16" thick x 2" wide $17.50 per roll	Blake, Moffitt & Towne Paper Co.
DRY MOUNT TISSUE	Contract item. 100 sheets 8"x10" – $4.50 100 sheets 11"x14" – $8.00	Art Supply Stores
COLD MOUNT (2-sided)	20" x 25" – $2.00 per sheet	Art Supply Stores
RUBBER CEMENT	$10.00 per gallon	Art Supply Stores
VELCRO (hook & loop)	$.10 per inch	Yardage Stores
PRESSTYPE	$2.00 to $5.00 per sheet	Art Supply Stores
PRESSTYPE SPRAY COAT	$4.00 per can	Art Supply Stores
KRYLON (spray fixative)	$2.50/13-oz. can	Art Supply Stores
SILKSCREEN STENCIL FILM	(ulano blue poly II) 40" x 150" – $25.00/roll	Art Supply Stores
SILKSCREEN DEVELOPER	$3.00 per box	Art Supply Stores
SILKSCREEN INKS	Enamel – $4.00-$6.00/quart Lacquer – $4.00-$7.00/quart	Art Supply Stores
LACQUER THINNER	$4.00 per gallon	Art Supply Stores or Paint Stores
SILK	14xx 40" wide 1-4 yds @ $15.00/yd. 5-9 yds @ $12.00/yd.	Western Sign Supply 77 Eighth Street Oakland, California

*The prices shown are estimates only.

APPENDIX B: DESIGN GU ELINES FOR SELF-GUIDED TRAILS

The following design guidelines are reproduced from "Self-guiding Interpretive Trails: A Design Process for Better Relating the Visitor to Various Environments," by Kuehner (1977).*

SOME DESIGN CONCEPTS COULD HELP YOU

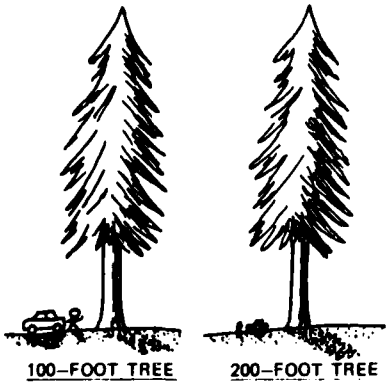
As an interpreter you may be tempted to let the landscape architect or engineer do all your interpretive trail design — after all, you are busy writing the booklet. Don't yield to this temptation. You must understand some of the concepts the landscape architect might consider and he must understand what experience and message you have in mind for the visitor. Together you create the desired visitor experience.

The design concepts that follow are just some of the things to consider when trying to physically and emotionally relate visitors to specific environments.

Scale And Size

What makes something seem large or small? We must have a reference point. A 200-foot-tall redwood tree would look giant next to a 20-story building in San Francisco, but compared to 200-foot-tall redwoods in a forest, the single tree may seem rather ordinary.

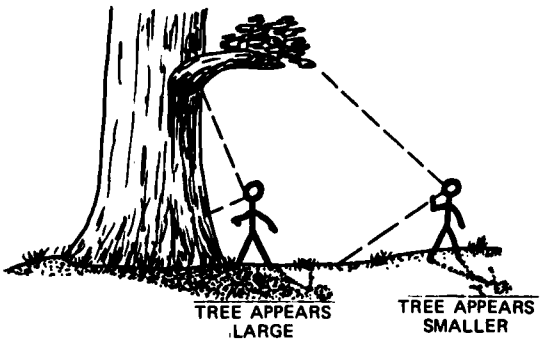
A 100-foot-tall tree may have the same or similar proportions to a 200-foot tree. It also may be of similar color and texture. Again, a reference point is necessary. A car or person next to the tree could offer some scale. We know roughly how large people and cars are.



Looking at a big place from a small place can make the big place appear larger. If you are in a confined space on the edge of a meadow, the open meadow will appear larger as you enter it versus entering it from an open space.

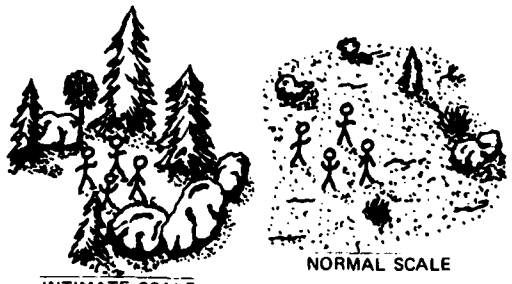
This concept is used to make small stores seem larger. The entryway will have a low ceiling, then the comparatively higher ceiling in the store makes the entire store seem larger.

To make something appear overwhelming or awe-inspiring in scale, the viewer needs to be in a close relationship to it and usually looking up at a sharp angle. Yosemite Valley from 30,000 feet up in an airliner isn't very awe-inspiring, but standing at the base of a 3,000-foot granite wall is. The closer you are to a wall or tree the taller it will appear. You needn't even see the top.



At the opposite extreme of awe-inspiring is intimate scale. To make the person feel bigger and more important, subject him to spaces, trail widths, benches, etc. which are designed to be smaller and more confined than those to which he is accustomed. This concept may foster more personalized spaces where families or friends may converse more and be less overwhelmed or intimidated by the unfamiliar environment. Restaurants use this concept. When you have the choice, do you select a table in a wide open cafeteria in the middle of the room or a secluded and enclosed booth?

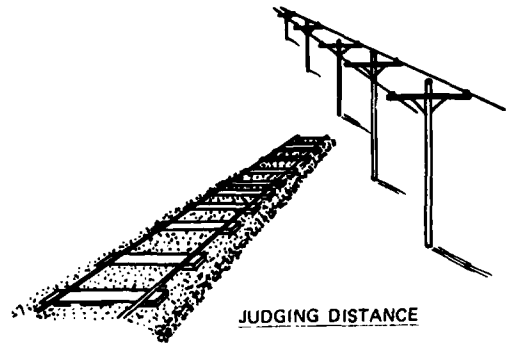
* Reproduced with the permission of the author.



Distance

When traveling across a flat valley, the Great Basin, desert land or a large body of water, distances appear shorter than they actually are. Distances are judged primarily by vertical objects. Visually comparing 50-foot-tall trees along the highway with trees two or three miles ahead gives you a reference point. You mentally (and subconsciously) reason that the trees down the road are actually the same size and their apparently shorter image means they are farther away. Of course, if the trees are actually shorter, then you will overestimate distance. Thus, if you want someone along your trail to estimate distances or have a feeling for distance, be sure he is next to some familiar vertical reference objects.

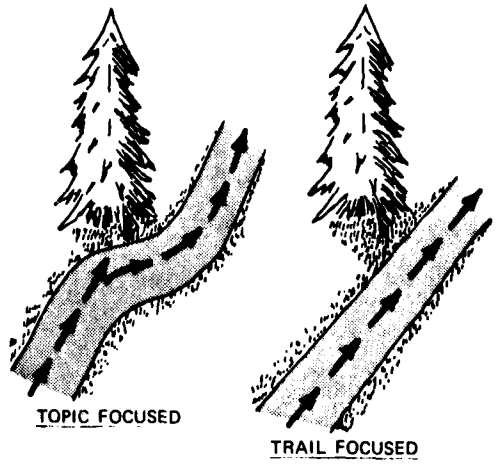
We associate converging lines and smaller objects in a scene to be farther away. The railroad or telephone sketches are examples of this.



Things appear to be smaller and closer together in the distance. The more vertical objects there are to judge in the scene the greater the effect of visual distance. And what's important to trail planning is that this concept applies to relatively small areas as well. Walking through a meadow visually appears shorter and thus may seem to take longer than walking a similar distance through a forest. This concept is further illustrated by a house-hunting expedition. Examine an empty room. It will appear small. You will underestimate the amount of furniture which will fit into it. Or better yet, stand on the floor of a house before the walls are constructed. You will think the contractor isn't giving you the 1,200 square feet you ordered. Or plot out the floor plan of a house or room you presently use, on a lawn or open field and compare the apparent size. I think you will be surprised.

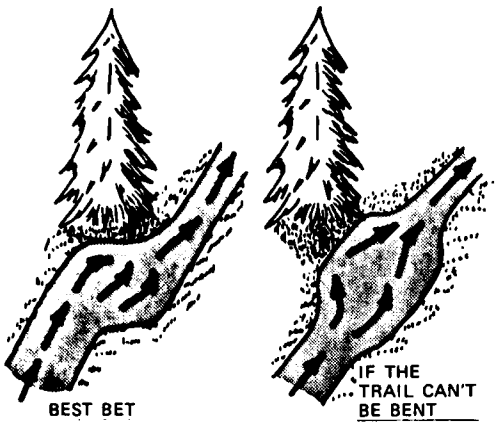
Foci

The trail alignment can focus on the trail subject you wish to describe or it can detract from it. Why not direct the trail straight at a tree if that's the topic you wish to discuss rather than directing it straight by. As you reach the tree, the trail direction can be abruptly changed. This might induce the visitor to stop and see what the trail has directed him toward, before turning the corner and proceeding to the next stop.



Better yet, also widen the trail at the point of interest.

If the trail focuses on an object, such as the tree, the visitor is subconsciously building a progressive image of the tree. He may see the total outline of the tree, then the branches, the leaves, the trunk, then finally bark detail. Plan the stop to be at that distance from the tree where the



item you are describing, say branches, comes into prominent view.

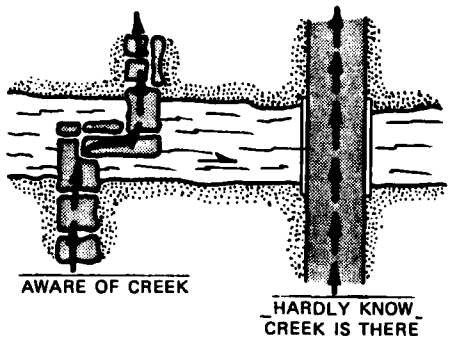
The above focus concept may not work for small items. Visitors may not "bend" around a 2-foot diameter bush. They might cut over it and ultimately cause its destruction. The object focused upon needs to be large enough to form a physical or visual impediment to travel. However, a small bush or object doesn't preclude widening the trail at the feature to provide some focus or slowing.

Physiography

The number of stops or foci along a trail might be dictated by the variety of natural breaks in topography found in your area. Interest points might be placed at the top of a grade, or the bottom of a grade, at a stream crossing, at the edge of a meadow, at the edge of the chaparral, at the edge between a shallow and steep slope, at a rock wall and many other natural breaks. In this way you would be emphasizing the natural characteristics of the area rather than thinking of the distance of the trail as being negative — that is, distance to be overcome rather than enjoyed. The negative distance concept is achieved by picking arbitrary trail stops first then "connecting the dots" with the straightest line possible. I've seen some trails designed to alter or fight the flow of topography rather than to express and progressively unfold it. And varying the trail with the topography will simply add more variety in contrast to the monotonous, constant percent grade trail.

If a trail bends too sharply without bending around a physiographic barrier (a rock, tree, etc.) then visitors will make their own trail. A sign "don't cut trails" is not the answer. You must anticipate that some visitors will follow the path of least resistance whether you designed the path or not. Then others will follow the first visitors' example. The solution is simply to bend the trail at points where the continuing trail can't be seen. In some areas this may require artificially dense (but native, please) plantings along the trail to hide the continuing trail.

You might bend a trail in a stream as is frequently done in Japanese gardens, to direct attention along the creek.



Textures

The texture of a trail can add to the visitor's experience. The transition from the gravelly texture of a trail to the spongy forest duff can set the mood for many an interpretive message. Paving the trail along the stream or in the forest, while perhaps preventing erosion, would prevent the visitors from fully using their sense of touch.

Textures can be used as transition points. A smooth-textured paved trail could be changed to a different texture (angular, cobblestone, sand, turf, loose rock, wooded surface, etc.) at a trail stop so that visitors know it's time to read another caption or listen to a recording at this stop or at least change their speed. This might work for blind persons as well. And, of course, if the transition texture can be expressive of the habitat or item being described — e.g., stream gravel surface

CHANGING TEXTURES IDENTIFIES TRAIL STOPS

when the topic is salmon egg habitat — then we have utilized one of the visitor's senses which might otherwise have been neglected.

Edge

Edges of trails may be rough or smooth, parallel or varying, well defined or vague, rigidly geometric or irregular. Very defined straight trail edges made of straight boards or simply cut straight cause a visitor to have no doubt where the trail edge ends. They may help keep people on the trail. But, they may also separate the visitor from the trailside environmental-sensual experience. Straight edges which are parallel, of course, also force attention down the trail rather than to features beside the trail.

Rough, irregular edges blend into most environments. They give a more informal or "natural" feel to the trail. The straight edges seem more fitting in a formal rose garden.

INFORMAL RELAXING

FORMAL STIFF–FAST MOVING

Microclimates

As you walk around a site, there will usually be small areas of distinct microclimates. There may be places with shade, places of very hot direct sunlight, places where the snow lasts longest, places where the wind frequently blows, places where the cold air subsides and warm slopes. Routing a trail through the total variety of microclimates could reduce the monotony of keeping the trail only in the sun or shade. Of course, the greatest value from considering microclimates would be matching them with a trail which dealt with microclimates or microenvironments.

Sequence

Many interpretive trails are encyclopedic — they contain numerous stops and tidbits of information each unrelated to the next. They differ from an encyclopedia, however, in that they are not alphabetical. The visitor can't really tell what is to follow ahead. These are relatively easy to write as the interpreter has only to walk around the area and write on anything he knows or he can easily discover.

The encyclopedic trail is unfair to the visitor. The interpreter/designer is supposed to help the visitor to understand the over-all scheme of the environment as well as the specialized tidbits. If the interpreter isn't able to discern a theme or over-all image of the prospective interpretive trail area, then perhaps he needs to spend more time experiencing and researching the site.

Think of the successful motion pictures you have seen and the captivating books you have read. I am sure they unveiled at least a thread of a theme. They followed some sort of intellectual logic. This doesn't mean that the stories had to be without specific facts. But the specific facts have to be related to the over-all story.

The sequence of topics in a theme should be outlined so that you can see if and where you are leading the visitor. (In retrospect, you might try this on an existing trail.) Some possible conceptual sequences occurring over several stops of the entire trail might be:

Trail 1. introduction—background—background—conclusion—review

Trail 2. punchline—example—involvement—review

Trail 3. punchline—example—example—review

Trail 4. punchline—involvement—involvement—review

Trail 5. punchline—example—example—punchline—example—example—example—synthesis of two punchlines or conclusions

Trail 6. background—background—punchline—review

The encyclopedic trail (the one requiring the least imagination) might be conceptually diagrammed as:

Trail X. misc.—misc.—misc.—misc.

The number of separate stops in a sequence or theme depends on how well you conceive the story and capture visitor interest. If you can't write well enough to retain and stimulate your visitor's interest at each stop, he may leave or at least lose interest and stop reading the booklet or trail signs. A well conceived, self-guiding interpretive trail might keep visitors eager for more after twenty-five stops. And I've been on trails where I was bored after five stops.

The absolute number of stops desirable on a trail cannot be specified. I've been on a trail with sixty stops. It was boring, but not because of the number of stops. Each stop said so little that perhaps groups of five stops could have been combined into one. Therefore, sixty divided by five results in twelve stops. And this reduction may tell the same story—only better.

You may argue that visitors may have limited time and therefore we should always design short trails with few stops. Once again, I contend the amount of time most visitors will spend at any interpretive trail is determined by the point at which boredom occurs rather than the amount of time they might have preprogrammed for the interpretive trail.

AUDIOVISUAL PRESENTATIONS

A Supplement to

A GUIDE TO CULTURAL AND ENVIRONMENTAL
INTERPRETATION IN THE
U.S. ARMY CORPS OF ENGINEERS

Abstract

This supplement is composed of two parts. The first part, "A Guide to the Use of Audiovisuals in Interpretive Programming," contains basic techniques for developing and using slide, slide-tape, and multimedia presentations; slide-tape displays; motion pictures; and videotapes. Also included is an inventory of audiovisual (AV) programs produced by Corps Districts and information on AV equipment.

The second section, "Multi-Image Audiovisual Presentations," provides more detailed instructions for designing and producing AV programs. It covers story development, photography, sound recording, soundtrack production, programming, and program evaluation. Appendices include a glossary of AV terms and guidelines for auditorium design.

Both sections of this supplement provide valuable instructions for designing AV programs, whether they are simple slide shows or complex multimedia presentations.

A GUIDE TO THE USE OF AUDIOVISUALS IN INTERPRETIVE PROGRAMMING*

A Guide to Cultural and Environmental Interpretation in the U. S. Army Corps of Engineers

PREFACE

This guide to the use of audiovisuals for interpretation has been prompted primarily by the author's trial-and-error education regarding this medium. It is hoped that through the utilization of this guide Pittsburgh District Rangers, Managers, Park Technicians, Outdoor Recreation Planners, and others may be able to benefit from some of these errors and both present and produce interpretive programs in a more professional and effective manner.

Most of the material presented in this document was derived from one of three sources—a review of available literature, a nationwide survey of Corps employees, and the author's experience. Please keep in mind that the material discussed consists of suggestions only, not absolutes. Perhaps the most useful section of this guide will be the References and Bibliography as there are some good resource publications available.

INTRODUCTION

Communication takes many forms and touches each Corps employee daily. In order to communicate more effectively in the area of interpretation, be it project, historical, organizational, or environmental, one must choose and utilize the available tools correctly.

The objectives of the Corps' Interpretive Services Program are to:

- Aid project personnel in accomplishing management objectives.
- Enhance the public's understanding of the role of the Army and the Corps of Engineers in development and administration of water resource projects.
- Enhance the public's understanding of the purpose and operation of the project, its man-made, natural, and cultural features.
- Develop public appreciation for proper use of project resources in an effort to reduce overall project O&M costs.

This guide deals with the development and use of audiovisuals as communications tools. For the purpose of this guide, audiovisual is defined as the unique combination of both sounds and sights to convey a message—to create awareness, to inform, or to stimulate responsibility. The guide has been organized

*This supplement was written by Mr. Thomas W. Fleeger, Resource Manager, Kinzua Dam and Allegheny Reservoir, and was originally published in May 1983 by the Pittsburgh District.

into three parts: a series of discussions regarding basic techniques of audiovisual use in interpretation such as slide presentations, slide-tape presentations, slide-tape displays, motion pictures, multimedia, and video tape; an inventory of available audiovisual programs produced by Corps installations; and what is new in the rapidly growing audiovisual hardware industry.

AUDIOVISUAL TECHNIQUES

There are various reasons why audiovisual media have become so popular for use in interpretive programs. Visuals have always been effective as a means to enhance understanding and direct audience attention from the presenter. In addition, today's society increasingly relies on sophisticated means of electronic communication as a part of their daily routine and in interpretive situations. Finally, the current trend of decreasing interpretive staff dictates a need for automation in order to provide visitors with the same level of interpretive programming with fewer employees.

The following types of audiovisual programming methods are presented in order to help the interpreter become more efficient in this field. If nothing else, you may find the "common errors" part of each section interesting. Please learn from these mistakes.

The Slide Presentation

Although the most basic audiovisual form is the interpreter himself, utilizing voice as audio and his body expressions and movements as visual, for the purposes of this handbook we begin with the addition of projected slides to help with the visual aspect. The slide presentation is perhaps the most elementary audiovisual technique. Utilized daily in thousands of programs across the country, this technique has proven very useful in a variety of program settings.

The reason behind this great popularity is the relative simplicity of the slide presentation. The audio portion is simply the presenter's voice. The visual portion merely requires a slide projector and screen, although for those who prefer more sophistication, additional projectors, dissolve equipment, or portable viewers can also be employed.

In order to prepare a program of this type, one must first choose a subject (or perhaps one has been chosen for you). The interpreter must have some knowledge of the subject and it should be of interest to the audience. It will help if the subject is also of interest to the interpreter. Next, either a written outline or the full text of the presentation should be prepared. Never should the text be dictated by the chosen visuals to be utilized.

After the commentary (script) has been organized, the appropriate accompanying slides should then be chosen. A well-indexed slide file will make this task much easier. Each project should utilize a filing system that suits their individual situation and number of slides on file. Without delving too deeply into the art of photography, let us say that slides should be of the best quality available in order to hold the audience's attention for the longest period of time. Quality slides should have the following attributes:

- Correct exposure (neither too dark nor washed out)
- Correct focus
- Attractive composition

The area of composition is extremely important. Good composition can make a photograph indeed worth a thousand words and poor composition can result in a bored and disgruntled audience. The photograph should depict as closely and as accurately as possible the point made by the corresponding portion of the commentary. The viewer should not have to strain his or her eyes to see the intended subject in the background or the corner of the screen. Distractions such as power lines, signs, and so forth should be eliminated. A poor slide is worse than no slide at all.

There are some excellent publications on all types of photography that the audiovisual interpreter can take advantage of. Many of these are listed in the References and the Bibliography.

The length of a presentation will dictate the number of slides utilized. A generally accepted *maximum* of 50 words per slide is recommended, although after the first 5 to 10 sec a slide is on the screen, attention starts to wane unless the slide is extremely interesting or detailed. It should be noted when matching slides to the script that if the proper slide is not available it is far better to use a black slide or alter the wording than to utilize an unrelated slide.

Once the text is ready and the slides are in the tray, a certain amount of practice is required in order to produce a professional talk. The amount of practice will, of course, vary depending on the speaker's familiarity with the subject and his experience in front of groups. Even the most experienced speaker will wish to run through the program at least once to be sure the slides are not backwards or upside down.

The settings in which such programs are given vary greatly. It is imperative to be prepared for the particular circumstances. The best way to do this is either to visit the site beforehand or at least ask pertinent questions regarding space (including distance from projector location to screen), lighting (as well as provisions for darkening), availability of electricity, and voice amplification needs.

In order to be thoroughly prepared, it is advisable to use a checklist of needed items to take along when going offsite to make a presentation (Appendix A). Get to the site early (before the audience) in order to set up things, focus the projector, and tape down cords if they create a tripping hazard.

Evaluation is a necessary and continual part of any interpretive program. One of the best ways to improve upon your own programs is to be mindful of programs you have viewed, incorporate things that impressed you, and eliminate those that were disturbing.

The following list represents what can happen when learning by trial and error. They should be avoided where possible.

"COMMON ERRORS":

- Beginning and ending a program with a glaring white screen.
- Forgetting the remote cord and having to ask someone nearby to advance the projector every time you say, "Next slide please."
- Utilizing a 140 slide tray with dog-eared slides resulting in every third one failing to drop into the projector.
- Saying repeatedly, "This slide shows ....."
- Or saying repeatedly, "This slide doesn't show this but ....."
- Using a tray of slides after someone else without reviewing them between showings.
- Including a picture of youngsters paddling a canoe without personal flotation devices (PFD's) on in a water safety program.

The Slide-Tape Presentation

The next logical step in audiovisual interpretation is the slide-tape presentation. This technique is usually employed wh direct interpreter audience contact is neither essential nor possible or when t.. umber of repeated showings makes automation more feasible. In this form, the audio as well as the visual are produced mechanically. Levels of sophistication in this area vary greatly from the use of portable audioviewers through manually coordinated single projector and monaural tape player to multiscreen, computer-controlled, quadraphonic sound extravaganzas.

Despite the variety of equipment employed, the basics of programming are quite similar to those discussed previously in regard to the slide presentation. A script must be developed and edited and corresponding slides must be chosen, produced, or copied. The major difference is the recording of a sound track in lieu of the live spoken presentation.

The first variable involved may be the use of a syncronization pulse to automate slide changing. If this is employed, either one track of a standard stereo recorder will need to be reserved for the pulses or a specialized recorder that can record pulses after the audio has been produced can be utilized. In the past, reel-to-reel tape decks were primarily used to record sound tracks separately from pulse frequencies. Currently, however, a number of specialized tape decks are being marketed which will do this on cassette either with monaural or stereo sound track capability.

The next variable is the use of music in the sound track. Most professional and effective slide-tape presentations today use some mix of words and music. Background music is used primarily to set a mood and for this reason its choice is important to the success of a program. Different pieces of music are often used for different sections and can be utilized for transition effects. Background music may also be used to cover extraneous noise, such as swallows and breath sounds on sound tracks produced in less than ideal acoustical conditions.

The copyright laws that govern the reproduction of copyrighted music are open to some interpretation in the area of sound tracks produced for nonprofit public

educational purposes. The most widely accepted interpretation permits the use unless the sound track is made for distribution over a wide area and perhaps different agencies.

Some techniques useful in recording of sound tracks for slide shows follow:

a. Utilize the person with the most pleasing voice available. If possible alternate male and female voices where appropriate. Remember, you may have written the program but your voice may not be the best for the narration.

b. A lot of practice narration is necessary to get the right inflections before actual recording takes place. Nothing is worse than a monotone voice.

c. Often local radio stations can be solicited to volunteer their recording studios for a government program. If not, you may have to create your own.

d. A makeshift sound room can be created by utilizing 4- by 8-ft sheets of styrofoam insulation. A hole large enough to see the program director can be cut in the front. The narrator then speaks into the microphone inside watching for cues and listening through headphones to background music.

e. The use of more than two-track tape systems can allow for recording of different parts of the sound track at different times. A mixer can then be utilized to obtain the proper levels of all parts. When mixing music in the background, turn it up during long periods when there is no narration but always keep it low enough behind the narrator so that it does not draw attention from the script. Mix music and balance microphone volume prior to recording. It is wise to make a practice recording and then play it back over speakers (preferably in the situation where it will be utilized) to be sure levels are right. Adjust the microphone or microphones so as to eliminate breath percusion noises such as the "Pah" in Pittsburgh.

f. The amount of recording done at a particular project will ordinarily dictate the sophistication of equipment used. In the Pittsburgh District, the staff of Kinzua Dam and Allegheny Reservoir have volunteered to utilize the recording equipment there to assist other projects with sound track production.

g. The majority of information presented regarding the slide presentation can be applied to the slide-tape program, especially in the areas of slide utilization. In regard to slide timing, it should be noted that if audience attention drifts due to a slide being on the screen too long there is no physical narrator on which to shift attention. For this reason slide time on the screen in this type of program should be no more than 5 to 7 sec.

More and more slide-tape programs are being utilized with two-projector dissolve systems for single screen shows or multiprojector programmed dissolve and multiscreen shows. The only limiting factors seem to be imagination and budget. At the present time budget is a critical factor at Corps projects as is permission to purchase any audiovisual equipment. For these reasons, such equipment should be specified as a part of construction contracts for new buildings where possible.

Onsite, the slide-tape presentation is used most often in a theater or amphitheater situation. It should be kept in mind that, although these programs don't require narration by Corps staff, they should at least be introduced by one. The introduction should include the length of the presentation, what it covers,

and other points of interest to the audience. If possible, questions can be encouraged after the presentation.

Program length should be designed to fit the particular target audience. A campground amphitheater audience may be better able to tolerate a 20- to 30-min program than visitors to an interpretive center. Ordinarily, the interpreter has a good idea of the desires of the potential audience. If a short program can adequately tell the story, it will probably be viewed in its entirety by many more visitors than a longer one.

When utilizing a slide-tape program offsite the suggested list of materials to take along expands (Appendix A). If you go offsite frequently to present programs, you may find it useful to keep a box or brief case containing many of the items listed in Appendix A. This makes preparation much easier although it is still wise to check to be sure all needed items are on hand before leaving home. Someone may have "borrowed" one or more items resulting in some program presentation problems.

As the effectiveness and relative programming ease of this particular medium are discovered, the slide-tape program grows in popularity by leaps and bounds. In coming times of decreased staff, it may be one of our more valuable tools.

The following are errors that have been experienced in some slide-tape presentations.

"COMMON ERRORS":

- Utilizing the 1812 Overture as background to some serene views of wildflowers.
- Encouraging a program author to narrate a sound track in a squeaky, nasal monotone since it was his or her program.
- Programming a 30-min show for an interpretive center where the average visitor stays for 20 min.
- Allowing slides to stay on the screen for 20 sec at a time resulting in audience background noise of "zzzzz."
- Not taking the telephone off the hook while recording.
- Arriving late for an offsite program and having to align projectors, position speakers, and test sound levels while the audience looks on.
- Recording the music level so high that the narrator's voice becomes "background noise."
- Allowing cue pulse frequency "bleed-over" onto the audio track resulting in a "beep" between each slide.

The Slide-Tape Display

The slide-tape display has been utilized in various interpretive situations to cure the "book-on-the-wall" syndrome of many older displays (Propst and Roggenbuck 1981). Research strongly suggests today's visitor will not tolerate large amounts of print in an interpretive display as they feel their discretionary time is too valuable to be spent reading (Pickering 1971).

Most of the techniques discussed in regard to the slide-tape program are also utilized to program the slide-tape display. The major difference comes in the design of the display to allow for total automation. Most displays of this type either run continuously or are stopped automatically and started by the visitor via a remote switch.

In programming for this type of display, length of the show will be one of the most important determinations. Programs of more than 4 min are generally ineffective. Keep in mind that most audiovisual displays do not have the kind of captive audience as theaters. If a story can be told in 2 to 3 min it will be more effective and will be utilized in its entirety by more of the public.

As in a theater situation, a display can be made quite advanced technologically. Naturally, the more electronic equipment that is employed, the more opportunities for mechanical failure. For this reason, it is wise to have spare parts or spare equipment on hand in the event of problems. Displays consisting of a series of individual units that can be replaced within minutes reduce shut-down time for repair. As all interpreters know, it is far better to have no display than to have one with an "out of order" sign (Tilden 1967).

Because of their component nature audiovisual displays are not difficult to design or build locally. This may make them more popular at this time when both dollars and engineering and design time are hard to obtain. Outdated "books-on-the-wall" displays may soon be replaced by slide-tape displays that are not only easy to design and construct but easier to update or change.

The following errors should be considered when designing slide-tape displays.

"COMMON ERRORS":

- Designing a slide-tape display that must be totally dismantled in order to change projector bulbs.
- Programming a 15-min show for a display that is never watched for more than 5 min.
- Not keeping at least one backup tape in reserve when the tape deck decides to "eat" one.
- Failure to properly align projectors in multiscreen displays so that panoramic views appear disjointed.
- Failure to consider those in wheelchairs and children when specifying screen height.

The Motion Picture

The motion picture was one of the first audiovisual mediums employed by interpreters. Since everyone likes to "go to the movies" it has almost always had the potential to be an effective medium. The difficulty and expense of producing motion pictures locally have been major drawbacks to expanded interpretive use. Although there are many 16-mm movies available on a myriad of subjects, one that exactly suits your need or interprets your particular project is difficult to locate unless you have been lucky enough to have one produced for you. Eight-

millimeter movies are much easier to produce locally, although a great deal of care should be taken to be sure the product is of acceptable quality.

Movies may be a very useful addition to some interpretive programs. Movies should not be used as a program, but rather as a part of one.

Many interpretive programs have been interrupted by broken film, stuttering projectors, or wavering sound quality. To avoid this embarassment, the projectionist should be familiar with individual machine operation and be prepared to handle such crises. The film user should keep all these things in mind and be sure to preview movies, not just in regard to content, but also in regard to the physical quality of the film. Review and evaluation of motion picture content are covered in the next part on audiovisual programming.

The following are some mistakes that have commonly been associated with the use of motion pictures.

"COMMON ERRORS":

- Utilizing a movie projector with a standard lens in a 30-ft room resulting in a 1- by 1-ft picture on the screen.
- Leaving the spare projection bulb at home.
- Learning too late that the last user broke the film in the middle but didn't repair it.
- Forgetting the take-up reel or a proper sized one.
- Arriving unfamiliar with the operation of the projector to be used.
- Forgetting the extension cord or adaptor.

Multimedia Presentations

Multimedia presentations generally refer to the combination of slides, sound, motion pictures, and/or video tape in an interpretive display or presentation. As an example, a program may begin with an introductory message on a video monitor. The controls might then cue several slide projectors to illuminate one or more screens as the video monitor goes dark. At some point a motion picture projector could be cued to give a presentation on a center screen while slides are held or slowly changed on surrounding screens. A concluding statement might then be made utilizing the video monitor again. Each transition might be either preprogrammed or controlled manually from a console. The equipment needed for such a presentation would consist of one or more slide projectors for each screen utilized, a dissolve unit for each screen, a motion picture projector, a video monitor, a video tape deck, an audio amplifier, varying numbers of speakers, an audio tape deck, and a multi-image programmmer or microcomputer.

The programmer in these situations should be careful not to overwhelm the audience with technology to the point where the interpretive message is lost. With each additional piece of equipment utilized, the chance for malfunction is increased accordingly.

As with singular media, there are a number of mistakes that should be avoided when utilizing multimedia.

"COMMON ERRORS":

- Neglecting to plug video monitor and movie projector audio leads into the sound amplification system resulting in three differing sound levels during different parts of the presentation.
- Distracting audience attention from one media with another.
- Remembering to program for room lights to go off at the beginning of a presentation, but forgetting to program for them to come back on at the end.
- Failure to match screen sizes or projection lenses resulting in screens of varying size and illumination.

Video Tape/Disk

Video tape and video disk systems for interpretation are gaining rapidly in popularity. Their greatest benefit lies in relative ease of programming and their greatest detriment is their relatively high price.

For display purposes, the only equipment needed is a television monitor and a tape/disk player. As many visitors are attracted to television, it becomes an attention-getter. Video tape or the newer video disk has a tendency toward rapid deterioration with extensive use.

One reason why this particular medium is preferred by interpretive programmers is the ease of editing electronically. With a minimum of training and the correct equipment some very appealing programs can be produced at the project.

In the Pittsburgh District, this equipment and trained personnel are available in the Communications Section and should be requested when situations dictate.

Common errors are discussed below.

"COMMON ERRORS":

- Briefing the video cameraman prior to taping a special program by saying, "Just get whatever looks important to you and I'm sure we'll have enough coverage."
- Taping a presentation without the proper lighting, microphones, or color coordination.
- Attempting to program without proper editing capabilities.

AUDIOVISUAL PROGRAMMING

Software, or the programs for audiovisual interpretation, have been produced by Corps employees in almost every District around the country. There has also been a significant number of programs produced by Corps contractors. Appendix B identifies programs considered by the author to have use capabilities within the Pittsburgh District.

To use this inventory one should select a program that appears to be applicable to his interpretive situation and then contact the District under which it is listed

to determine its interchangeability and make arrangements to obtain a copy if possible.

The Nashville District produced a publication entitled "Audio-Visual Programs Available for Interpretive Services" (U.S. Army Engineer District, Nashville 1980). This is an excellent publication which not only lists audiovisual programs but also abstracts and evaluates them. It is suggested that each installation involved in the use of audiovisuals contact the Nashville District in order to obtain a copy of this listing.

Another excellent source of information regarding audiovisual programming is the National Information Center for Educational Media (NICEM) at the University of Southern California. Their indexes to a variety of media in various categories provide the interpreter with a valuable source of commercial software. A similar publication that provides a listing of video disks and tapes available on a variety of subjects is *The Video Source Book* (National Video Clearinghouse 1982).

In regard to Federal government audiovisual programming, the National Audio Visual Center publishes "A Reference List of Audio-Visual Materials Produced by the United States Government" (U.S. General Services Administration 1980).

The Audio-Visual Market Place (Bowker 1979) is an excellent index to producers and distributors of audiovisual products as well as contractors, production companies, and equipment dealers. This is a good source if one is contemplating contracting for software production.

If an individual project or area office utilizes significant amounts of audiovisual programs, it is recommended that copies of such publications be obtained. Otherwise, they may be available at a local college or university library.

AUDIOVISUAL EQUIPMENT

As mentioned earlier there has been an explosion in the development of audiovisual equipment in the last several years. The interpreter who is selecting equipment or the planner who is designing displays should be aware of this new technology. Unfortunately, there are even some audiovisual equipment contractors who do not specify the most effective up-to-date hardware for the situation.

The *Audio-Visual Equipment Directory* (Herickes 1981), published by the National Audio-Visual Association (NAVA), is the most complete inventory of new equipment available. A copy of this directory is available in the Pittsburgh District and should be consulted prior to the purchase of equipment.

Some recommendations regarding various items of equipment needed to produce different audiovisual programs are listed below.

Slide Projectors

The Kodak Ektagraphic slide projector has long been the standard of the industry for professional audiovisual use. The new Ektagraphic III series is

sufficiently advanced and solidly built for most uses. For more specialized uses such as random access (the ability to select any slide from a tray at will) or zero return (the ability to automatically return to the zero position when the program ends) there are many more options available. If an individual situation calls for such equipment, a great amount of research should be done to find the correct machine for the job. In such cases, the District Office should be contacted for advice.

Slide projector accessories are numerous and can be quite costly. Perhaps the most valuable to the interpreter is the automatic projection lamp changer. One manufacturer has very aptly identified their product as the "Show Saver." If you have ever been in the middle of a presentation and had one screen go black you can appreciate the value of such an item. Other accessories boost output efficiency, decrease cycle time, improve registration, and improve illumination evenness and brightness.

Sound slide projectors are becoming more numerous all the time and come either with or without integral rear screens. These are merely a combination of projector and cassette deck and are excellent for situations where their portability is important. The rear screen models are useful for showings to small groups around a table such as training situations. The greatest drawback to most of these machines is a fairly small speaker, limiting their use to smaller audiences. The addition of a small amplifier and external speakers can expand their usefulness.

It should be noted that, when purchasing slide projectors, the simplest machine that will get the job done will break down less than those with extras like autofocus and timers. These options are quite valuable in many instances but are not always necessary when permanently installed for singular purposes.

Lenses should not be overlooked as focal length will determine image size. The primary application should be considered. If use situations will vary, a variable focal length lens should be specified. In a singular use situation, the distance from projector to screen as well as the desired image size should be determined and a lens chosen accordingly. The NAVA directory mentioned previously contains excellent lens charts. If rear screen application is planned, a right angle lens can be used to reverse the projected image in lieu of reversing the slides within the tray.

Motion Picture Projectors

Like everything else advances have been made in this line as well. Perhaps the most interesting modification has been the addition of an integral programmer to a standard 16-mm sound projector. However, most Corps projects will not be utilizing these due to their high cost. The same applies to the Imax 72-mm projector costing close to half a million dollars for a six-story-high image. Those projects that use their movie projectors often should purchase the most heavy duty ones available to ensure a reliable machine as backups are not always readily available as is the case with slide projectors.

Dissolve Controls

Up until a few years ago many slide programs included a black screen between each slide. This all changed with the advent of the dissolve control, a piece of equipment that allows one or two projectors to fade slides one into another at varying rates. Not only has the two-projector show made audiovisuals more professional and appealing, it has also doubled the number of slides that can be projected without changing trays.

This field has grown the most rapidly of all audiovisual equipment. While only a few years ago one had a choice of three or four manufacturers, today there are over two dozen available. Sophistication is also growing at a phenomenal rate to the point that microcomputers are now utilized to control many multi-image audiovisuals. It would be impossible to describe the fantastic variety of units available in this handbook. It is suggested that one do a lot of consultation and shopping before specifying equipment in this realm. Again the NAVA directory is most helpful in this regard.

The diagram in Figure 1 is a sample of a typical four-screen, multimedia setup. It is offered in order to give the reader some idea of the diversity of programming made possible by today's technology.

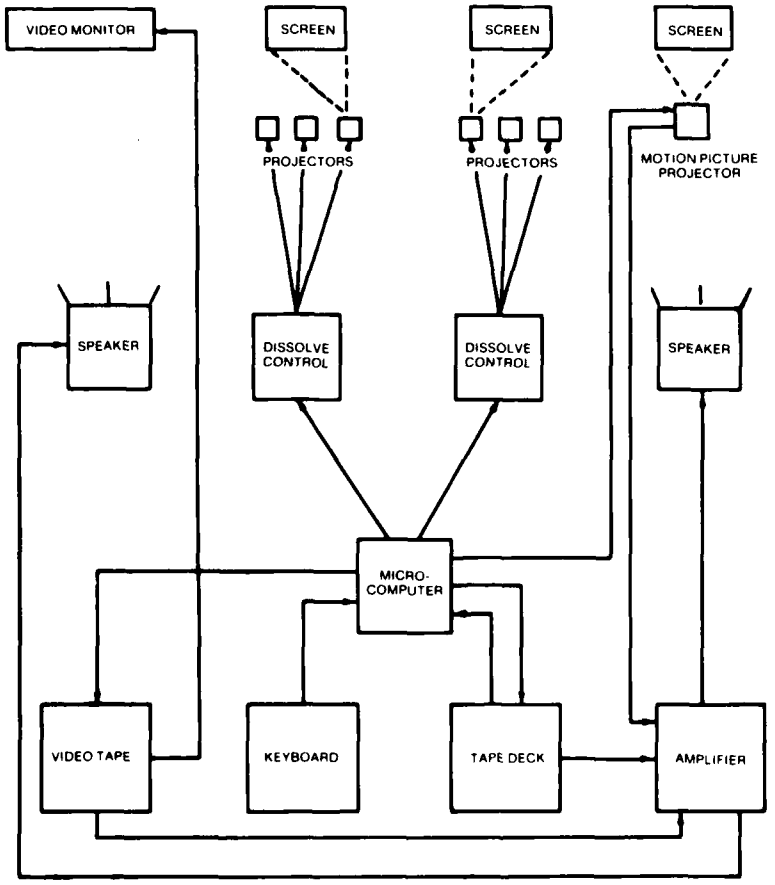


Figure 1. Typical multimedia equipment diagram

Sound Systems

Tape recorders utilized for either manual or mechanical syncronization with slide projectors vary significantly. Although eight-track tape units have been used in the past, the recent years have seen cassette and reel-to-reel tape decks used almost exclusively for audiovisual programming. Traditionally, the reel-to-reel deck was used when higher quality and less portability was desired such as in a theatre situation. Meanwhile, the cassette was popular for more portable shows or displays where there were space limitations.

In the past, in order to produce sophisticated, high-quality recordings, it was generally necessary to use a reel-to-reel deck (preferably a four-channel one) in order to record separate sound track pieces at separate times. A recent advancement is the manufacture of a four-channel cassette deck with this same feature plus a built-in mixer. With this type of equipment, a programmer could easily record ten different parts including a cue pulse onto a cassette tape.

There are also a lot of new tape recorder/players on the market with built-in syncronizers that can be patched directly into a slide projector, some even featuring stereo sound.

Your individual situation will dictate whether you use something this sophisticated, a lesser quality deck, or even a sound-slide projector. Whatever the case, a hurried decision may leave you wishing for more capability than you bought.

It should be noted that most tape decks will require connection to an amplifier and external speakers. Individual presentation situations will dictate the power (watts per channel) of the amplifier. Speakers should then be matched accordingly. The number of speakers and their placement will also vary with differing situations. At least two should be utilized and placed at either the front or the rear corners of the room. If four can be utilized, better coverage can be obtained. As previously mentioned, acoustics vary tremendously over a variety of room sizes, configurations, and material makeups and each situation will require different speaker placement.

Video Tape Equipment

There are several basic components needed to produce and present your own audiovisual programming on video tape: a video camera, a video recorder, a television monitor, lighting, microphones, and an editing capability. Price of this equipment constitutes a substantial initial outlay—from $4,000 to $40,000, depending on quality.

As mentioned earlier, video equipment is available in the Pittsburgh District and has been utilized for training and documentary purposes. Sufficient capability exists in the form of high-quality cameras (both stationary and portable), microphones, lighting, recording, and editing and playback equipment to produce excellent interpretive programs. Playback capability in the form of video recorders and monitors would have to be obtained at the project level if permanently installed video programs were to be utilized. All production could then be accomplished by the Communications Section in the District Office.

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APPENDIX A: CHECKLIST OF AUDIOVISUAL ACCESSORIES FOR AN OFFSITE SLIDE PRESENTATION

SLIDE PRESENTATION

Audiovisual accessories that are necessary in a slide presentation:

1. Projector and lens (plus a spare if possible)
2. Slides to be used (in appropriate tray)
3. Script
4. Screen
5. Extension cord
6. Projection stand (if not available at site)
7. Duct tape to tape cords
8. Extra projection bulbs
9. Plug adapter
10. Pointer
11. Remote control with extension cord

Optional accessories that can make things go much smoother:

1. A dual fabric folding screen to allow for adaptation to either a front or rear projection situation (remember to either reverse slides or use a right angle lens for rear projection)
2. An automatic focus projector (if not available, glass slide mounts will help standardize focus)
3. A zoom projection lens.
4. Blank slides (2″ × 2″ plastic) to begin and end program.
5. "Focus"/leveling slides to aid in setup.
6. Black paper or plastic to help darken windows.

SLIDE-TAPE PRESENTATION

Audiovisual accessories that are necessary in a slide tape presentation:

1. Projector(s) and lenses (with spare if possible)
2. Tape deck
3. Amplifier (if necessary)
4. Speakers (if not incorporated in tape player)
5. Dissolve unit (if necessary)
6. All necessary patch cords (tape deck to dissolve or tape deck to amplifier plus extras if possible)
7. Slides in appropriate trays and tape to be used
8. Screen
9. Necessary stands (piggyback projector stand if two are employed in this fashion)
10. Extra projection bulbs
11. Duct tape for cords or speaker wires
12. Extension cord
13. Plug adapter and two-into-one adapter
14. Blank slides for beginning and end of program

APPENDIX B: AUDIOVISUAL PROGRAM LISTING BY CORPS DISTRICT AND DIVISION*

Program	*Subject (If not self-explanatory)*	*Equipment Needed*	*Length min*
	Albuquerque District		
Over 200 Years	History of the Corps	Slide projector, cassette player (dissolve unit optional)	8
Over 200 Years	History of the Corps	Video tape	8
The Rio Grande	Travels of the river from headwaters in Colorado to El Paso, Texas	16-mm projector	8
	Chicago District		
Command Briefing	Chicago District	Two projectors, dissolve unit-programmer	20
Little Cal Flood Control Study	Corps Project	Two projectors, dissolve unit-programmer	15
	Detroit District		
Formation of the Lakes	Geology	Projector, lap dissolve unit	6
Loading of Bulk Freight	Iron ore	Projector, lap dissolve unit	6
North Gate to Mid-America	Lock operations	Movie projector with sound	25
The Great Lakes Connection	Lock operations	Movie projector with sound	25
	Fort Worth District		
Duties of a Ranger	Orientation of ranger's job	Slide projector, tape projector, synchronizer, elapse dissolve unit	12
	Galveston District		
Duties of a Ranger	Ranger training	Slide projectors, tape player, dissolve unit, synchronizer, screen, slide stand, extension cord, slide trays	15

* Addresses and telephone numbers for the Corps of Engineers Offices can be found on page 35.

Program	*Subject (If not self-explanatory)*	*Equipment Needed*	*Length min*
		Jacksonville District	
I Love	Photointerpretation of Tom T. Hall's Song & Lyrics "I Love"; Nature sensitivity	Slide projector, dissolve unit, tape recorder with synchronizer	2
Photo Essay	Polatkz Eco-Meet	Slide projector, dissolve unit, tape recorder with synchronizer	10
		Kansas City District	
A Question of Hunting	Wildlife mgmt.	16-mm projector	—
A Way of Life	Ecology		20
Backpacking	Rec. skills		—
By Map and Compass	Orienteering		—
Camping Out	Rec. skills		15
Cottontail	Natural history		50
Frontier America	Cultural history		33
Help Woodsy Spread the Word	Pollution		18
Innovative Approaches to O&M Activities	Resource mgmt.		12
Iowa's Precious Water	Water quality		25
More Than Trees	Forest ecology		25
Our Wild Inheritance	Natural history		22
Return of the Wild Turkey	Natural history		—
Survival on the Prairie	Natural history		—
This is the Mallard	Natural history		—
Triumph of the Wood Duck	Natural history		20
Water the Timeless Compound	Water safety		—
Wilderness	Natural history		—
Wildlife An American Heritage	Natural history		13
Winter Story of Survival	Natural history		14

Program	*Subject (If not self-explanatory)*	*Equipment Needed*	*Length min*
	Kansas City District		
A Look at the Lakes	District orientation	Slide projector	11½
A Look Around Harlan County Lake	Recreation opportunities	Tape player	18
A Ranger's World	Duties of a ranger	Slide projector, tape player	10
Civil Works Future	Corps' role		5
Civil Works History	Corps' role		3
Evolution of the Chariton	Natural history		12
Freddie the Fish	Water safety		6
Frogs of Missouri	Natural history		—
Four Seasons	Recreation		12
Hydropower	Energy		9½
Hypothermia and Cold Water	Water safety		—
Impressions	Corps		4
Indians, Pioneers & Native Plants	Cultural history	Slide projector, script	25
Kansas Wild Flowers	Natural history	Slide projector, tape player	25
Let Us Try	Corps		25
Mammals of Nebraska	Natural history		—
Military History	Corps		—
Military Current	Corps		—
Missouri's Venomous Snakes	Natural history		14
Nature's Bounty	Edible wild foods		10
Navigation	Corps		9½
Recreation	Corps recreation opportunities		5
Snakes Alive	Natural history		12
So This is Milford Lake	Recreation orientation		12
Stockton Lake	Recreation orientation		4
The Birds of Wilson Lake	Natural history		25
The Mammals of Wilson Lake	Natural history		22
The Old Story Teller	Cultural history		—

Program	*Subject (If not self-explanatory)*	*Equipment Needed*	*Length min*
	Kansas City District		
This Substance Called Water	Water resources	Slide projector, tape player	13
Water A Limited Resource	Water conservation	Slide projector, tape player	3½
Wild Flowers	Natural history	Slide projector, tape player	10
What's Bugging You	Insects	Slide projector, script only	—
	Nashville District		
A Drop of Water	Water cycle	16-mm projector	14
A New Frontier	Early settlement in Tennessee	Video equipment	—
A New Tomorrow	Tennessee in a technological age	Video equipment	—
A Whole Lot Proud	History of Corps Park Rangers	Video equipment, 16-mm projector	22
Across This Land	Geography of Tennessee	Video equipment	—
Air is for Breathing	Pollution control	16-mm projector	29
An Interest in Safety	Safety tips	16-mm projector	13
Camping Out	—	16-mm projector	15
Canada Geese of Old Hickory Lake	—	Video equipment	10
Cedar Glades of Middle Tennessee	—	Slide projector, tape recorder	13
Chattanooga	Gateway to the South	Video equipment	—
Drowning: Facts and Myths	—	16-mm projector	8
Freddie the Fish	Water safety	Slide projector, tape recorder	4
Hard Work and Good Times	History of YCC Programs	16-mm projector	22
Help Woodsy Spread the Word	Pollution problems	16-mm projector	18
Hydroelectric Power	Tour through a power plant	Video equipment	26
Hydropower	—	Slide projector, tape recorder	7
I'm no Fool Having Fun	Recreation safety	16-mm projector	8
I'm no Fool in Water	Water safety	16-mm projector	8

Program	*Subject (If not self-explanatory)*	*Equipment Needed*	*Length min*
	Nashville District		
In the Bag	Litter cleanup	16-mm projector	8
Innovative Approaches of Accomplishing Operation & Maintenance Activities at Corps Recreation Facilities	Resource management	16-mm projector	12
Knoxville	History of Knoxville	Video equipment	—
Lake Barkley Fish Population Study	—	Video equipment	13
Lakes & Reservoirs	Natural history	Slide projector, tape recorder	—
Let Us Try	Corps history	Slide projector, tape recorder	25
Memphis	River city	Video equipment	—
More Than Trees	Natural history	16-mm projector	25
Muir, John, the Father of our National Parks	—	16-mm projector	15
Nashville	Athens of the South	Video equipment	—
Nature's Half Acre	Animal interdependence	16-mm projector	33
Not By A Dam Site	Hazardous conditions	16-mm projector	14
Our Outdoor Heritage	—	Slide projector, tape recorder	—
Outdoor Classroom Ideas	—	Slide projector, tape recorder	15
Outdoor Classrooms, Where Do We Go From Here?	—	Slide projector, tape recorder	—
Recreational Opportunities in the Nashville District	—	Slide projector, tape recorder	8
Restoration of Mill Springs Mill	Cultural & historic heritage	Slide projector, tape recorder	3
River of Return	Navigation	16-mm projector	14
River Patterns	—	Slide projector, tape recorder	—
Secrets of the Ant and Insect World	—	16-mm projector	13

Program	*Subject (If not self-explanatory)*	*Equipment Needed*	*Length min*
	Nashville District		
Secrets of the Bee World	—	16-mm projector	13
Secrets of the Plant World	—	16-mm projector	15
The Boston Tea Party	History	16-mm projector	30
The Early Americans	History	16-mm projector	41
The Fine Art of Interpretive Critiquing	Interpretive training	Video equipment	—
The Historic Cumberland River	History	Video equipment	25
The Historic Cumberland River	History	Slide projector, tape recorder	30
The Litterbug	—	16-mm projector	8
The Lorax	Environmental cleanup	16-mm projector	24
The Mill at Philipsburg Manor	—	16-mm projector	20
The New Willamette	Cleanup of Willamette River	16-mm projector	26
The Park, The Visitor, The Interpreter: A Personal Training Program for Interpreters	—	Video equipment	—
The Political Parade	Tennessee politics	Video equipment	—
The Shot Heard Around the World	History	16-mm projector	32
The Uncalculated Risk	Water safety	16-mm projector	15
The Untamed Earth	Natural disasters	16-mm projector	20
They're Your Lakes Too	Recreation	Slide projector, tape recorder	6
This Land	Continental development	16-mm projector	14
Town & Country	Rural scene in Tennessee	Video equipment	—
Two Centuries of Service	History of the Army	16-mm projector	28

Program	*Subject (If not self-explanatory)*	*Equipment Needed*	*Length min*
		Nashville District	
Vandals Wild	Vandalism	Slide projector, tape recorder, video equipment	11
Walking on a Miracle	Natural resources	16-mm projector	8
We Were There, But Not For Conquest	History of the Corps	16-mm projector	28½
Wildflowers of Tennessee	—	Slide projector, tape recorder	—
Wildlife — An American Heritage	History	16-mm projector	13
Young Man River	Navigation	16-mm projector	28
		Omaha District	
Construction of Oahe Dam	Construction	2 slide projectors, lap dissolve unit, script provided	30
Crow Creek Archeology	Story of Arikara Village on Lake Sharpe (Crow Creek) and its massacre, as deducted from archeological study	Slide projector, synchronized cassette tape player	30
Mammals of the Great Plains	Description of South Dakota wildlife as related to habitat areas	Slide projector, script provided	40
Native Plant of South Dakota	Identification / uses local plants	Slide projector, script provided	40
Charles M. Russell, Cowboy Artist	Life and work of Charles M. Russell	Slide projector, script provided	40
Sioux Indian Women: A Part of the Universe	Role of women in Sioux North American Indian society	Slide projector, script provided	40
Welcome to Lake Sharpe	Recreation opportunities on Lake Sharpe	Slide projector, cassette tape synchronized	30
		Philadelphia District	
Agnes Was No Lady	Hurricane Agnes	16-mm projector	—
A Whole Lot Proud	Corps ranger duties	16-mm projector	25
Clouds	Educational image	Slide projector, script provided	—

Program	*Subject (If not self-explanatory)*	*Equipment Needed*	*Length min*
		Philadelphia District	
Ecology of a Stream	Educational image	Slide projector, script provided	—
Ecology of a Woodpile	Educational image	Slide projector, script provided	—
Find a Float	—	16-mm projector	10
Fish, Ice & Fun	Ice fishing	Slide projector, cassette deck, dissolve unit	10
Freddie the Fish	Water safety	Slide projector, cassette deck, dissolve unit	4
Inland Waters, Search Rescue Recovery	—	16-mm projector	25
On Drowning	—	16-mm projector	15
The Drowning Machine	Low level dams	16-mm projector	15
The Upper Allegheny Flood Control System	—	Slide projector, cassette deck, dissolve unit	15
The Water Cycle	Educational image	Slide projector, cassette deck, script provided	—
They're Your Lakes Too	Recreation	Slide projector, cassette deck, dissolve unit	6
Two Centuries of Service	Corps history	16-mm projector	—
Water, the Timeless Compound	—	16-mm projector	—
Water's Web	Water	Slide projector, cassette deck, dissolve unit	12
We Care About Eagles	—	Slide projector, 16-mm projector	—
Wetlands Slide Series	—	Slide projector, tape recorder, script provided	—
We Were There	Corps history	16-mm projector	25
Wild Mushrooms to Eat	—	Slide projector, tape recorder	—
Wild Plants to Eat	—	Slide projector, tape recorder	—
		Rock Island District	
A Visit From Cavendish Throckmorton	Life on a riverboat	Slide projector, dissolve unit, costume props	30

Program	*Subject (If not self-explanatory)*	*Equipment Needed*	*Length min*
	Rock Island District		
This Substance Called Water	Physical properties of water	Slide projector, tape player, dissolve unit	15
Navigation	In-land navigation		11
Impressions	Environmental aesthetics		4
Water, A Limited Resource	Water as a natural resource		5
Too Thick to Drink, Too Thin to Plow	Overview of multi use of upper Mississippi River		30
The Mississippi River, Where It Is, Where It's Going	Inter-governmental agency management of Upper Miss. River		30
The Corps' Role in Recreation	—		30
Visitor From the Past	Historical presentation of upper Miss. River		45
Dexter the Deckhand	Present day life on a towboat		45
Water, The Timeless Compound	Water safety	16-mm projector	40
The Drowning Machine	Water safety demonstration	Water safety props	45
Cold Water Connection	Water safety demonstration	Water safety props, slides	45
The Lorax	Environmental education	16-mm projector	40
Wildlife Management	—	Slide projector, tape player, dissolve unit	20
Iowa's Forest: A Dwindling Resource	Resource management		30
A Prairie Pilgrimage	Prairie ecology		30
We Care About Eagles	Wildlife management		20
Wildlife Photography	—		25
Prairie Buffalo	Environmental education		15
White-Tailed Deer	Environmental education		20

Program	*Subject (If not self-explanatory)*	*Equipment Needed*	*Length min*
	Rock Island District		
Nature's Supermarket (Wild Edible Plants)	—	Slide projector, tape player, dissolve unit	10-15
The Lone Prairie	History and ecology of the prairie		20
Red Rock	Recreation opportunities at Lake Red Rock		30
Hypothermia	Water safety		20
Water Resources	—		60
Prairie Grasses and Wildflowers	Environmental education		60
Saylorville	Recreation opportunities at Lake Saylorville		60
Capers of Cooter Camper	Camper etiquette	Puppets, stage, PA system	30
Coralville Lake Puppet Show	Camping etiquette, water safety, recreational opportunity	Slide projector, tape player, dissolve unit, puppets, stage	55
Dexter, the Deckhand	Life on a modern towboat	Slide projector, costume, props	30
High Adventure	High adventure slides and music	Tape player, six projectors, three-screen capability, dissolve units	5
Introduction to Jr. Rangers	Overview of Jr. Ranger Program	Slide projector, tape player dissolve units	10
Mississippi River Puppet Show	River history recreational opportunity	Slide projector, tape player dissolve units, puppets, stage	20
Pat the Bunnies	Ranger duties	Slide projector, tape player dissolve units	15
What's the Army Doing in the Recreation Business?	Overview of Corps' role in recreation	Slide projector, dissolve units	20
Where Do the Buffalo Roam?	Slaughter of the prairie buffalo	Slide projector, tape player, dissolve units	20

Program	*Subject (If not self-explanatory)*	*Equipment Needed*	*Length min*
	Sacramento District		
Snags	Value of snags to wildlife	Projector	15
The Guardians	Rangers and research management	Dissolve unit, two projectors	18
Water Safety Programs	Water safety	Slide projector, dissolve units	5-30
	St. Paul District		
Keeper of the Waters	Orientation and history of St. Paul District	Video or slide projector or movie projector	12-22-27
The Other Side of the River	1965 flood, Mississippi River	Movie projector	27
	San Francisco District		
Fish Hatchery	Operations	Slide projector	15
Fish Hatchery Video Tape	Spawning operations, major dam features	Video tape player, television	4
Mystery of Tides	Tides	Slide projector, dissolve unit	5
Warm Springs Dam / Lake Sonoma	Current work, facilities, future plans	Slide projector	15
Warm Springs Dam Movie	Project purpose	16-mm film projector	18
Warm Springs Dam Procedures	Construction	Slide projector	20
	Savannah District		
All Strung-Up	Archery	16-mm projector	60
Birds of Hartwell	Birds	Slide projector, tape recorder	30
Cap'n Buoy	Water / boating safety	Costume	Variable
Clarks Hill Critters and Company Presents	Water / boating safety, anti-littering, history of the dam	Puppet theater, tape recorder, puppets and props	30-40
Clarks Hill Lake, See and Enjoy It	Clarks Hill Project	Slide projector, script outline	20
Comedy Film Festival	Strictly for entertainment	16-mm projector, films from local library	60-120
Construction of the Richard B. Russell Project	Construction	Slide projector	15-20

Program	*Subject (If not self-explanatory)*	*Equipment Needed*	*Length min*
	Savannah District		
Early Farming Methods	Farming of yesterday	Slide projector, tape recorder	15
Folklore of Southern Wildflowers	History of local plants	Slide projector, tape recorder	20
Hartwell Lake—a Review	Hartwell Lake	Slide projectors, dissolve unit, Wallensak slide tape player	12
Hisss . . . story	Snakes	Slide projector, Caramate cages and live specimens and/or preserved specimens	30-40
Historic and Prehistoric Happenings at Russell	Archaeological excavations and historical findings	Slide projector	20
I Haint Scart	True local ghost stories	Slide projector, slides	30
Interpretation—An Insight	Interpretation	Slide projectors, dissolve unit, Wallensak	10
In the Drink	Water/boating safety	16-mm projector, film, props	45
Leaf-Watch Weekend	Fall leaves/Corps	Temporary exhibit panels, hiking and driving tour maps	All day continuous
Life of Johnny Reb	Living history	Civil War clothing, food, military equipment, etc.	35-40
Mammals of Hartwell Lake	Mammals	Slide projector	30
Snakes Alive!	Life history of snakes	Slide projector	20
Snakes of Hartwell	Snakes	Slide projector, script	30
Star Gazing	Astronomy	Telescope, star chart and copies, homemade astronomy study equipment	45
Station Weather	Homemade weather forecasting instruments	Charts, weather instruments	45-60
Wild Edibles/Nature's a Supermarket	Wild edible plants	Samples of wild foods and drinks, slides of out-of-season edibles	45-60
Wildflowers of Hartwell Lake	Wildflowers	Slide projectors, dissolve unit, Wallensak	12

Program	*Subject (If not self-explanatory)*	*Equipment Needed*	*Length min*
		Seattle District	
Fish and Wildlife Slide Show	Wildlife Management in the Northwest	Two projectors, one dissolve unit and recorder	6½
"Koocanusa"	Construction of Libby Dam	16-mm sound projector	7
"Kootenai"	Movie on Kootenai River and Libby Dam	16-mm sound projector	16
		Southwestern Division	
Duties of a Ranger	—	Slide projector, tape player, dissolve unit	15
		Tulsa District	
Safety in Locking Through	Water safety	Slide projector, tape player	5
		Walla Walla District	
Granite-Goose	General orientation	Slide projector, tape player	12
Home for the Wildings	Wildlife	Slide projectors, tape player, dissolve unit	20
Lewiston Levees	General orientation	Slide projector, tape player	8
The Anadromous Fish	Natural history of salmon	Mini Mack IV, amplifiers, AVL-QD3 or 2 or dove unit, slide projectors, speakers	3
Today's Northwest Passage	Navigation	Slide projector	30
Water as a Resource	Water resources	Slide projectors, three AVL-QD3 or dove units MacKenzie Lab. 100/TST/SYNC tape recorder, amplifier, speakers (min.)	12
Water as Energy	Energy and hydro power	Mini Mack IV, amplifiers, AVL-QD3 or 2 or dove unit, slide projector speakers	3
Wildlife and Habitat	Wildlife	Slide projector	20

Program	*Subject (If not self-explanatory)*	*Equipment Needed*	*Length min*
	Wilmington District		
An Interest in Safety	Water safety	Film projector	25
An Interest in Safety	Water and camping safety	16-mm projector	15
A Whole Lot Proud	Resource management	Film projector	25
A Whole Lot Proud	Ranger role interpretation	16-mm projector	25
Breath of Life	Artificial respiration	Film projector	25
Canada Geese of Old Hickory Lake	History and ecology of geese	Video equipment	10
Dam Construction	—	Slide projector	15
Drowning Facts & Myths	Water safety	16-mm projector	15
Find a Float	Water safety	16-mm projector	10
I'm no Fool in Water	Water safety	16-mm projector	10
Inland Water Search & Rescue	Water rescue	16-mm projector	25
Moonshine Making	Local heritage	Slide projector, tape player, dissolve unit	40
Mysteries and Legends of Virginia and North Carolina—in Story and Song	—	Slide projector, cassette recorder	45-60
National Safe Boating Week Program	Water safety	16-mm projector and display	40
National Water Safety	Water safety	Film projector	25
Nature's Carpet Sweeper	Children's nature program about snails	Slide projector, tape player and dissolve unit optional	10
Not By a Dam Site	Boating safety	16-mm projector	20
Recreation and Facilities at W. Kerr Scott Reservoir	—	Slide projector	25
Safe in the Water	Water safety	16-mm projector	20
Smokey Bear & the Campers	Children's camping safety	Slide projector, tape player, dissolve unit	10
Take Safety with You	Water safety	16-mm projector	11

Program	*Subject (If not self-explanatory)*	*Equipment Needed*	*Length min*
	Wilmington District		
The Fish of Philpott	Natural history	Slide projector, tape player, dissolve unit	35
The Price of Freedom	History	16-mm projector	25
The Rattling Truth about Snakes	Natural history	Slide projectors, tape player and dissolve unit optional	30
This Substance Called Water	Ecology, conservation, and management of water resources and role of the Corps	Slide projector, synchronized tape player	20
Vandals Wild	Littering, vandalism, man's effect on environment	Slide projector, synchronized tape player	11
Water, Friend or Foe	Water safety	Film projector	25
We Were There	Corps history	16-mm projector	25
Wildflowers of Western North Carolina		Slide projector	20
Wild Plants and Their Uses	Natural history	Slide projector	40

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MULTI-IMAGE AUDIOVISUAL PRESENTATIONS*

A Guide to Cultural and Environmental Interpretation in the U.S. Army Corps of Engineers

INTRODUCTION

This publication is one of a series of supplements to "A Guide to Cultural and Environmental Interpretation in the U.S. Army Corps of Engineers" (Propst and Roggenbuck 1981). The Interpretation Manual takes a broad approach in its guidelines for choosing an effective interpretive media (see "Choosing the Appropriate Media"). This supplement will provide a detailed explanation of how to produce professional quality audiovisual (AV) presentations. Although each presentation will involve a unique set of production considerations, the basic approach, as presented in this supplement, will remain the same.

This supplement will provide the information necessary to develop multi-image AV presentations. The basic guidelines, however, are applicable whether your show contains one projector or eight. Recognize that you do not have to follow every suggestion in order to produce a high quality presentation. Instead, use those which will help with *your* presentation. If, for instance, you are developing a show with two projectors and no soundtrack, concentrate on the sections covering the story board and visuals and skip over the sections on sound and soundtracks.

Why consider audiovisuals as a means to communicate? Just what are you getting into? The reason for today's increased use of programmed presentations is due to the medium's flexibility. The ability to manipulate images provides communication benefits that most single-image media (slide shows, films, and video) cannot. AV presentations have the capability to project multiple viewpoints of the same subject, and to project them simultaneously. This allows the viewers to see objects, events, or settings in perspectives impossible through normal human perception. The viewers can see not only the panorama, but also close-ups of objects within the panorama. They can see the whole and the parts. They can even see an activity in motion and in still-frame analysis at the same time. All this greatly improves retention of the intended message.

AV presentations allow producers to compress the time needed to create impressions. These impressions are created by multiplying images. We normally see in panoramas, our eyes sweeping the space before us. This process of "seeing" takes place rapidly. Our eyes may focus on dozens of objects in a matter of seconds. From these individual focusings our mind begins to build an overall impression. AV presentations duplicate this process.

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* This supplement was written by Mr. Robert Clark, Recreation Resource Management Branch, U.S. Army Engineer District, Vicksburg; Vicksburg, Miss.

How do slides, film, audio tape, holographic displays, lights, music, and narration fit into your project management? Programmed presentations create interest and excitement when the manipulation of images is artistic, choreographed to involve viewers in the presentation. Such choreography involves the use of color, movement, composition, and sound. The synthesis of sight and sound causes AV presentations to be remembered long after the last slide fades and the music ends. Thus, they are a most effective media to use when communicating a message.

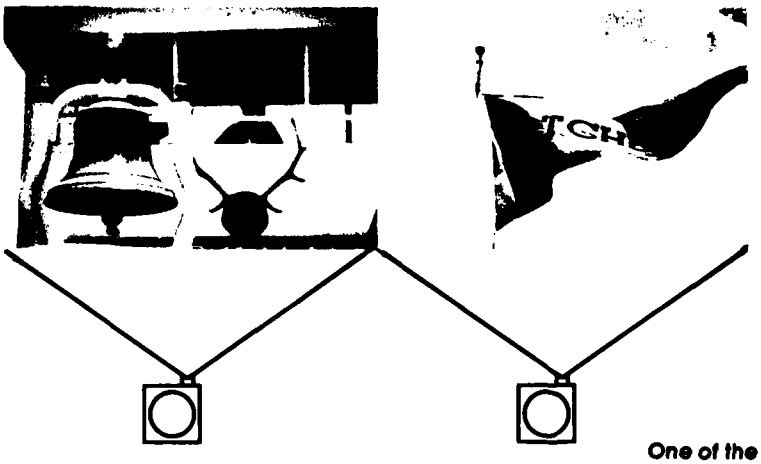
AV presentations come in many, if not infinite, forms. The illustrations (Kenny and Schmitt 1979)* below on the next three pages describe some of the most used screen configurations.

The type of program you select can depend on several factors, including: cost, portability requirements, flexibility to make changes, and in-house capabilities.

Available funds might be the most important factor. You cannot determine the exact amount it will take, but you can determine costs within a certain range. That should be sufficient to determine whether or not to proceed with production.

You must determine whether the show will be taken to remote areas or remain in a permanent location. Usually, portable presentations are not as elaborate as permanent ones. Remember that almost every piece of equipment used in production will have to be transported to remote areas.

It would be a good idea to design shows so that future changes would require minimum effort. It is almost impossible to produce a show without dating some part. However, you should make the effort to eliminate any obvious dated material. You will also want to continually improve the visuals (replacing slides) and



One of the most common multi-image screen formats uses two 2:3 ratio images side by side. The presentation requirements for a production will determine the number of projectors used in this format.

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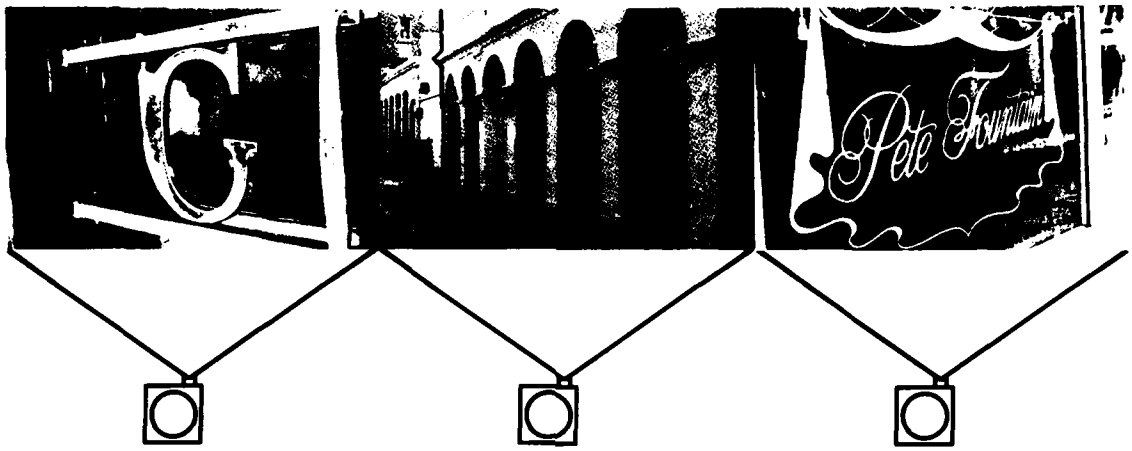
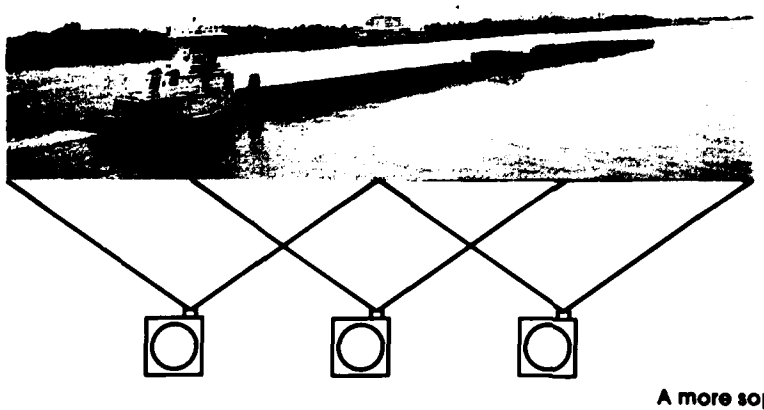
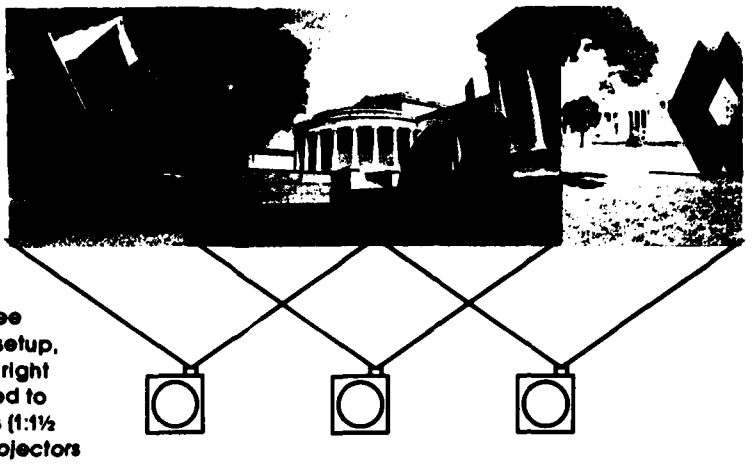


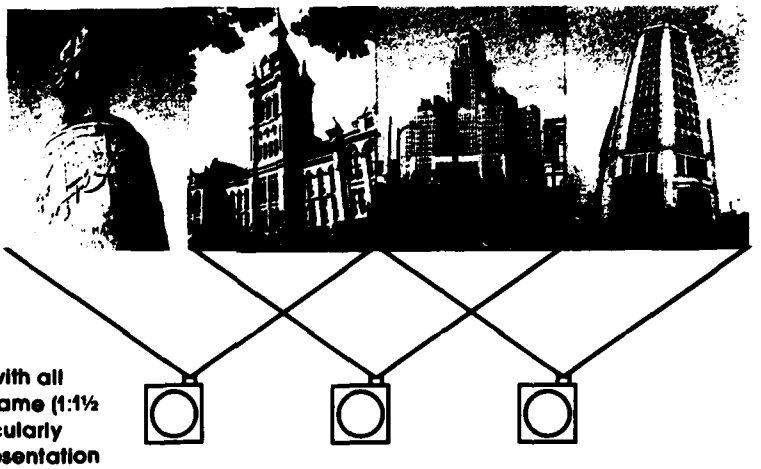
One step further in sophistication: A screen *format using three 2:3 ratio images side by* side. Here again, presentation requirements for a production will determine the number of projectors used in this format, as well as the number used for each screen area.



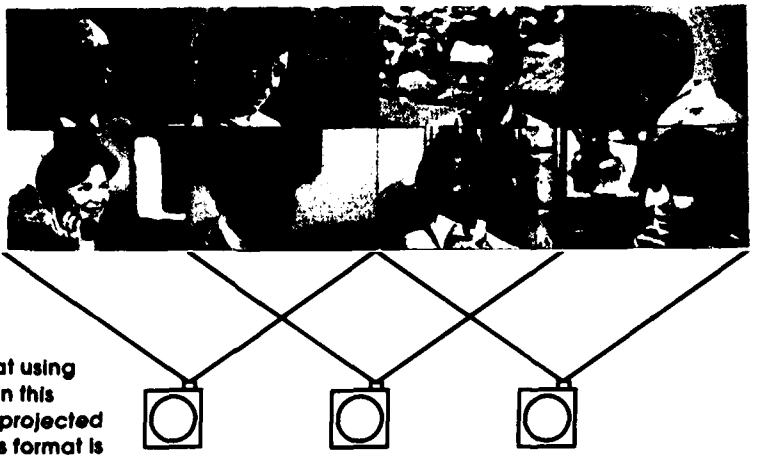
A more sophisticated format using overlapping images: The projection setup consists of two 2:3 ratio images side by side plus an overlapping 2:3 ratio image *focused on the center of the screen.* This setup allows a producer to create full-screen panoramas as well as to create sophisticated animation.



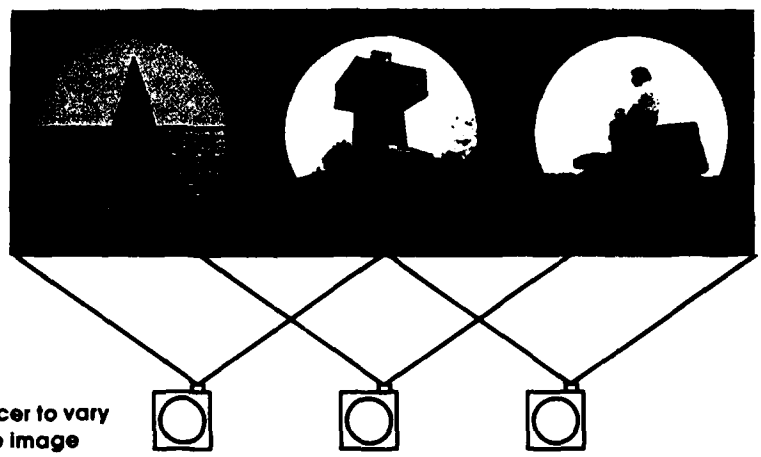
A variation of the format using three overlapping image areas: In this setup, images projected by the left and right banks of projectors can be masked to create vertical half-frame images (1:1½ ratio), while the center bank of projectors uses 2:3 ratio images.



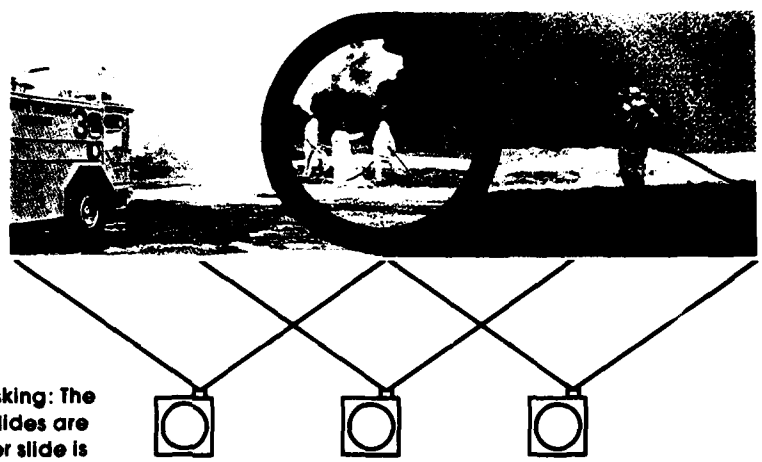
Another variation on the above, with all images masked to vertical half-frame (1:1½ ratio) formats: This format is particularly useful when the subject of the presentation presents a basically vertical orientation.



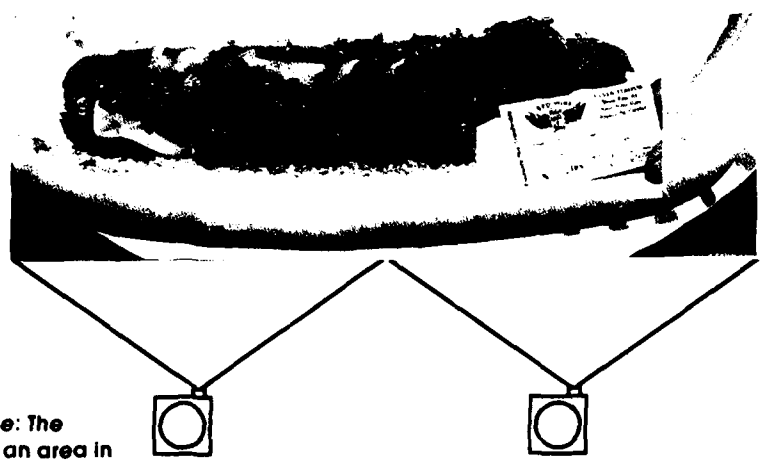
Still another variation of the format using three overlapping image areas: In this setup, quarter-frame images are projected into each of the screen areas. This format is frequently used when a producer wants to show many simultaneous images and when numerous image changes are required in the center screen area.



Creative masking allows a producer to vary the basic rectangular and square image formats.



Another example of creative masking: The inner edges of the left and right slides are masked by semicircles; the center slide is masked as are the slides in the illustration above.



Placing an image within an image: The effect is created by blocking out an area in the larger, background slide through the use of a mask; the smaller image is then projected into the masked area.

soundtrack (finding better music, narration, and sound effects). The complexity of the show will make a difference. It is much easier, of course, to rework a simple two-projector lap dissolve* show than to rework a three-screen, twelve-projector monster. As a rule of thumb, the more projectors and associated equipment, the more permanent the show.

The use of music in combination with narration and visuals can produce a variety of emotions in the audience. One of the initial considerations in the production of the show is to determine the emotional response you want from the visitors. You must then decide what type of music will do the job. Music is a powerful force, capable of changing moods almost instantly. So, remember that the selection of music is a critical decision to be made early in the planning phase.

In-house capability versus contract is another point to be decided early. Utilize in-house capabilities whenever possible. In most cases this will be less expensive and will give you more control over the final product. Any aspect of the production may be done in-house — the photography, narration, recording, mixing, etc. It is suggested that you do as much as you think appropriate to reduce the number of people who contribute to the final product. This usually produces a more unified and coherent presentation.

So to repeat an earlier question: Just what are you getting yourself into? The answer is: You are dealing with the programmed presentation of visual images to convey information and create an impression.

GETTING STARTED

Objectives

The following questions might be helpful in planning your presentation:

- Can the communications objectives be accomplished with an AV presentation?
- Are the audience and occasion suitable for an AV presentation?
- Are time and money available to complete the production?
- Is staff available to handle the production, or can outside producers be hired?
- Are the necessary equipment, supplies, and space available to produce and present the show?

Always start production planning with a purpose. You must have a statement of the effect you want your presentation to have on an audience. Ask yourself: What do you want your audience to think, feel, and do after seeing your presentation?

Writing a communications objective is not a matter of simply describing the presentation's focus or theme. To do that is to confuse a statement of content with a statement of audience reaction. "To explain the facilities and benefits of a project" is not a communications objective. Such a statement merely outlines the content of the presentation. In stating objectives, frame the goal in terms of some change in

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* Appendix A contains a glossary of AV terms.

human behavior. The communications objective should always include such statements as "to ask," "to learn and use," "to become excited about," etc.

Quite simply, you want to influence audience thinking and behavior. You may want the viewer to take home only three or four new ideas from your show, but these must be identified in the initial planning.

Audience Analysis

Who is the presentation for? This question must be answered now. From past experience you probably already know something about the potential audience, such as age groups, occupations, if they will be voluntary or "captive" participants, if they are repeat or first time visitors to your project, their communications skills, and regional differences.

What does the visitor want and need from the presentation? You need to determine if you can fulfill those wants and needs in ways the visitor can understand. Always remember that the viewers will be subjected to an experience that will involve practically all of their senses. Remember the visitor and his or her characteristics throughout the entire production of the presentation, including the evaluation.

Resource Analysis

Besides audience analysis, a resource analysis must also be completed. What features and events on the project are conducive to interpretation? A good place to start looking for information is the master plan. However, the really "juicy" subject matter will ultimately be found at the local newspaper office and through personal interviews with the local citizenry. You will be researching historical, cultural, archeological, architectural, and ecological subject matter. Spend time in the library, in historical society meetings, in the State archives department, and on the phone to the Corps District (Public Affairs Office, Historical Division, etc.). In other words, you will be busy researching your project and learning more about it. From this vast storehouse of information will come the title and content for your AV presentation.

PRODUCING THE PROGRAM

The critical path chart* (Kenny and Schmitt 1979) shown in Figure 1 is being provided merely as a guide for producing AV shows. From this guide you can determine your own path and sequence to follow.

Storyboard

Now is time to incorporate all the preceding elements: the audience analysis, resource analysis, and objectives, into a show. You will begin by drawing a set of images you wish to portray. Once these images and ideas start coming to mind they must be recorded rapidly. One accepted way to do this is with a storyboard, which is a series of illustrations showing the composition and camera angle for most slides in the presentation. The illustrations should not be works of art, because you must

* Reproduced with the permission of Eastman Kodak Company.

record your thoughts on paper as they pop into your head. Also, the storyboard will not show every single slide or visual that will appear in your program. It will, however, provide you with a record from which to refer throughout the entire production. Appendix B contains a storyboard which formed the basis for an AV show for the Grenada Lake Visitor Center, Vicksburg District. As you can see, this storyboard provides enough detail and thoughts for the producers to work from. Do not think that every storyboard must look as detailed and polished as this one. The storyboard is a working tool for ***your*** use only. If you want to you can always polish the art work later for the photographer who will shoot the visuals.

One good way to obtain ideas and create the storyboard is to brainstorm with someone who also has an interest in the presentation. Many good thoughts will emerge from these sessions. It is always best to talk the story through rather than create the entire show in silence.

Once the storyboard is completed, it must be critiqued relative to the original goals and objectives. If it does meet the goals and objectives, you can move on to the ultimate test of a storyboard, review by outside neutral parties. This may mean other Corps employees, your spouse, your children, or your neighbors. Do they follow your approach and line of thinking? If not, ask them where the confusion lies and then modify that section so it is understandable.

Script Production

The presentation can be developed with or without narration, depending on the subject matter and objectives. If the show is to be narrated, you can now begin writing the script.

AV scriptwriting is a process in which you take a set of words that tell a story, combine them with visual descriptions that tell a story, and wind up with a presentation that tells the same story, but more effectively than words or pictures alone. It has been said that the script can be described as suggestions for the director of a show. The script defines and delineates the presentation.

There are at least three points to remember about good scriptwriting. The first point is to think visually. Think in terms of images rather than words. The natural tendency is to write for readers. In AV scripting, you must write for viewers and listeners. Short, straightforward, easy-to-understand sentences should be used. The best way to critique the script is to read it aloud. If you can read it without difficulty and understand it as you read, then it probably is a good script.

The second point is called writing for the ear. The audience will not sit in the amphitheater and read the script. The script will be "experienced" along with visuals, sound effects, music, and physical layout of the presentation site.

A third point is writing in sequences rather than paragraphs. Writing in sequences is like telling a story. Information is presented in a logical order, as in the succession of events, instead of progressing from general concepts to specific details, as in paragraphs. In sequences, descriptions of visual and audio effects may be interspersed with the narration.

Because sequences present distinct thoughts or feelings, it is easier to link visuals to them. Linking visuals to paragraphs, however, is more difficult since the

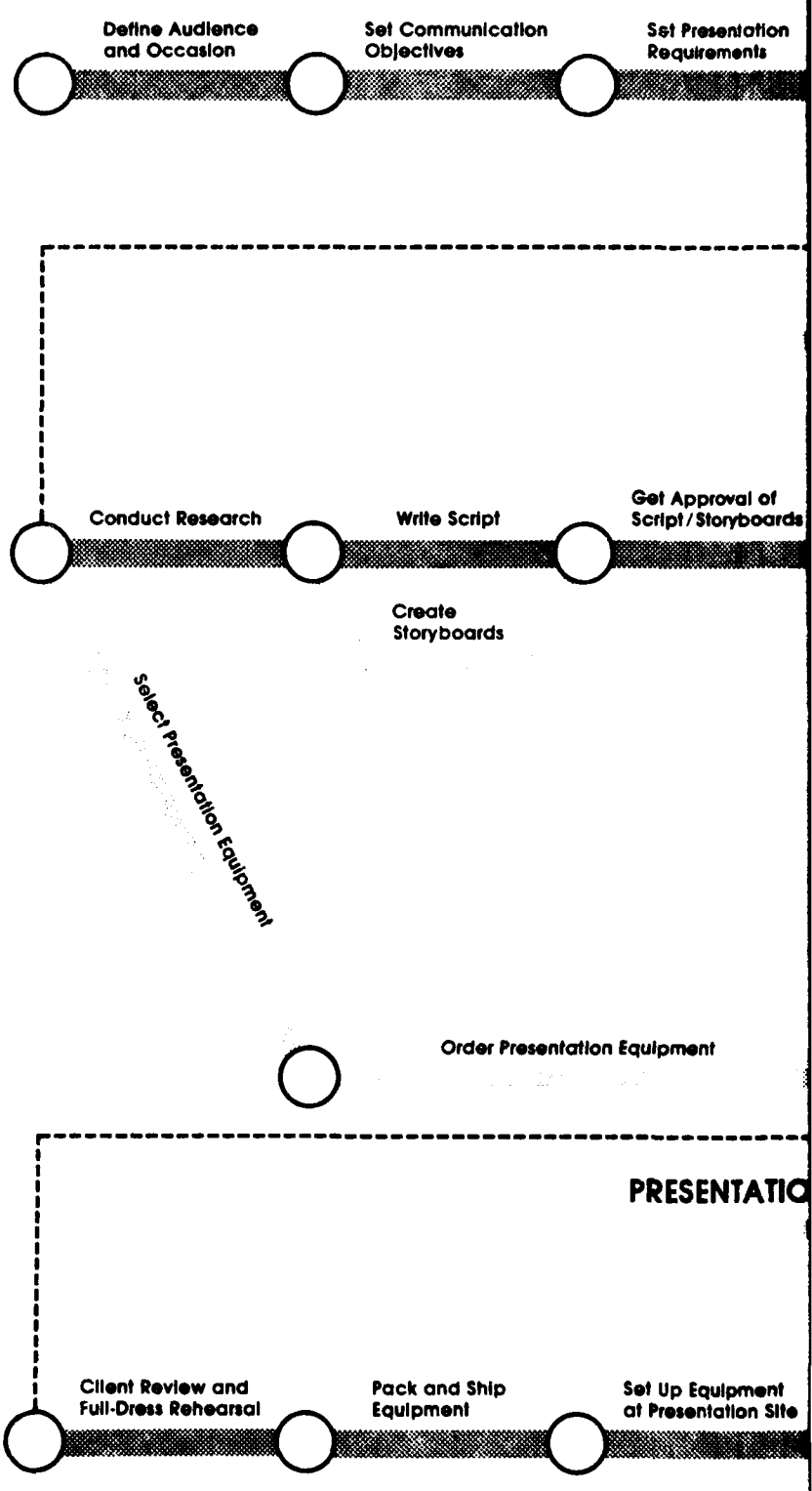
How To Use The Chart

The Critical Path chart diagrammed on the inside pages should be used like a road map. When planning a trip from Point A to Point B, you choose a route that suits your purposes best, selecting expressways if your purpose is to arrive at your destination in the shortest possible time, a scenic route if your purpose is to enjoy the sights along the way. In much the same way, when you plan a multi-image presentation, you should move from "Define Audience and Occasion" to "Present the Show" along the path that suits your specific production needs best.

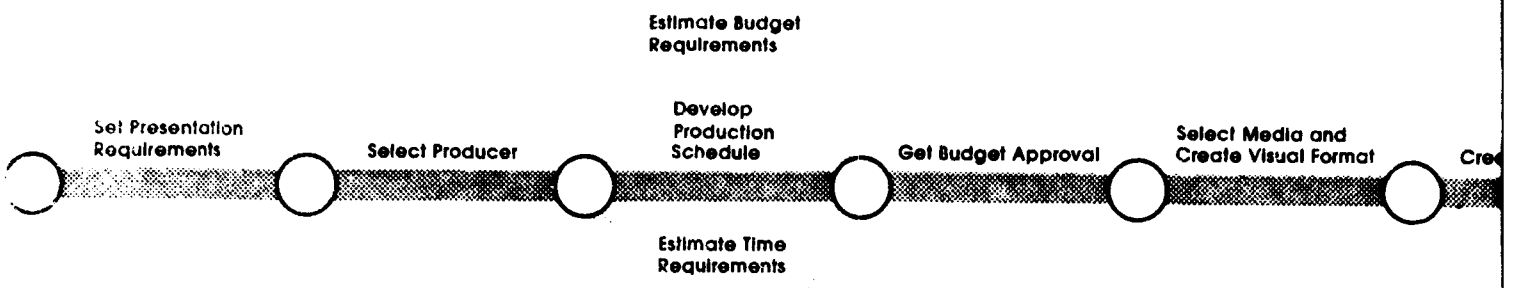
For example, in the production phase of our chart, we have indicated "Write Script" as the critical path activity, the one that will take longest to complete. Your particular presentation, however, may require a great number of detailed storyboards; if that's the case, "Create Storyboards" may be the critical path activity for your presentation.

An area where you are more likely to find our chart diverging from your particular needs is in the planning for motion picture production. We've listed it as a critical path activity. Your presentation, however, may not require motion pictures, so the activities listed for slide production (or, perhaps, sound production) would become your critical path.

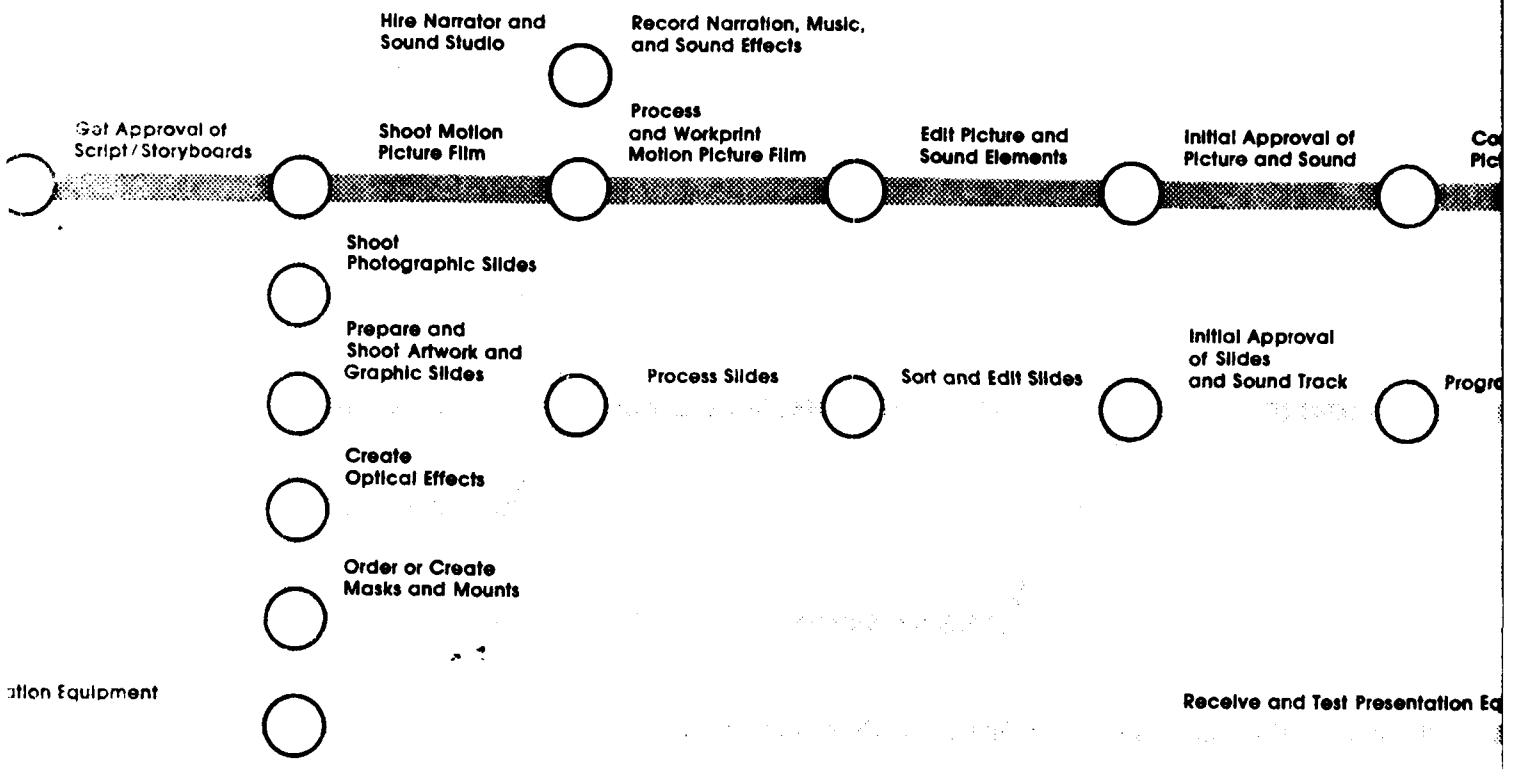
The following chart, then, is not a plan to follow, merely a guide to consult. When you sit down to schedule the activities for your production, use our chart as a model, but create your own version of it. List only the activities **you** will undertake, and list them in the sequence **you** will follow.



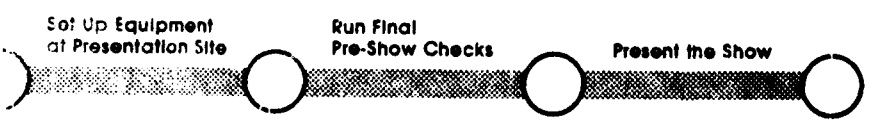
OBJECTIVES AND BUDGET



PRODUCTION

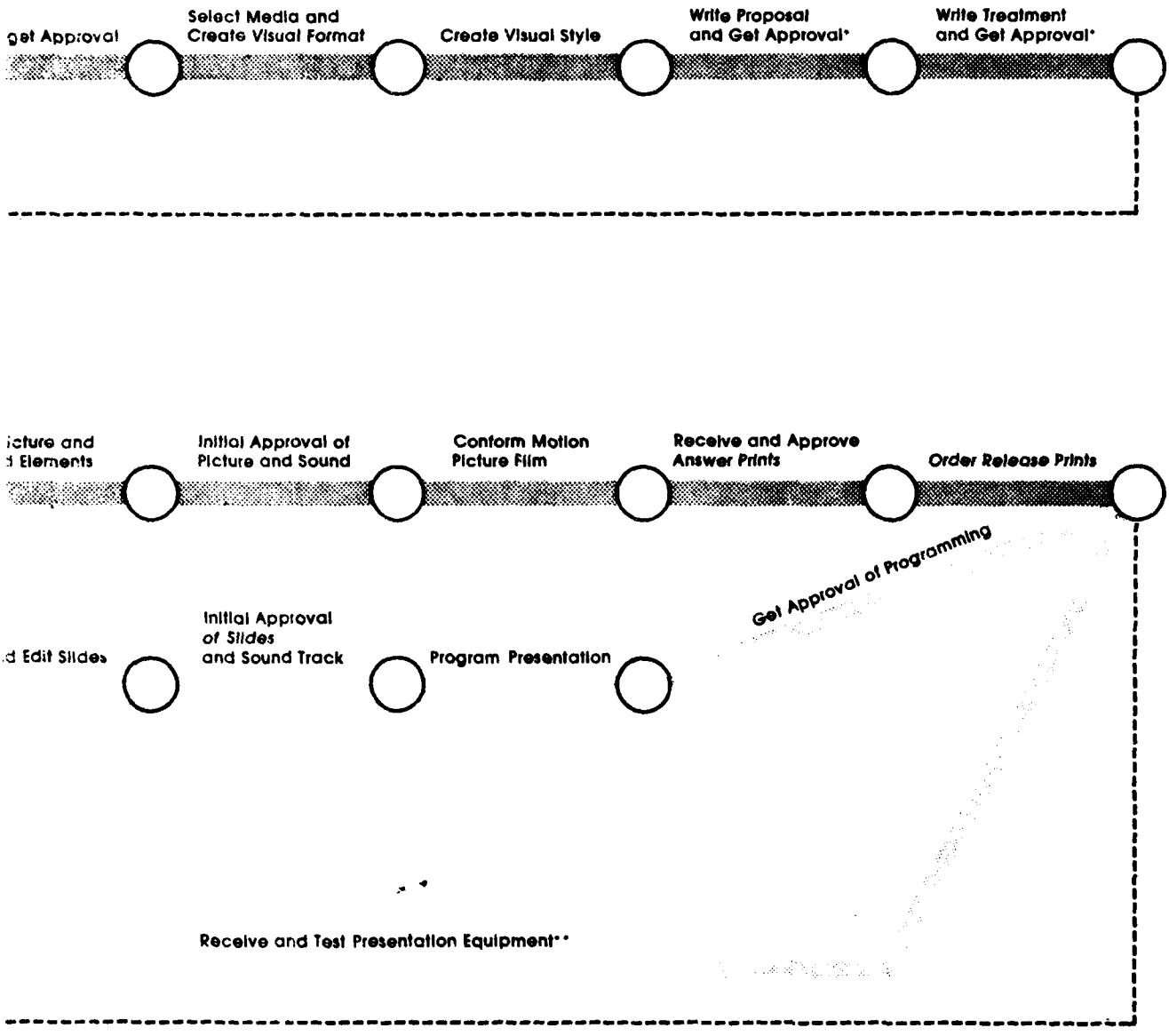


PRESENTATION



*We have listed "Write Proposal and Get Approval" as a single activity because two are so closely related. (The same is for "Write Treatment and Get Approval.") planning, however, you must allow time two activities – you must set a deadline scriptwriter to complete copy and for a whether in your organization or outside read, consider and approve the copy.

PLANNING



*We have listed "Write Proposal and Get Approval" as a single activity because the two are so closely related. (The same is true for "Write Treatment and Get Approval.") In planning, however, you must allow time for the two activities – you must set a deadline for a scriptwriter to complete copy and for a client, whether in your organization or outside it, to read, consider and approve the copy.

**The chart lists "Receive and Test Presentation Equipment" as the final activity in the equipment path. That, of course, is an activity that will take you little time to complete; however, it may take a manufacturer two to six weeks or more to deliver the equipment to you. So most of the time indicated on the chart is to allow for delivery.

Figure 1. Critical path chart

text is wordy. Following is an example of sequence writing with corresponding visuals. For this presentation, the screen was divided into three subsections.

	Visual
"Of course they enjoy all that fast skiing and boating with their parents, too."	1. Screen goes completely dark.
A ski boat is faintly heard from the right front speaker, becoming louder and louder until . . .	
the boat sounds travel rapidly across the front of the theater (moving from the right speaker to the left).	2. Ski boat zips across the entire screen from right to left.
Upbeat music begins immediately.	3. Different skiing shots fill all three subsections of the screen.
"Folks from all over the country come here to enjoy themselves in the ways they like the most."	4. Skiing shots dissolve into three other water activities (boating, sailing, and kite-skiing).
"And there are a lot of things to do at the lake."	5. Various relationships appear on the three subsections of the screen (one shot of overall boat, one shot of skier, one shot of hands on the boat's steering wheel).

To improve your ability to write in sequences:

- Attend as many AV presentations as possible and concentrate on how the words and visuals work together.
- Read as many AV scripts as possible.
- Then write AV scripts by the dozen until you start to feel the difference between the old structured paragraph style and the new self-taught sequence writing.

Is the script to be written in first person or third person? In first person, the narrator describes his or her own experiences. In a third person script, the narrator describes a third person's experiences. First person scripts can be really expressive and fun to write. They also have a tendency to be more personal. Because of the synchronization between visuals and text, you can almost believe the narrator is in the room.

The following excerpt is from a script written for the AV presentation at the Grenada Lake Visitor Center. It illustrates a first person narration. The entire script comprises Appendix C.

> It must have been sometime in late February when I realized that 1927 was going to be a memorable year for me. I was only seven years old then, but I remember all the rain we had and the old folks talking about how high the Mississippi River was and how much backwater flooding was on its way. The rain just kept coming and all the rivers overflowed. My daddy told me that it was going to be mighty hard to plant cotton that year because of all the rain. And it turned out that the flood in the Mississippi Delta of that year was the worst on record.

Remember your audience when scripting. It is very easy to forget them and go off on tangents to suit your own desires. Limit the use of technical wording, except

when the intended audience is made up of highly technical people. You do not have to write in complete sentences. After all, few people speak entirely in complete sentences. And remember you are writing for listeners and not readers.

PRODUCTION OF VISUALS AND SOUND

At this point, the storyboard should undergo minor changes because most of the photos and sounds have been identified. This new revised storyboard will be the one to take to the field for shooting and sound recording. The storyboard will not have to be redrawn to reflect these changes or additions. Simply make notes in the margins or redraw the specific visuals that need modification. Again, remember that the storyboard is a working tool and not meant to be displayed in an art gallery.

Next, comes shooting of the slides or filmstrips and recording of the sound. If you desire, you can copy photographs and figures from published material or use recorded music for your presentation. However, if they are copyrighted, you will need to obtain permission to use them. To obtain permission for printed materials, write to the publisher; for recordings, check with the recording studio. Consider too, that the studio will have a variety of recordings available which you may use without obtaining specific copyright permissions.

Although photography and recording will be done simultaneously, they are discussed separately here.

Visuals

The storyboard will tell you what visuals are needed. Getting them will be something else. At this point you need to decide if you will be the photographer or someone else will do the job. Either way, a substantial degree of professionalism in multi-image photography is required. If you will be the photographer and feel inadequate for the assignment, read Appendix D which is reproduced from the Kodak publication *Images, Images, Images—The Book of Programmed Multi-Image Production** (Kenny and Schmitt 1979). Then go out and practice multi-image photography on your project.

Prior to beginning the photography, you should finalize the types of movements you will program on the screen. These movements could be: (a) sequences, (b) panoramas, (c) animation, (d) related item sequences, and (e) special effects.

By identifying these techniques early, you can avoid panic in the field. These techniques will determine equipment requirements, locations of subject matter, time of day and season for desired visual effects, coordination for staged shots, and length of time necessary to spend in the field to secure all the proposed visuals.

To make arrangements for field photography, you must consider the shots needed. Is it possible to obtain them during the present season of the year or must you wait for different weather conditions? Can you shoot all the slides on the project or do you have to find other sources such as books, negatives, or other sites?

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* Reproduced with the permission of Eastman Kodak Company.

Will you need to coordinate staged shots such as a camping setup sequence? Now is the time to arrange these things rather than in the field.

For vivid and lively colors, shoot on clear days when the sun can really saturate the scenes. You will be able to create many moods by playing with different camera angles. On the other hand, some of the most famous landscape shots were taken on overcast or foggy days. Misty morning or foggy sunset photographs can give powerful moods to the show.

Close-ups of people are also effective when taken in the shade or on cloudy days. There will not be any harsh shadows or contrasting light that can fool the camera's light meter. The person's face will be evenly lit, which is sometimes difficult to accomplish in full sun. The squinting problem is also eliminated on overcast days.

The following criteria should be helpful when thinking about photography:

a. Become familiar with taking multiple shots of the same subject and shooting from a variety of viewpoints.

b. Tell the story with pictures; that is, you should see sequences with a beginning, middle, and end. This differs from an advertising photographer who tries to tell the whole story with a single photo.

c. Become competent with the 35 mm, 16 mm, or video camera.

d. Learn to work quickly because you probably will not be given enough time to get all the shots you want.

e. Learn to work on location. You will encounter equipment trouble, lost film cartons, bad weather, and loud and distracting sounds.

f. Learn to direct people during a shooting session. This will require you to improve your ability to work with people, to put them and yourself at ease, and allow both of you to act naturally. It will not be easy to walk up to a campsite and say "I work with the Corps of Engineers and I would like to take some pictures of you."

g. With experience you should become comfortable with this type of photography. You will discover, for example, that your job as photographer will become a lot easier simply by dressing similar to the people you wish to photograph.

A difficult habit to break is taking one normal shot of the subject from eye level and then moving on to something else. You must learn to take the normal shot, say of a camping scene, and then move in to take tight shots of hands washing dishes or roasting hot dogs over a campfire. Take shots of the nameplate on a camper. You may get some strange looks and comments from the visitors who do not understand what you are attempting, but these shots will help communicate your message. An explanation can easily put the visitor's mind at ease.

Never confine your photography by adhering strictly to the storyboard. Unpredictable situations will always arise in the field. Seize the moment and incorporate those visuals into your story. These visuals may be more expressive than the ones you originally had in mind.

As a last note, do not be stingy with film. One of the differences between amateur and professional photographers is the amount of film they shoot of the same subject. Professionals will shoot an average of 10 times the shots of an amateur.

Photographic equipment. The photographic equipment needed will, of course, depend on the complexity of the show. For instance, animated sequences in a three-screen format will require the use of a winder (one or two frames per second) or, better yet, a motor drive (four or five frames per second). The following 35 mm equipment list is recommended for producing a professional AV presentation:

- Two 35 mm camera bodies (preferably the same brand and model).*
- 28 mm wide-angle lens.
- 80 to 200 mm, or 200 mm lens, with macro capability if possible.
- 300 mm or 400 mm lens.
- Winder or motor drive.
- Flash unit.
- Skylight and polarizing filters.
- Tripod and/or monopod.
- Aluminum carrying case for entire system and/or soft-sided gadget bag.
- Cable release.
- Lens cleaning fluid, tissue, and brush.

Although this system represents a sizable investment, it is necessary to do professional quality shows. Some of the equipment may be borrowed from other sources such as the photo lab. As was stated previously, ***your*** show may require more or less equipment, such as 16 mm movie equipment, special lens (e.g. 800 mm mirror lens), video, and studio lights. If necessary, get assistance from your photo lab or other people who have produced AV presentations.

Film. To avoid catastrophic results, always use "amateur" films. These films are not inferior to "professional" films. The latter type of film requires refrigeration and very prompt processing because the ASA ratings are exacting, i.e. ASA 64 is exactly 64. The amateur film's ASA ratings could vary slightly from batch to batch, though you will probably never notice the difference. Try, however, to get all your film from the same emulsion batch. This is usually easy if you buy all of the film at one time from the photo lab or a photo dealer. Local discount stores are not recommended because the film may be out of date or from many emulsion batches.

Because of the number of slides needed, it is recommended that you use 36 exposure rolls. Probably 90 percent of your visuals can be shot with ASA 64 film. If greater speed is required, use 200 or 400 ASA. Just remember that the higher the ASA number, the more grain the film displays.

There are several brands and types of film that you can use. All tend to represent colors differently;** so analyze the types of shots you will be taking before you purchase the film. It is recommended that you do not mix film types as the difference in colors will be noticeable.

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* This will save you from continually changing lenses while shooting.

** For instance, of the Kodak films, Ektachrome tends to emphasize blues and greens, while Kodachrome emphasizes reds and yellows. Photography magazines should be referred to for more detailed descriptions of film types.

When you return from the field, if possible have the film processed at a professional color lab. If you plan to cut and mount the slides yourself, have the film processed uncut and unmounted. This is necessary to ensure precise alignment of both the film chip in the mount and the projected image. It is recommended that you use pin-registered glass slide mounts to protect the film chips and ensure accurate screen alignment.

Two people should be able to hand mount and clean mount 1000 slides in 3 days. Cleanliness is mandatory! Lint, fingerprints, or any foreign material will show on the screen. Your slides should be cataloged by subject (swimming, camping, interpretive programs, etc.) using three-ring binders with vinyl pages or slide storage cabinets or boxes. These are available at most reputable camera stores.

One item that will be essential in viewing slides is a light table of some sort. Photography magazines are good sources for locating manufacturers of light tables. There are good ones on the market; however, you can make a light box with materials probably already on hand.

Sound

Sound production goes hand-in-hand with photography in AV productions; it has to for the visuals and soundtrack to be properly synchronized. The soundtrack, whether on cassette or reel-to-reel, can contain three types of audio: words, sound effects, and music. Narration backed by sound effects and music becomes a powerful instrument of persuasion. The same holds true for sound as for photography. Make a rough list of those sounds you know will be in the show. Then decide how to obtain them (onsite, commercial studio, etc.). At this point, the mood of the presentation will be set by the type of narrator's voice, sound effects, and music. You will soon discover that by changing any one of the three you will change the emotions elicited by the show, such as when a string ensemble is replaced by a country banjo duet.

Audio equipment. Again, as in the photography section, you must determine sound equipment requirements for field recording. The quality of sound recordings will only be as good as the sound equipment. For professional sound, use professional equipment.

The recommended and universally recognized type of recorder is the portable reel-to-reel. If you plan on having the soundtrack prepared at a studio, cassette recorders are not practical. It is not a question of their quality, but rather a question of the smaller tape size and slower recording speed of 1-7/8 inches per second (ips). This makes cassettes incompatible with the tape used on fast-speed (7-1/2 ips and 15 ips) reel-to-reel recorders used by studio sound editors. The portable reel-to-reel recorder is the answer. As an alternative to buying, you may be able to rent a recorder from AV dealers.

Selection of the microphone is as important as selection of the recorder. Perhaps the best type of microphone to use is one having a directional pattern of about 40 deg in front of the microphone. Again, the best microphones cost or rent for considerably more than the inexpensive ones. When using a very sensitive (expensive) microphone, always prevent any vibration from reaching either the microphone or the cable running to the recorder. The slightest brush of a finger

over either will result in a bass rumble or pop on the tape. So be extremely careful to isolate them from shock. You can do this with a professional microphone tripod, available at the same place that sold or rented the microphone and recorder.

Sound recording. It is finally time to head for the field and photograph and record sound. Recording sound on location is not simple. Good quality tapes, "clean tapes," require considerable experimentation. After recording, play the tape back for analysis. Do the recording again if it is not acceptable. You will learn where to set the volume control, how to position the microphone, and even how best to carry all the equipment in the field. The important thing is to become comfortable and proficient with the equipment so that you only miss few of the sounds you wanted.

You may record interviews with visitors for the show. Choosing the right person for an interview requires judgment. You must judge quickly whether or not the person is worth recording. To prepare for an interview, plan out the order and phrasing of questions and/or comments. Ask specific rather than broad, open-ended questions.

One of the most common yet serious mistakes made when recording sound effects on location is to make short recordings of a lot of different sounds. Short segments make the job of splicing the soundtrack very difficult. Instead, let the recorder run longer than you feel necessary to get, for example, 3 min of beach sounds versus 30 sec. That way there will be plenty of tape and sound effects to edit.

All tapes should have the subject matter identified on the outside of the tape box. Be sure to write the tape speed (7-1/2 ips, 15 ips) on the box and the reel itself. Even if all sound is recorded at the same speed, labeling will assist the sound editor who puts together the soundtrack.

PREPARATION OF THE SOUNDTRACK

The next step after taking original slides and organizing them with the tapes is to experience a synesthesia, "a concomitant sensation." It means seeing colors in your mind when listening to sounds. The soundtrack will necessarily be done before programming because it is far less complicated to change the program cues than to splice and edit tape. Also, you will probably feel more comfortable having a soundtrack against which to program the sequences. The music and effects will help you "see" how to develop the show.

Producing a Scratch Track

One way to proceed here is to create a rough soundtrack—or scratch track—to use in programming. The scratch track should be edited until it sounds right for the show. Then you can program to it. There are three good reasons to produce a scratch track:

a. The soundtrack will help in determining the mood or emotions to be conveyed in each sequence.

b. The number of visuals in the show will be determined in this rough track by the pace of the music and/or effects.

c. The scratch track is useful if a multitrack mix is going to be used (it is much easier to edit a mono or stereo track than an 8-, 10-, or 12-track mix).

How do you make a scratch track? Take your storyboard and decide what moods and emotions are to be conveyed to the audience (see the sample storyboard in Appendix A). Write these thoughts in the margin of the storyboard. This should be done by sequences. Usually AV presentations have natural breaks where emotions or scenes change. You are now really deciding what "flavor" the show will have and finalizing thoughts about how visuals will match audio. You may even be able to think of the music you want for each sequence. The more you can decide now, the better for you and the technician at the recording studio. Once you have a script and a storyboard with the music and sound effects noted by sequence or scene, you are ready to find a studio to record the scratch track.

Studio Selection

Very few, if any, of you will have your own professional recording studio. So you will need to seek the services of one. Here are some things to look for in a studio:

a. Has the studio recorded AV soundtracks before? If they have only done radio commercials or music, then they will have to learn as they go. You will be better off, all things considered, if you can find a studio that has AV experience.

b. The studio interior should have sound-isolating properties such that no external sounds can be heard.

c. Are the acoustics of the room proper? You should hear only clear, natural tones without echoes or dull characteristics.

d. Is the equipment adequate for the job? If your show, for instance, requires two-channel sound, then the studio should have a four-channel recorder as a minimum, and an eight-channel recorder really is even better for mixing music and sound effects.

Solicit at least three studios and select the one that comes closer to meeting the criteria above. Once the studio is selected, take or send the storyboard and sound effects tapes to the studio. Find out the name of the technician who will be doing the scratch track and thoroughly go over every aspect of the storyboard. Tell this person everything you ever thought about while developing your presentation: every emotion, music change, sound effect, sound climax, music type, and narration spot.

If the show is to be narrated, you will need to select a narrator(s). Unless you are familiar with "a voice" from past experience, you will need to listen to audition tapes of voices. Listen for the right voice to match the emotions of the music, sound effects, and visuals.

Before you leave the recording studio, ask the technician for either a mono or, preferably, a stereo scratch track of the show.

Programming

The necessary equipment for programming the presentation should be either purchased or rented. A description of programming equipment is contained in Appendix E. You will also need a suitable room for programming. The room will

have to be large enough to work in, isolated from any other activity, so the volume can be turned up to final presentation levels, and the lights turned off during programming. Prior to programming, arrange the light table, recorder, programmer, and slide projectors so they are all easily accessible.

The best way to program is to divide the storyboard into related segments or obvious breaks. Take one segment at a time. Shorter segments will be easier to program at the beginning while you are getting used to the equipment. As you become more proficient, you can progress to longer segments.

There is no way to tell you how to operate all the many makes of programmers currently available. However, it might help to remember that all programmers perform the following three functions:

- They turn projector lamps on and off.
- They control the cycling of projector trays.
- They provide a means of timing these two functions.

Programming Effects

Descriptions of the type of effects possible with today's better programmers are as follows:

Dissolves or fades. This is the basic AV effect. It simply means fading an image until it completely disappears. You can fade to black or fade to another image (one image seems to dissolve into another). Most programmers have fade rates from less than 1 second to 30 or more seconds.

Fast or hard cuts. A cut means that an image is either removed or substituted instantaneously. It might be thought of as super-fast dissolve. This movement will produce a lively and fast-paced series of images. Use this effect to emphasize the beat of music and keep your slides in synchronization (sync).

Cut on/dissolve off, dissolve on/cut off. This simply combines the effects of the dissolve and cut. These techniques can add a lot of emotion to the presentation.

Hold. Here a slide is retained in the projector with the lamp off. A hold is valuable for showing the same slide several times in one sequence. Another reason for holding is to retain a series of slides to be used in flashing or animation.

Wipes. In a wipe an image or series of images is removed from the screen in a sweep from left to right, right to left, top to bottom, or bottom to top. The images can also be placed on the screen in the same manner. Wipes are made by programming a sequence of dissolves separated by a specific time interval (or cue link). If you have more than one screen area, this technique can make a ski boat travel across the screen followed by a skier.

Flashing. In flashing, the projector lamps cut on and off in split-second intervals while holding the slides. Flashing can call attention to words or images.

Animation. Animation can either be limited or extended. Limited means that you flash held slides in a sequential programmed cycle. This animation can be three or four step (three or four projectors). You can make a fisherman reel in a fish and even make his rod bend. A campfire can "burn" using this technique. Extended animation is similar except the slides are not held in the projectors but advanced,

introducing new slide sequences. This effect is the next thing to motion pictures.

Special effects. Most programmers can control auxiliary equipment or functions such as turning the house lights on and off, activating other AV equipment, and just about anything else that is electrical.

The ability to create the above effects is the first step toward becoming a good programmer. After this technical stage comes the creative level of proficiency. This involves making the effects function with the rough soundtrack and still adhere to your storyboard. Remember, you will be trying to emotionally affect the audience through meaningful sight and sound. Instead of trying to create as many effects as possible, ask yourself "what is the storyboard trying to communicate by this specific passage?"

Once you are satisfied with a sequence of moves on the programmer, stop and make a note of movements necessary to produce the sequence. That way, you will always have the movement even if an accident happens. This will also be helpful if you might want to repeat certain effects through the show for continuity.

Once you have programmed a sequence to your satisfaction, transfer it to your audio tape, beta tape, and whatever medium your programmer provides for storing cues. Again, this preserves the sequence against accidental erasure or machine failure.

The best advice on programming is to read the owner's manual and/or operating instructions that came with the programmer. They will explain how to mechanically accomplish the various effects available on the programmer. However, it will be ***you*** who creates the show, not the programmer.

Production of Final Soundtrack

The next phase of producing the final show is to return to the studio and coordinate the final mix of your tape. Usually, you will have made minor changes to the scratch track during the programming, for example, shortening or lengthening a sequence. This is one reason for having a scratch track produced prior to the final tape.

What does "final mix" mean? A mix involves storing sound effects, music, and narration on separate channels on a master tape in the studio. The studio technician can mix, or combine, one or more of these channels together to form one "mixed" track. For example, bird sounds might be placed on track 1, while a camping interview is on track 2 of an 8-track recorder. Mixing results in a camping interview with bird sounds in the background. This mixing process will add life and "presence" to the presentation, especially if done for stereo or quadraphonic sound.

As with the scratch track, tell the studio technician everything you felt while programming. The more information the technician gets, the better the final soundtrack will be. A good technician can also offer suggestions that could improve the show.

If the studio has playback capability, you might make a video recording of your show before returning to the studio for the final mix. This will give the sound technician a better feel for the show. He or she can also determine the length of each sequence, thus improving the final mix.

The final mix should proceed as your programming, one short sequence at a time. Each sequence can be tested before moving on to the next.

Once the final mix is finished, some adjustments may have to be made in the programmed visuals, such as changing dissolve ratios. These should be relatively minor if no major changes were made to the scratch track. This adjustment of cues is the final polish; you now have an AV presentation ready to be shown and evaluated.

PROGRAM EVALUATION

The first evaluation should be conducted as soon as the show is completed. The evaluation might be the most important phase of producing the show. Does the presentation meet the original objectives? Is it easy to watch? Is it enjoyable to watch? Are you satisfied with it? Does it do the things you wanted?

Undertake an audience evaluation right away. This can be done by simple observation or informal interviews. First, let us consider observation. Try to act like one of the visitors. This may mean that someone else will have to run the show if it is not automated. You do not have to ask any questions. Just sit there and watch people's faces and reactions. Do they respond to the spots you tried to make funny? Are most people sleepy at the end? Is the show too long? What kind of things are people saying as they leave the presentation site?

The second evaluation process is to informally (while still in civilian clothes) ask a sample of the audience about the presentation. Ask specific questions like "Do you remember why the project was built?" People usually respond positively to general questions ("Did you enjoy the show?"), so try to be as objective as possible in wording the questions. You will be attempting to determine whether or not your ideas and message are effectively communicated by the presentation.

A periodical reevaluation of the AV presentation is suggested because (a) portions of the show may become obsolete, (b) audiences may change, and (c) materials may deteriorate.

Wait about 6 months for a reevaluation of the presentation. You will find that your show looks different for some reason and you will find fault with parts of it that looked fine 6 months ago. Improve the show by eliminating the obsolete portions or those portions that obviously need changing.

Maybe your audience changes characteristics in 6 months. If so, make the necessary changes to your program. Audience changes can sometimes be very subtle and hard to identify. At other times the changes are obvious, e.g. change from an older audience to children.

Materials deterioration is a certainty. Tape will eventually wear out, slide quality will deteriorate due to the repeated exposure to bright and hot projector lights, projector bulbs will blow, and other equipment will malfunction because of dust accumulation. Proper maintenance is the only way to prevent major breakdowns and costly repairs. Prepare a maintenance schedule and trouble-shooting guide. This will be especially useful if someone else will be responsible for running the presentation and maintaining the equipment.

SUMMARY

This supplement has exposed you to the process of producing AV presentations. Appendix E contains additional guidelines on auditorium design and equipment selection. Obviously, not all questions can be answered here. The various publications listed in the Bibliography and in the References can be of valuable assistance. AV workshops can also help answer your questions. However, perhaps the best way to solve your problems is by doing. This is called experience, and no book can give you that asset. You must learn to be fearless when trying new ideas in AV productions. The field of AV production will not progress if new and better methodologies are not perfected.

Keep abreast of the latest technology in AV equipment by subscribing to *Audio Visual Communications* and other AV magazines and by attending AV workshops. You could join AMI, the American Media Institute. Finally, manufacturers will always be more than glad to send colorful brochures on their latest equipment.

"Interpretation should begin with entertainment and end with wisdom."
John Barkin

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APPENDIX A: GLOSSARY OF AUDIOVISUAL TERMS

This glossary is reprinted from the 1981/82 Audio-Visual Equipment Directory and is reproduced with the permission of the National Audiovisual Association, Inc., Pittsburgh, Pa.

ADAPTOR—A device to permit interconnection of two connectors that do not match physically.

ANALOG RECORDING (Multi-Image Devices)—A method of recording control information (encoding) by a continuous but varying signal rather than discrete (digital) pulses.

APERTURE—Size of an opening; diameter of a lens in relation to its focal length.

AUDIO CASSETTE—A cassette designed to hold audio tape for automatic play in tape recorder devices. Also see COMPACT CASSETTE.

AUDIO MONITOR—A studio-type speaker for listening to the playback of a tape or record, also used for editing and quality check.

AUTO STOP—A device which automatically stops or disengages the mechanism at the end of recording or playback. This feature may be combined with AUTOMATIC SHUT-OFF. FULL AUTO STOP returns the mechanism to stop position at tape end in any mode including fast forward and rewind.

AUTOMATIC LEVEL CONTROL (ALC)—(Audio Recorders)—A circuit used to control the volume or level of the recorded signal automatically to provide uniform level without distortion due to overloading. Sometimes called AUTOMATIC GAIN CONTROL (AGC) or AUTOMATIC VOLUME CONTROL (AVC). An ALC DEFEAT control permits manual level control for wide ranges or special recording purposes.

AUTOMATIC SHUTOFF—A device which automatically turns the electronics off at the end of recording or playback. This feature may be combined with an AUTO STOP mechanism.

BIAS—A direct current (dc) or high frequency alternating current (ac) signal fed to a magnetic recording head with the audio in order to minimize distortion. AC BIAS ordinarily provides higher fidelity but at higher cost.

CAPSTAN (Audio Tape Recorders, Record Players)—A rotating shaft or spindle which moves the tape at a constant speed during recording or playback in tape recorders. A pressure roller squeezes or pinches the tape tight against the capstan to provide traction.

CHANNEL—One program path through a system without interference from another. See DUAL CHANNEL.

CLOSED LOOP—A continuous loop of film or tape for repetitive playing, often in a cartridge.

COMPACT CASSETTE—Often called "Philips" cassette; a 0.15 in. (3.81 mm) audio tape attached to two hubs inside a plastic container for self-threading. May be operated in fast forward or rewind modes. The number after "C" indicates the total running time in minutes on both sides of the tape at the standard speed of 1-7/8 ips (defined in American National Standard S4.8-1975 (EIA RS-399-A-May 1975).

CUT—To terminate a program, image, or scene abruptly; to make a sudden and complete change from one to another.

DECODER—The device in a SYNCHRONIZER or PROGRAMMER which reads the encoded signal or pulse and turns it into some form of control. (Compare with ENCODER.)

DIGITAL RECORDING—Advanced method of recording which involves a sequence of pulses or on-off signals rather than a continuously variable or analog signal; advantages are increased frequency range and lower tape noise. May be used for control, audio, and video purposes.

DISSOLVE—A change from one scene to another in which the outgoing and incoming visual images are superimposed or blended together for a discernible period of time as one scene fades out while the other fades in. Sometimes called CROSS FADE or LAP DISSOLVE.

DISSOLVE CONTROL—A device which controls the illumination from one, two, or more projectors in such a manner that the images fade from one into another at a fixed or variable rate.

DISTORTION (audio)—A modification of the original signal appearing in the output of audio equipment that had not been present in the input. The most common way of expressing distortion is in percent of original signal as Total Harmonic Distortion (THD).

DUAL CHANNEL—A device with two separate paths that do not interfere unless deliberately mixed. Stereo equipment is an example.

ELECTRONIC EDITING (Video)—Inserting or assembling program elements on video tape without physically cutting the tape.

ENCODER (Multi-Image Devices)—(signal generator or pulser)—A device used with a tape recorder or other information storage device to produce the synchronizing signals or pulses for later decoding to operate combinations of devices (projectors) in synchronization. (Compare with DECODER.)

FEEDBACK (acoustic)—The regeneration of sound caused by a system's microphonic pickup of output from its own speakers causing a ringing sound or squeal.

FLUTTER—Rapid change in frequency of an audio or video signal due to variations in tape or disc speed. A WOW is usually considered a lower frequency speed variation.

FOCAL LENGTH (FL) (Projection Equipment)—The distance between a focal point of a lens (or mirror) and the corresponding principal plane. Shorter focal length means larger image size on screen for given projection distance.

FOCUS (AUTOMATIC) (Slide Projectors)—The first image requires actual focusing; remaining similarly mounted slides are automatically focused.

FREQUENCY RESPONSE (Audio and Video Systems)—The frequency range over which signals are reproduced within a stated amplitude range. Generally expressed in dB versus Hz; example: 100-5000 Hz ± 5 dB.

FRONT SCREEN PROJECTION—An image projected on the "audience side" of a light-reflecting screen.

HEAD DEMAGNETIZER (DEGAUSSER)—A device which provides an alternating magnetic field used during routine maintenance to remove the residual magnetism from recording or playback heads.

IMPEDANCE—Resistance to the flow of alternating current electricity. Measured in ohms and abbreviated or Z. Low impedance circuits (low Z) are 600 ohms or less, and high impedance (hi Z) may be 50 K ohms or more.

INPUT—The program that enters a unit or system; the jack or receptacle into which a signal is fed.

INTERLOCK PROJECTOR—A special type of projector which can be interconnected with another projector or tape recorder for synchronous running. Used for screening of separate picture and sound tapes or in multiprojection systems. (See DOUBLE BAND PROJECTOR.)

JACK—Receptacle for a plug connector for the input or output circuits of an audio or video device. There are several common sizes and formats of plugs, such as:

Standard phone-¼"	0.25" or 6.35 mm diameter
Small phone	0.206" or 5.23 mm
Mini	0.140" or 3.6 mm
Micro	0.097" or 2.5 mm

KEYSTONING—The distortion (usually of a wide-top narrow-bottom effect) of a projected image. To avoid keystoning the screen must be at a right angle to the projection axis.

LENS SPEED—Refers to the ability of a lens to pass light expressed as a ratio—the focal length of the lens divided by the (effective) diameter. A fast lens (which passes more light) might be

rated f/1.1 or 1/2; a much slower lens (which passes less light) might be designated f/3.5.

$$\text{F/number or f/\#} = \frac{\text{focal length}}{\text{aperture}}$$

MICRO-COMPUTER—A small self-contained computer.

MICRO/MINI CASSETTE—One of several audio cassettes much smaller than the compact cassette; used principally for note taking and dictation.

MICROPHONE—A device that conveys sound into electrical signals usable by other pieces of audio equipment. Microphones vary in sound quality, generating system used, directional patterns, and impedance.

Directional Patterns:

OMNIDIRECTIONAL—A microphone that picks up sound from all directions.

CARDIOID, UNIDIRECTIONAL—A microphone that picks up sound primarily in the direction it is pointed, rejecting sounds from rear of microphone.

BIDIRECTIONAL—A microphone that picks up sound in front of and behind itself, and rejects sound from the sides.

Generating Systems:

DYNAMIC—A microphone with a diaphragm connected to a fine wire coil moving in a magnetic field. May be any pattern.

CONDENSER, ELECTROSTATIC OR CAPACITOR—A microphone with a conductive diaphragm that varies high-voltage electric field to generate a signal. May be any pattern. Requires a miniaturized amplifier and power supply.

ELECTRET—A microphone similar to electrostatic except that the diaphragm is permanently charged, eliminating need for high voltage supply; however, it usually requires an internal battery for a built-in preamp. Particularly well suited for hand-held and machine use because of low susceptibility to vibration-induced noise. Can be any directional pattern.

RIBBON—A microphone with a thin sound-sensitive metallic ribbon supported between the poles of a magnet; usually delicate; now seldom used. Bidirectional.

CERAMIC—A microphone or phono pickup which uses a piezo-electric element which generates voltage when it is deflected by sound or needle pressure.

CRYSTAL—Similar to CERAMIC; no longer used in audio-visual applications.

CARBON—A microphone made with a diaphragm which compresses carbon granules to vary the current; no longer used in audio-visual applications.

MICROPROCESSOR—The brain of the micro-computer; the electronic chip (circuit) which does all the calculations for and control of data. In larger machines it is called the Central Processing Unit (CPU). Used increasingly in projector control equipment.

MIRROR—Device for reflecting light; may be plane or curved. Used in projectors behind lamps to concentrate and distribute light, to reverse images for correct viewing, and to fold light beams for more compact or more convenient systems. They may have the reflective coating on the back as in household mirrors (SECOND SURFACE), but it is more often on the FIRST or exposed SURFACE to prevent double images. A mirror has a "specular" surface.

MONITOR—A device to inspect or preview a program; to watch over a program for quality control. See also TELEVISION MONITOR and AUDIO MONITOR.

MOTION PICTURE FILM—A strip of flexible transparent film with a sequence of images and perforations or sprocket holes for advancing it through a projector. Films come in various widths measured in millimetres. Most theaters use 35 mm or 70 mm for some wide screens; schools have traditionally used 16 mm; home movies are 8 mm

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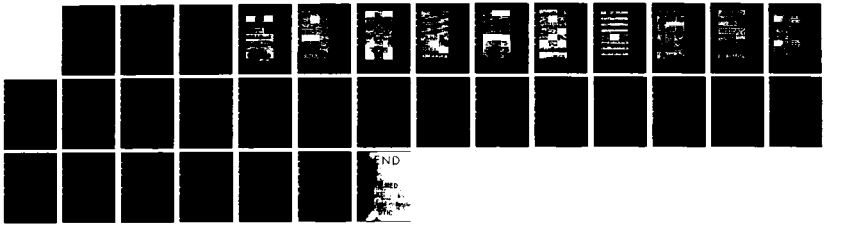
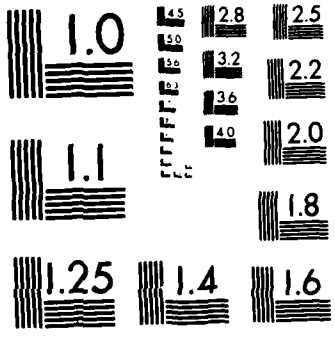




MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

(often called standard 8, regular 8 (R8) or Super 8 (S8). School films for individual or small group use are most often Super 8 on open reels or enclosed in a cartridge or cassette requiring a compatible projector. Some projectors will accommodate both regular 8 and Super 8 films.

NOISE—In audio systems, noise is electrical interference or any unwanted sound. In video it refers to random spurts of electrical energy or interference. In some cases it will produce a "salt-and-pepper" pattern over the televised picture. Heavy noise is sometimes referred to as "snow."

PAUSE CONTROL—A mechanical device to stop tape movement temporarily during playback or recording without turning off the motor.

PLAYBACK—A device to reproduce a previously recorded program for hearing and/or viewing.

PLUG—A device on a cord for connection or attachment to a jack; various kinds are in use. See JACK.

PRE-AMPLIFIER—A amplifier that strengthens weak signals such as those from a microphone, magnetic playback head, photo cell, or a phonograph pickup to a level sufficient to drive a power amplifier.

PROGRAM STOP—A cue on an audio tape (usually 150 Hz separate track) capable of causing the tape recorder to pause automatically. To re-start the recorder, a restart button or switch is depressed.

PROGRAMMER (Multi-Image Devices)—A multi-channel, multi-function device used with a tape recorder, computer, or perhaps its own built-in information storage device to perform certain predetermined functions when called upon to do so by the SYNCHRONIZER. In addition to controlling projectors, dissolve controls, etc., it can be arranged to perform other functions (often via interfaces) such as operating a motorized screen, turning on room lights, etc. It may contain the functions of a synchronizer and/or a dissolve control. (Compare with SYNCHRONIZER.)

PROJECTION LENS (Objective Lens)—A convex lens or system of lenses that recreates an enlarged image of the transparency, object, or film on a screen.

RACK AND PINION FOCUSING—A toothed bar (rack) which engages a gear (pinion) to convert the rotation of a knob to linear movement of the lens for focusing.

RANDOM ACCESS PROJECTOR—A device to permit the selection of slides for projection in any sequence desired regardless of placement order in the slide tray.

REAR SCREEN—A translucent screen of glass or plastic with a specially formulated coating on which the image is transmitted through the screen for individual or group viewing. The screen is between the projector and the viewer. The slide or film must be reversed or a mirror or prism used to correct the image for viewing.

RECORDER—A device for making a permanent or temporary record of a signal or a program. It may be audio and/or video. It usually can play back or reproduce as well as record. Tape is most often the recording medium. The tape may be on open reels or in a container called a cartridge or cassette. The tape may be from 9.15 to 2.0 in. wide.

REEL-TO-REEL—Film or tape transport in which separate supply and take-up reels are used; they may be open or enclosed.

SCREEN SURFACES—

MAT or MATTE WHITE—Screen with flat, dull, non-shiny, non-glossy surface for even reflection over wide viewing angles.

GLASS BEADED—Screen surface made up of very small glass beads to provide a bright image to a narrow viewing area.

LENTICULAR—Screen surface characterized by a lens-like embossed and silvered or aluminized surface to reflect maximum light over a wide horizontal and narrow vertical angle. Must be held very flat to avoid "hot spots."

SLIDE PROJECTOR—A device containing a light source and lens system which focuses an image from a slide or transparency mounted in cardboard,

glass, metal, or plastic frame onto a viewing screen. Some models are equipped with built-in rear viewing screens; some are provided with a high-intensity light source for projection of large images, long throw, or when ambient light is high; some have random access of slides or a built-in advance. The most common slide size is 2x2 in. (50x50 mm). Slides may be contained in trays, cartridges, or drums for use in appropriately designed projectors.

SLIDE/SYNC RECORDER (or VISUAL/SYNC RECORDER)—An audio tape recorder capable of advancing one or more projectors on cue.

SOUND SLIDE PROJECTOR—A slide projector with an accompanying or built-in source of sound (record player or tape recorder/player). In most cases the sound unit controls the slide advance automatically, usually by the 1000 Hz system.

STEREO—Equipment with separate signals and channels for the left and right audio information.

SUPER SLIDES—One of the popular formats for mounting 2x2 in. slides in which the mounted size of the image is 38 mm x 38 mm.

SYNCHRONIZER (Multi-Image Devices)—A single-function device which, together with a tape recorder or other type of playback, operates other equipment; i.e., signals for slide change. Has only "decoding" ability (reads the signal on playback and translates it into commands). Often built into a PROGRAMMER, the synchronizer tells the programmer WHEN something is to happen, and the programmer determines WHAT happens. It may also be built into a tape recorder. (Compare with PROGRAMMER.)

TAPE DECK—Tape recorder designed solely for use with an external or separate sound system. It includes a transport mechanism (complete with heads) and pre-amplifier electronics.

TELEVISION MONITOR—A device for reproducing the visual display of pictures from a camera, video recorder, or closed-circuit system. It has no channel selector or ability to receive broadcast signals. Ordinarily, a separate sound system must be used.

TRACK—The path of a recorded signal on film, tape, or disc. Audio on tape is ordinarily along a straight longitudinal track; video on tape is ordinarily along a helical or diagonal track; the track on a disc is a spiral. In reproduction, the responder must track or follow the recorded signal accurately.

VIDEO—

(1) Refers generically to any production using video tape or television technology.

(2) Television and the technical equipment and events involved in creating television.

(3) The picture portion of a television broadcast.

(4) Non-broadcast or private television.

Technically, the signal has to be broadcast to become "TELEVISION."

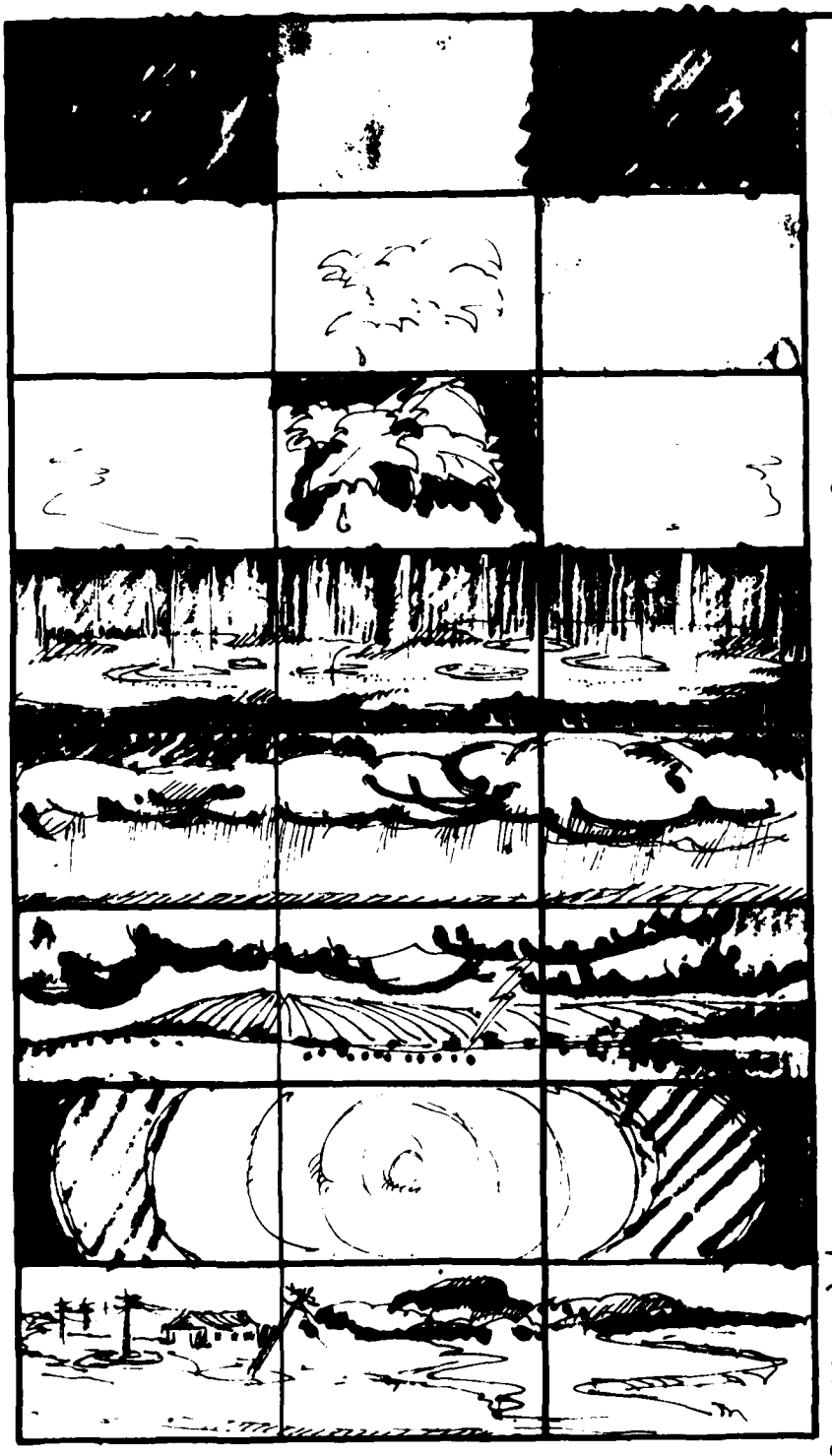
VIDEO PLAYER—A device to reproduce sound and pictures from a film or video tape on a television monitor or receiver; it cannot record images or sound.

VIDEO TAPE RECORDER (VTR)—A device which accepts signals from a video camera and a microphone and records images and sound on video tape in the form of reels, cassettes, or cartridges. It can then play back the recorded program for viewing on a television monitor or special receiver. Some machines have modulators for feeding a television receiver directly. Also called a TELEVISION TAPE RECORDER.

WOW—A low rate periodic disturbance in sound usually caused by regular variations in the rotation of some mechanical component of the system. Usually WOW and FLUTTER are combined; see FLUTTER.

XENON ARC LAMP—A point source arc lamp filled with high pressure Xenon gas. Xenon arc lamps have no filament. The arc is formed by electric current flowing through the Xenon gas between two tungsten electrodes. Used mainly in motion picture and slide projectors and follow spotlights for medium and high intensity applications.

APPENDIX B: SAMPLE STORYBOARD
(Vicksburg District)



Show starts with blank screen and sounds of a light rain shower, very soft sounds

Rain on a leaf or leaves

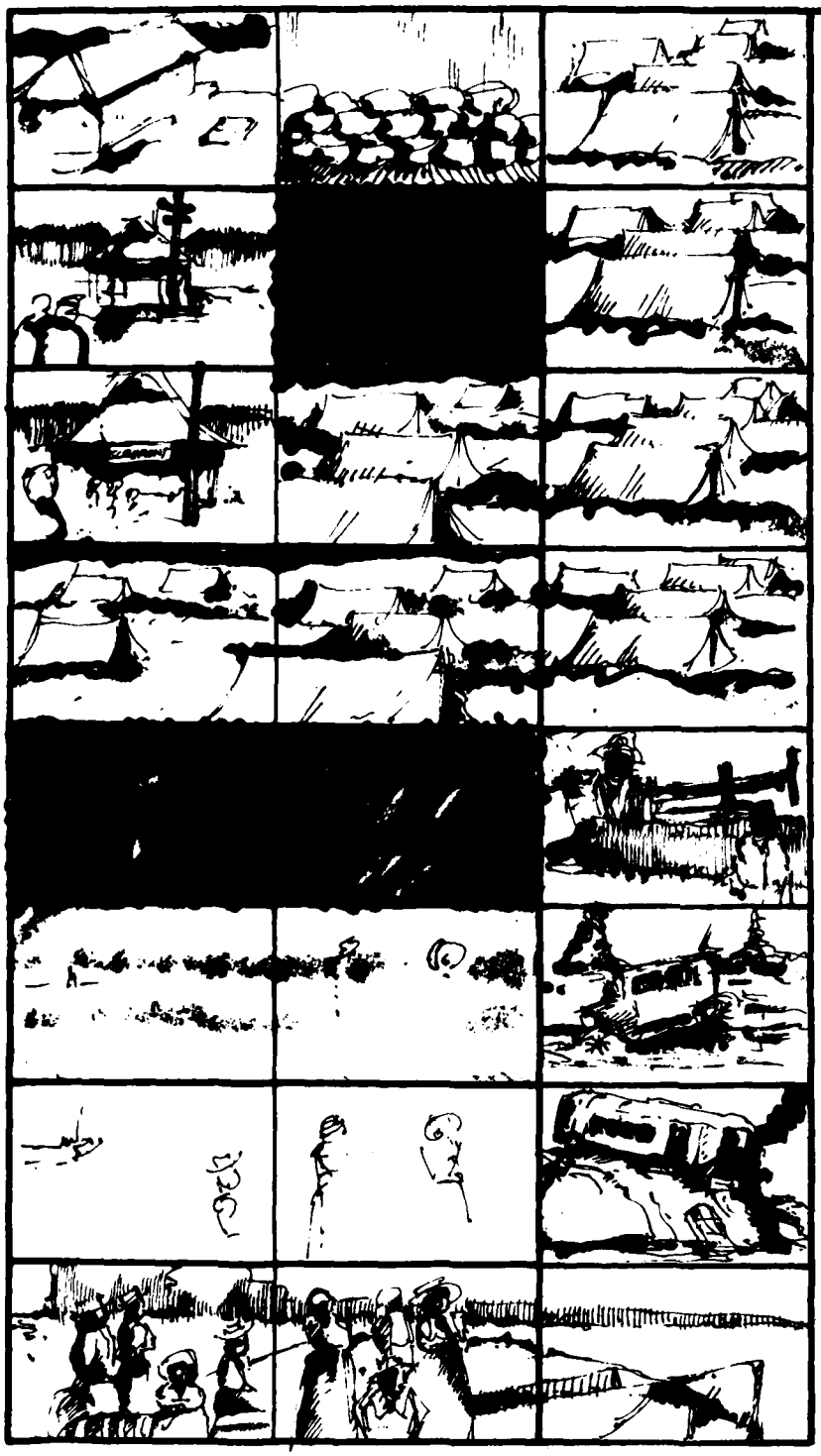
Rain gets heavier

Thunder sound effects get louder
Rain gets intense

Thunder
Flooding streams
Sounds get louder and louder
Lightning bolts
Sound is very loud and climaxes here.

50 sec.

Pan of '27 flood scene
Narration starts
Sad type music as backgrd
Something like the depressing segments of the movie "Patton"



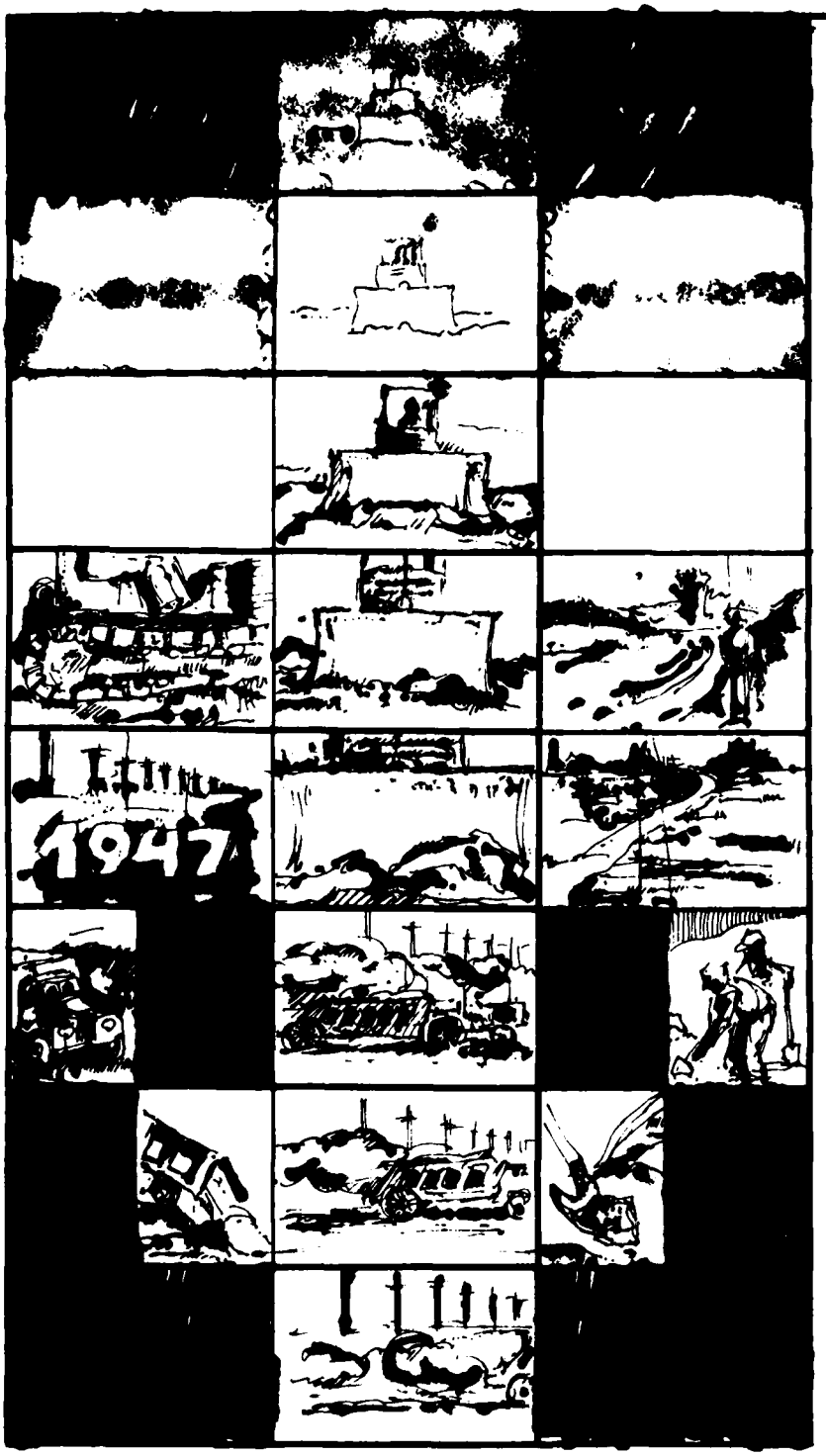
Visuals come faster and faster
sound of music starts getting louder and louder

Narration ends for this segment

Music is intense

this '27 segment climaxes with part of this scene music climaxes

60 sec.



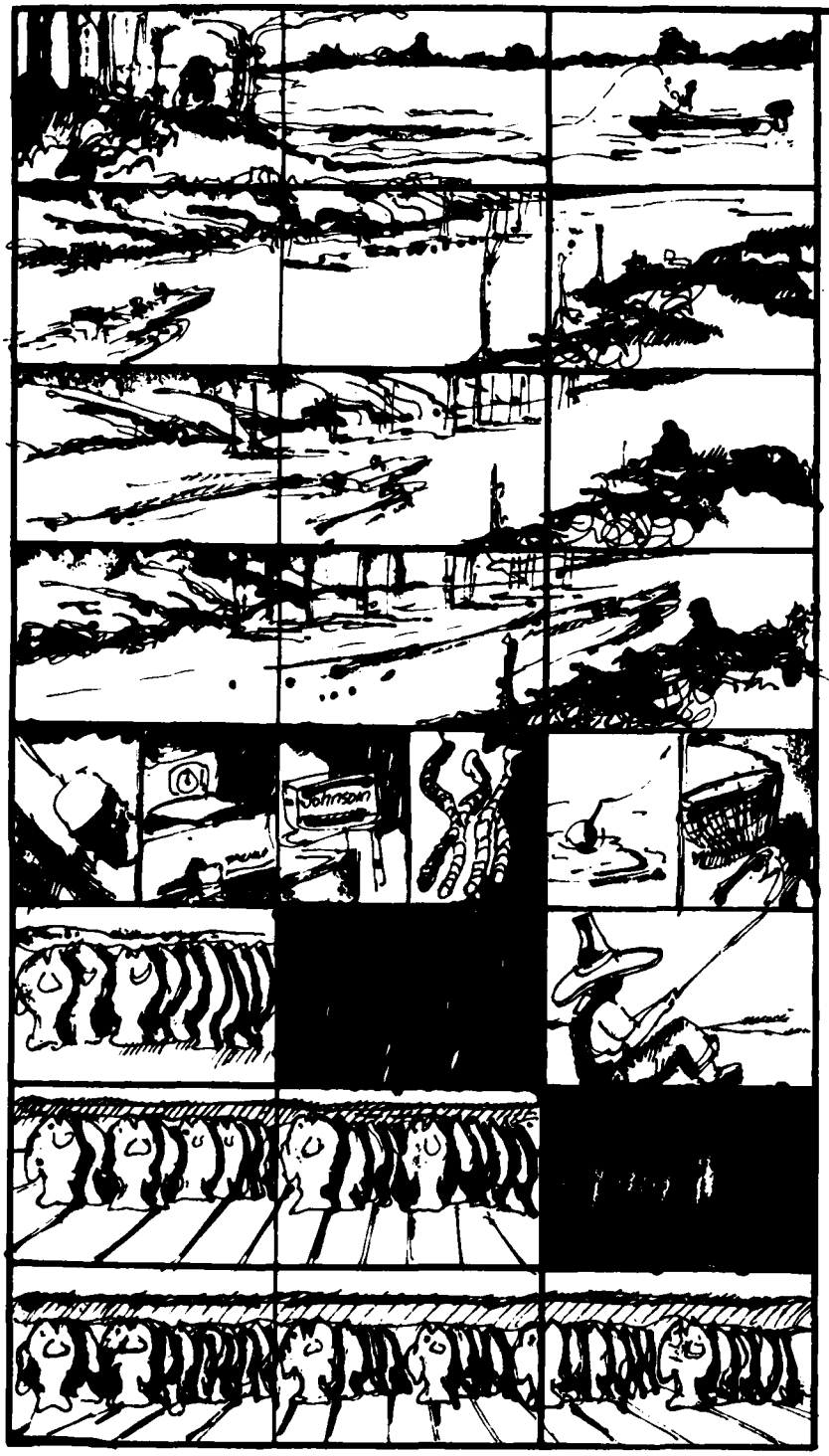
Bulldozer is heard in distance, very faint but gets louder as visuals get bigger of the dozer

Narration starts again

Construction sounds workers in background

Movie of actual dam construction begins

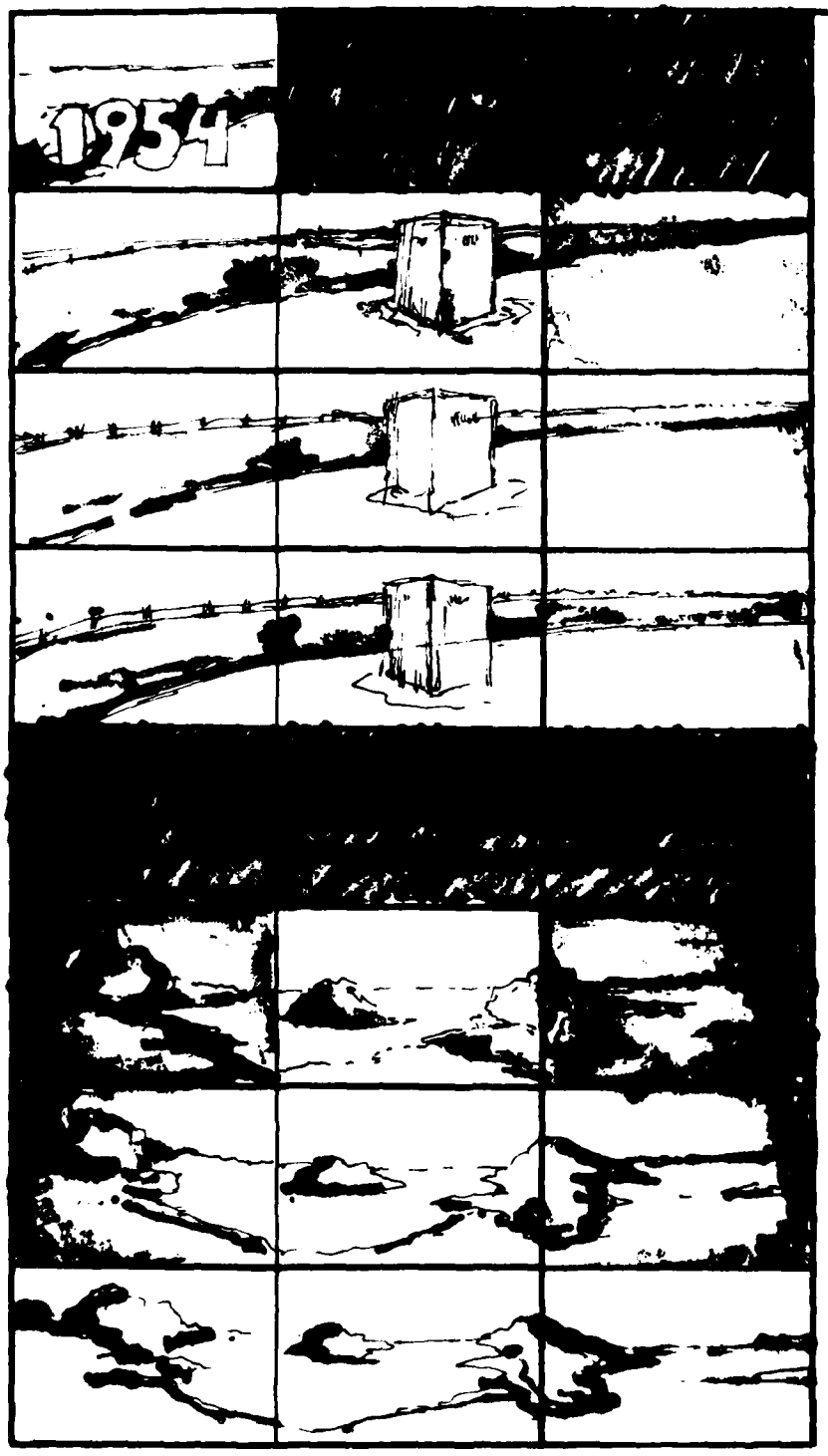
Construction sounds get louder and louder
visuals come faster and faster



Change of pace
Music goes upbeat
Narration starts again

Narration stops

2 min. 20 sec.



Construction sounds climax with pan of dam the way it looks today

Narration stops

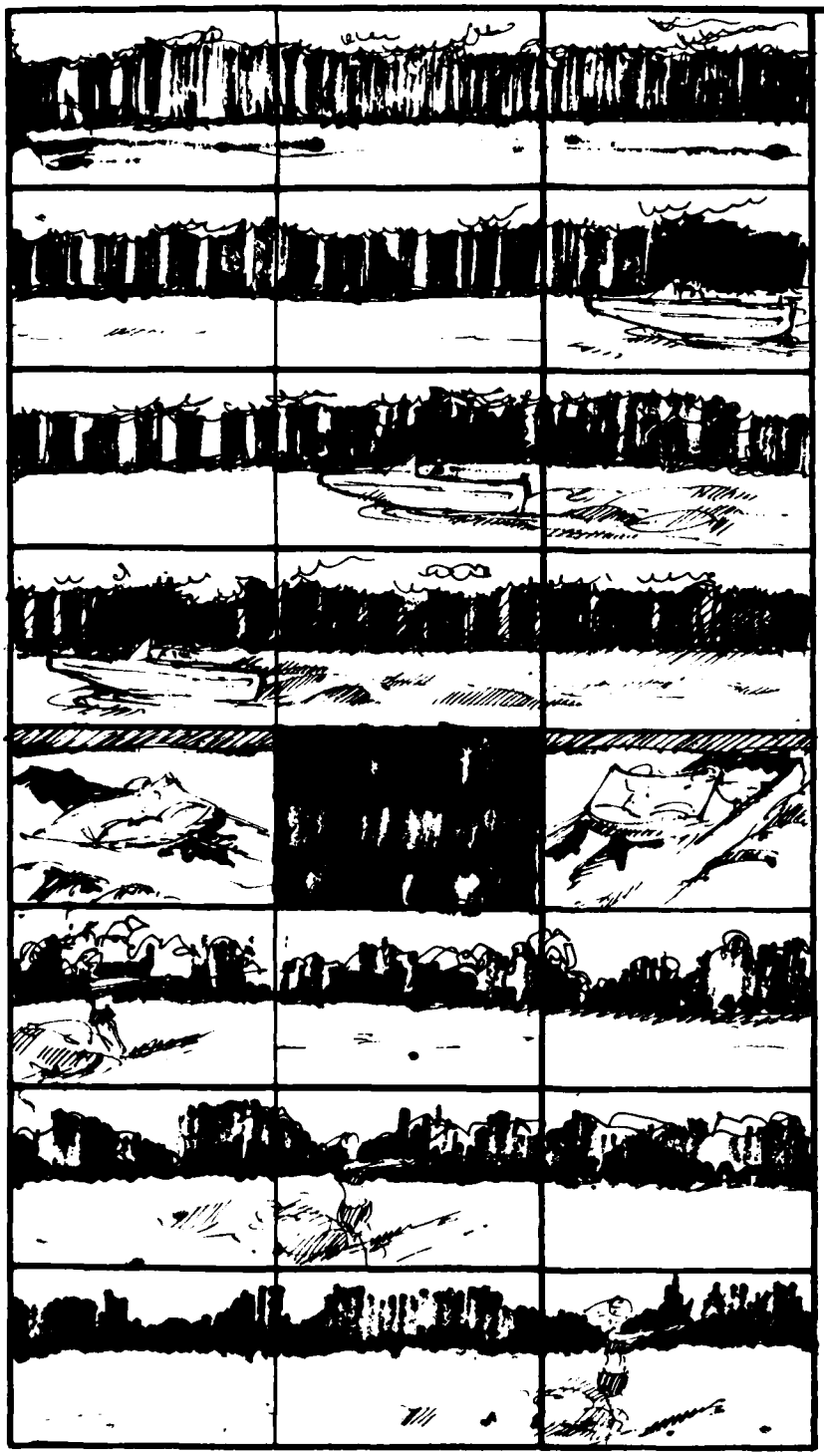
2 min. 20 sec.

Blank screen
Really beautiful music with natural sounds of birds, etc.
Maybe something like the "Molly McGuires" theme

Really sweet, nice music for visuals of nature
No violins

Pretty music fades

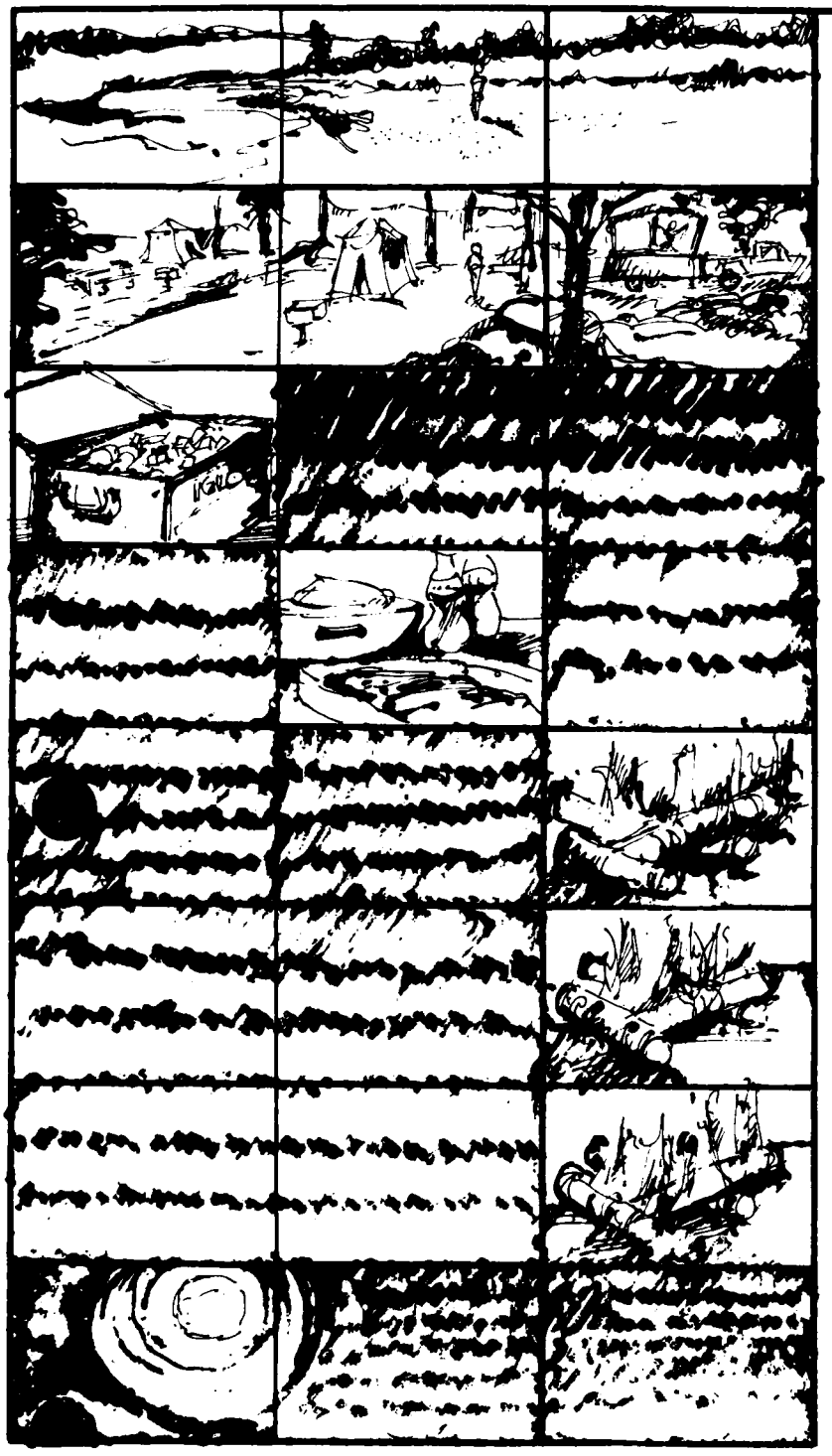
2min.



Boat wipes screen from right to left
Really loud speed boat (my recording)
Sound just wipes people out as it passes, overhead from right speakers to left ones

Some get down music here for fast visuals
Narration starts

Narration stops

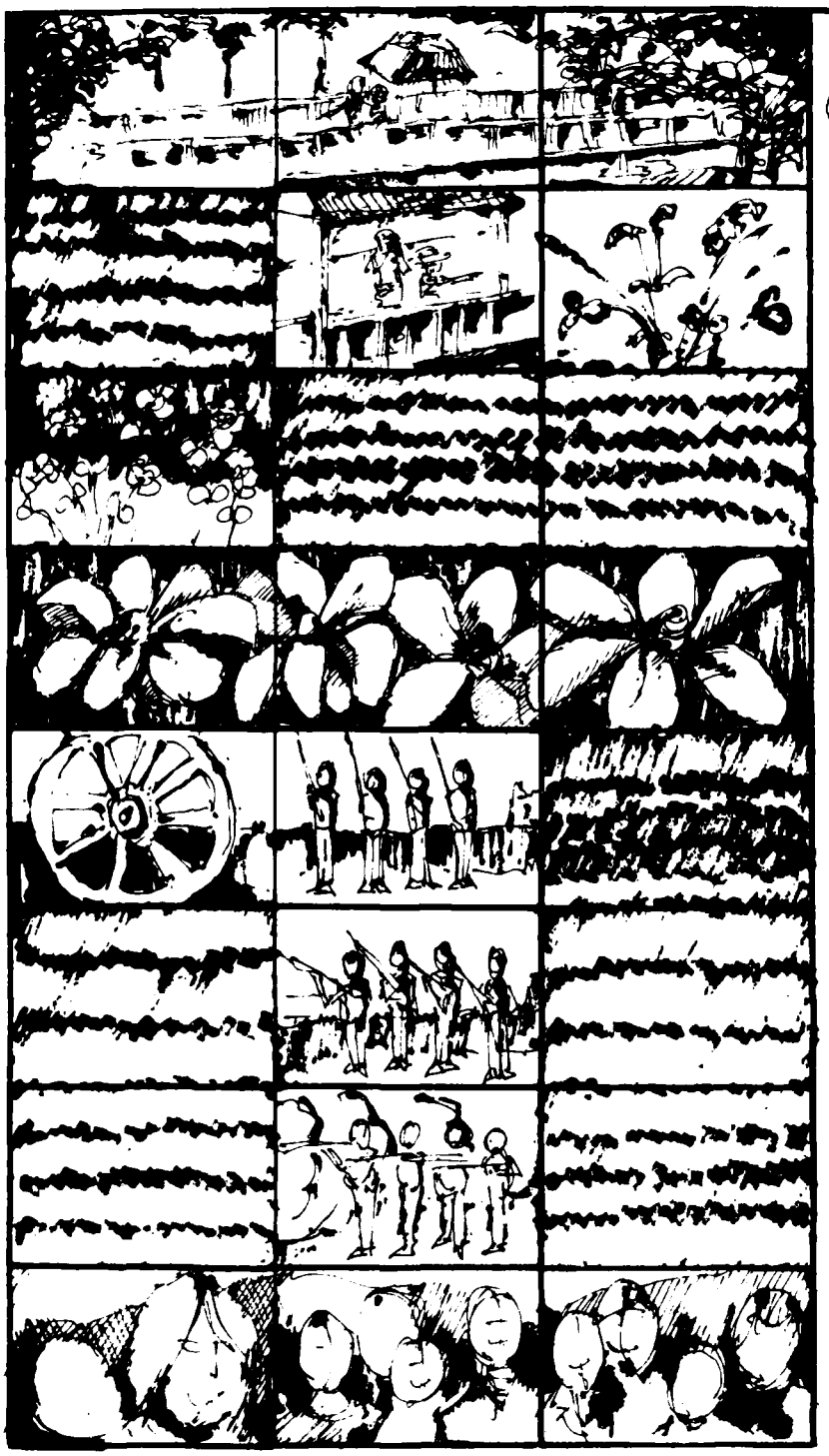


3 min.
Music changes to slower stuff
Camping sounds (My recording)

Fire

Crickets (My recording)

2 min 30 sec.



Interpretive programs (recordings I have)

Nar on starts

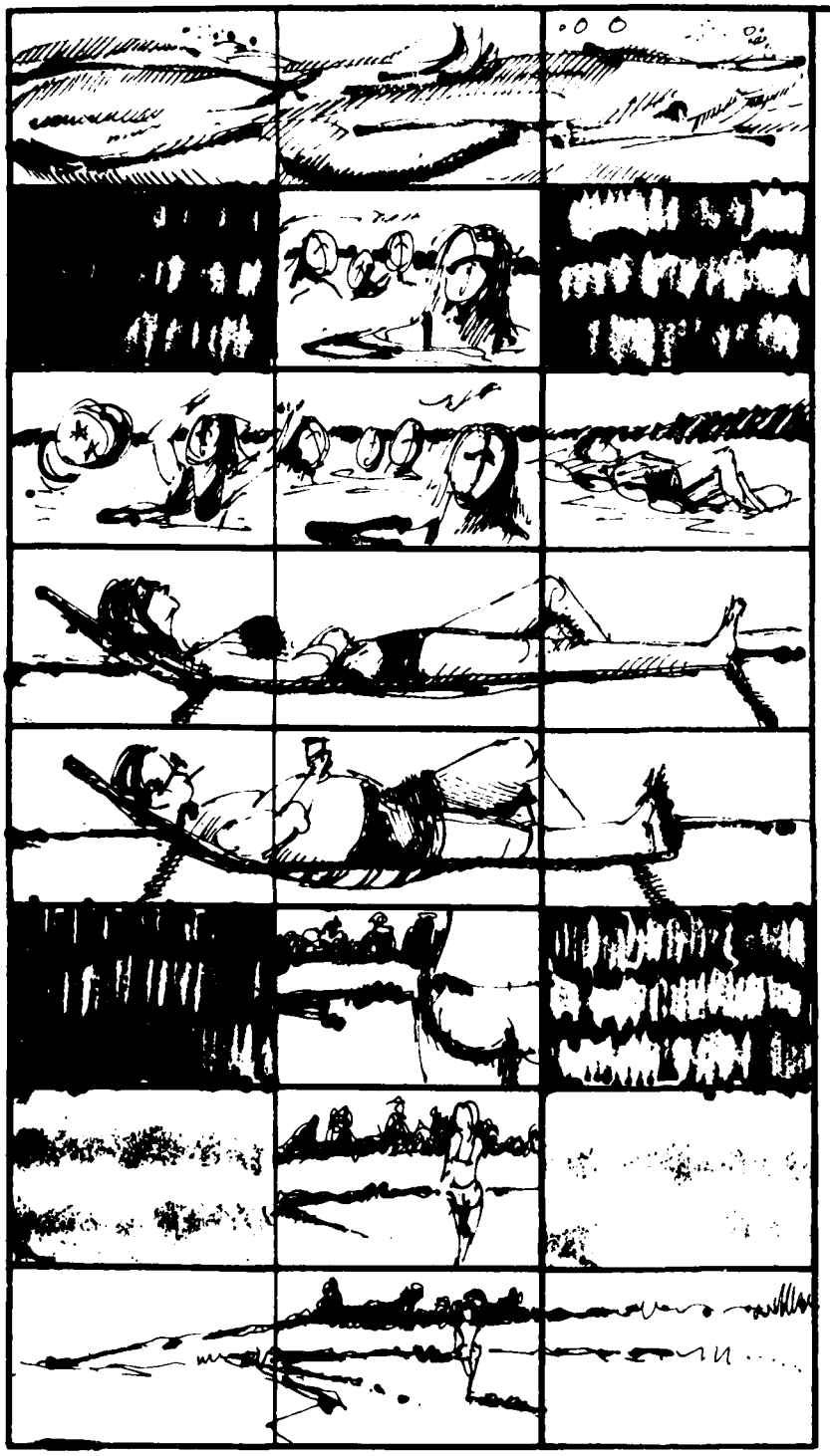
30 sec.

Sounds (I have) of Civil War reenactment, living history in background

1 min.

Narration ends
Music climaxes at very loud level, upbeat type

20 sec.



Beach sounds

Guys whistling at girl on beach

APPENDIX C: SAMPLE AUDIOVISUAL SCRIPT (Vicksburg District)

Grenada Lake is located northeast of Grenada, Mississippi, on the Yalobusha River. The lake and the adjoining project lands provide excellent opportunities for many types of recreation.

A sample of the script used in the theater presentation at the office/ visitor center at Grenada Lake is presented below.

It must have been sometime in late February when I realized that 1927 was going to be a memorable year for me. I was only seven years old then, but I remember all the rain we had and the old folks talking about how high the Mississippi River was and how much backwater flooding was on its way. The rain just kept coming and all the rivers overflowed. My daddy told me that it was going to be mighty hard to plant cotton that year because of all the rain. And it turned out that the flood in the Mississippi Delta of that year was the worst on record. (PAUSE)

We had it bad here at Grenada, but it was nothing compared to what the folks in places like Greenville and Leland were up against. In April my daddy took us to see my Aunt Hattie who used to live in Greenville, but the only way we could get to her house was by boat. A lot of people had to live in tents on high ground. I remember the awful smell of the water and the looks on people's faces. But, I also remember the amazing way folks helped one another too, something I've never seen since then. (PAUSE)

Well, it wasn't too long after the spring of 1927 that people began to talk about levees being built along the Mississippi River. They were to hold back the floodwaters so that a flood like we had in '27 would never happen again. (PAUSE)

It was about the end of World War II, in 1945, when the Corps of Engineers started making plans to build a dam on the Yalobusha River just east of Grenada. The dam would be part of the overall plan to help reduce the flooding in the backwater area that flooded in '27. I remember going to town meetings and hearing folks talk about the dam with people from the Corps. In 1947 the Corps started work on the dam. I was 27 years old at the time. (PAUSE) They had some awful big equipment and a lot of men out there. My folks and I would drive out to the damsite nearly every Sunday after church to watch them work. Sure took them a long time to build the dam, but there's a lot of dirt and rock in it. Anyway, we all attended the dedication of the dam and the lake behind that dam is something to behold! (PAUSE)

Grenada Dam was built for flood control, but the lake sure provides some of the best crappie and bass fishing around here. Now that I'm retired, I spend a lot of my weekends with my grandchildren at the lake. They sure enjoy fishing as much as I do. We fish sometimes in some of the same spots I fished when I was their age. (PAUSE)

Of course they enjoy all that fast skiing and boating with their parents too. Folks from all over the country come here to enjoy themselves in the ways they like the most. And there are a lot of things to do at the lake. (PAUSE)

If anybody in 1927 had told me that all these campgrounds, beaches, boat ramps, restrooms, and Civil War reenactments would be at Grenada, I'd a thought they were crazy. (PAUSE) But here they are and the folks around here love 'em. I've seen a lot of changes around here in my lifetime, and the lake is one of the biggest. The lake means many things to a lot of people who visit here, but for me it's still part of home. I've taken up just about enough of your time here on the inside. You folks have traveled a long way to see Grenada Lake, so how about you and me go out and enjoy it.

APPENDIX D: EXCERPT FROM *IMAGES, IMAGES, IMAGES— THE BOOK OF PROGRAMMED MULTI-IMAGE PRODUCTION*

As an aid to the photographer, the instructions below are reproduced with the permission of Eastman Kodak Company, Rochester, N. Y. (Kenny and Schmitt 1979).

The Requirements of Multi-Image Photography

You don't judge a book by its cover, and you shouldn't judge a multi-image presentation solely on the basis of its photography.

But the average audience does just that. They remember what they see—the slides and film sequences you use to illustrate your message. It doesn't matter that these sequences may be the result of a scriptwriter's inspiration or a programmer's imagination. To an audience, script and programming remain out of sight and out of mind. They see only the slides and motion pictures. That's what they react to, that's what they judge, and that's what they ***remember.***

This being the case, your first consideration when undertaking photography is the creativity and technical competence of your photographer. Quite simply, you or your photographer should have professional experience in slide photography. If your photographer doesn't, find one who does. If you don't have experience but must, for whatever reason, shoot slides for a multi-image presentation yourself, then put this book aside for a while and study one or more of these basic texts.

This chapter extends a basic knowledge of photography into multi-image production. It examines several areas where you must give special consideration to the requirements of a multi-image presentation.

Planning the Visual Sequences

A multi-image presentation isn't a simple audiovisual presentation with additional images—at least it shouldn't be. When you use multiple images, you should do so with a purpose. Each image you project on the screen should extend the meaning of a sequence—provide another viewpoint, offer another comparison, or concentrate the viewer's attention on an additional detail. This requirement demands more planning on your part.

You can appreciate this need for additional planning more vividly if you contrast the visual development of a single-image presentation with that of a multi-image presentation. In planning a sequence for a movie or a single-image slide presentation, you approach a subject as if duplicating the path traveled by your eyes. You begin with an overall view, then tighten to a medium view, then move in for a close-up, and maybe even an extreme close-up study.

For example, let's say you're shooting a sequence focusing on the efforts of an art director in an advertising agency. You could begin this sequence with a long shot of the building in which the agency is located (while your narration introduces the topic of art direction in advertising and, in particular, the work of one art director in a specific agency). Your next sequence might show a full shot of the art director at the drawing board (while the narration introduces him and cites relevant work experience). Then you might move in for a head-to-waist shot of the art director, with the camera angled to also show the layout he's working on (while the narration introduces the subject of layouts in advertising). Finally, you might tighten your focus to an extreme close-up of the art director's hand as he completes an element of the layout (while the narration relates layout to final ad).

This approach recreates the visual path your eyes might take if you were walking into the agency to watch the art director work. Of course, in planning the photography for a single-screen audiovisual presentation, you would select only the highlights of this journey. You wouldn't

show every step, only those that reveal the essence of your message.

Your audience will follow your steps—and fill in the gaps in your visual journey—if you maintain continuity throughout the sequence. Continuity is the word used to describe the flow of events in a slide or film sequence. If each image in a slide sequence looks as if it flows out of the action and setting of previous images, then your sequence has continuity.

When developing a sequence for a multi-image presentation, you use these same techniques—planning the action and maintaining continuity. But their application must be extended. As mentioned earlier in the book, multi-image presentations allow viewers to see more than the unaided eye can see. So your planning must ***extend*** your sequences to include more visual information.

You can extend a multi-image presentation's "vision" in three ways.

- ***You can multiply the elements included in the action of a sequence.*** This reduces the number of gaps the viewer must fill in an strengthens continuity. Applying this approach to the art director example, you could show not only the exterior of the building, but also—simultaneously—the agency's listing in the building directory, an elevator control panel indicating a car stopped on the designated floor, the entrance to the agency's offices, and a receptionist looking up from her desk. These shots present additional details of the path followed to reach the art director—but without adding more time to the presentation. In effect, you compress time and extend vision.

- ***You can multiply the viewpoint of a single subject.*** This helps you establish the identity and dimensions of your subject. To go back to the example of the art director, you might, when you reach the point where you want to show him in his office, shoot slides of the director from the front, both sides, from the back, and from below—as if the camera were looking up from the drawing board. This additional information rounds out your portrait of the art director and his work—without requiring additional time.

- ***You can multiply the details in a sequence.*** This approach helps you characterize the subject and setting of a sequence. If, for example, you shot details of the art director's office—close-ups of previous ads, the books and magazines he keeps in the office, awards that hang on his walls, his work materials, a list of coming assignments—you would be enhancing the audience's appreciation of the man and his work.

Your goal then, when planning multi-image sequences, is to consider both the length and breadth of the sequence. The length represents the basic continuity—the action that will take a sequence from a logical beginning to a logical end. The breadth represents additional information—the multiple images that give a sequence greater detail and meaning.

Directing

All the considerations mentioned above about planning your visual sequences apply equally to directing the photography. The latter activity is just a step removed from the former. So in directing you must ensure that the intent of the visual planning is carried out. In addition, you have to interpret each scene based on the requirements of your visual format.

This isn't difficult if you're handling photography yourself. Having developed the visual format, you'll know the size, shape, and position of the visual "slots" you have to fill. But if you're directing other photographers—and especially if some of the photographers will be working without continuous direction—you're going to have to communicate, in detail, the requirements created by the visual format. This means giving your photographers three sets of directions:

- First, you have to explain the visual format of the show and indicate how the requirements of this format translate into slide aspect ratios. Specifically, you must tell a photographer if you need 24x36 mm transparencies or one of the super-slide sizes; if you're using a horizontal, vertical, or mixed format for your slides; or if

you're planning to mask certain slides to create special effects. Only with these specific instructions can a photographer shoot the slides your visual format requires.

• Second, you have to explain how the slides will be used. Will they be used as separate images, with each slide independent of those that precede and follow it? If so, the photographer can use a hand-held camera for shooting. Or will the slides be used in an animated sequence or a progressive disclosure? If so, the photographer must use a tripod with the camera to maintain a uniform orientation throughout the shooting session.

• Third, you should convey to the photographer the style of photography you want. This is especially important in multi-image presentations, where a number of images appear on the screen at the same time. If this grouping of images reveals a variety of photographic styles, your presentation will look as if it were produced from slides found in a desk drawer.

The easiest way to convey these three sets of instructions is with a storyboard. Photography is a visual art, so words alone may not fully convey the scope of your instructions. A storyboard, on the other hand, ***illustrates*** your visual approach. It leaves little to chance and nothing to misunderstanding because the photographer can see how each element fits into the overall presentation.

Shooting Panoramas

A panorama is a wide view of a subject, filling the full screen area and generally created by projecting two or more slides simultaneously. The projected slide images are often separated by narrow vertical spaces. A panorama can also be created with one slide by using a projector with a shorter focal-length lens, but this may introduce problems in maintaining satisfactory image brightness.

Like all dramatic effects, panoramas should be saved for a special moment in a presentation, one in which you want to gain maximum visual impact. So like a magician who keeps the best trick for last, you should keep the panorama in your catalogue of effects until that precise time when communication requires its use.

You can shoot slides for a panorama in a number of ways.

• The simplest method is to set up a 35 mm camera on a tripod, being sure it's level; then aim the camera so that the right edge of the frame is at the precise midpoint of the scene you want to shoot.

Then, after taking several exposures, swing the camera to the right so that the left edge of the frame lines up with the same image midpoint. Shoot several exposures at this point, being certain to cover the same exposure range you used for the first shot. The resulting slides will make a two-screen panorama. If you want to make a three-screen panorama—or more—simply duplicate the action described for each additional screen.

Another point to keep in mind when shooting this type of panorama is to have the camera pivot under the optical center of the lens, rather than back under the camera body. This will provide a better image edge match. The optical center of the lens can be found accurately enough by measuring a distance equal to the lens focal length ***in front of the film plane.***

• A more precise method of creating this type of panorama relies on an indexing head mounted on a tripod. Instead of using points of reference in a scene to align your camera, you use the calibrated markings on the indexing head. Most such indexing heads are also calibrated for use with lenses of different focal lengths. Here again, it is best to pivot the camera on the optical center of the specific lens being used.

• You can also use a panoramic camera to create your slides. These special cameras advance film past the lens as the camera is swung through the panoramic field of vision. The film is returned from processing in a strip, which must be cut and mounted by hand.

• You can achieve a panoramic effect—with less perspective distortion than the three previous methods—by shooting your scene with a 4x5-inch camera. Shoot two transparencies of the scene—being careful to keep the camera locked in the same position and using the identical

exposure for both transparencies. When the transparencies are returned from processing, you cut 35 mm slides out of each of the two larger pieces of film, the left half of your two-screen panorama from one end and the right half from the other. Be sure to allow about 1/16-inch (1.6 mm) overlap between the two slides to provide for the masking edge in the slide mounts. If you're planning a three-screen panorama, the left and right screen images should be cut from one of the 4 x 5 transparencies and the center image from the other. Again, by cutting the slides in this pattern, you avoid leaving a cutting edge gap in your panorama when the slides are mounted. (This method also can be used when the original slide is shot on 35 mm or a 2¼-square format and then duped to 4 x 5 inches. The disadvantage of this approach, however, is the increased grain that occurs in the enlargement.)

- You can use a tripod-mounted platform to hold two or three identical 35 mm cameras having the same focal-length lenses and same shutter speeds, positioned so they provide overlapping fields of vision. Using shutter-release cables, you trigger the cameras simultaneously. This technique is especially useful when you're shooting a panorama containing people or objects in motion.

- You can use one of the relatively new, superwide-angle cameras. Two identical transparencies from one of these cameras would allow you to produce either a two- or three-screen panorama.

- You can use a recently developed and simple approach to creating two- or three-screen panoramas. Shooting the original transparency for this method is the same as those listed above for the 4 x 5 camera, the panoramic camera, the 2¼-square camera, or the superwide-angle camera. However, instead of mounting the segments of the original transparency or enlarged duplicate to "butt" with each other on the screen, the segments—or duplicates of them—would be sandwiched with continuous-tone masks. These masks—called seamless masks, soft-edge masks, or shadow masks—create a gradual blending of one portion of the image into the next one with virtually no visible seam between the two. However, to achieve a two-screen panorama with this technique actually requires three images (and therefore three projectors) for each panorama, unless you allow for a sufficient overlap of your two screen areas. Of course, this technique also can be used to create a three-screen panorama. Details on the creation of these masks are located in the section entitled The Magic of ***Kodalith*** Film.

APPENDIX E: GUIDELINES FOR AUDITORIUM DESIGN AND EQUIPMENT SELECTION

This appendix is provided to address some of the essentials involved in audio-visuals (AV). Most of these topics must be addressed in all AV presentations.

PORTABLE VERSUS PERMANENT PROGRAM

Obviously, portable programs are far less sophisticated than permanent ones. The reasons become apparent if you have ever tried to transport a 3-screen, 12-projector show. Permanent shows, on the other hand, can be custom installed in a visitor center where the number of projectors and other pieces of equipment are not a limiting factor. If your show is to be shown one or more times a week in an amphitheater, then do not try to produce a complicated show involving many pieces of delicate equipment. A 4-projector show is about the maximum for shows that involve frequent transporting.

AUDITORIUM DESIGN

Room Size

Room size will dictate types of speaker systems, size of audience, acoustical treatment, screen size, lighting, projection distance, and possibly the number of showings per hour or day. More often than not a small room is the only room made available for presentation. This makes it extremely difficult in setting up the equipment and arranging the seating.

Rooms that are at least 18 by 25 ft will provide a little flexibility in seating and projection. The sound system will produce a "tight" audio response in smaller rooms. The speakers simply cannot be positioned to cover the entire audience. Some people will receive a blast in the ears while others receive mostly reflected sounds. This is critical in 2- or 4-channel soundtracks where each channel contains either one half or one fourth of the entire audio message.

Seating

Seats and seating arrangement should be as comfortable as possible. Try to obtain padded seats if possible. Arrange the seats so that movement is not obstructed. At least 24 in. should be allowed between the front of one seat and the back of another. This dimension will depend on the particular type of seat.

Once screen size and configuration are determined, you can calculate the seating arrangement. To determine the number of people who will be able to see the screen from bottom to top, and edge to edge:

a. Multiply actual screen height by two. This number is the minimum distance allowed between the screen and the front row of seats.

b. Multiply actual screen height by eight. This figure is the maximum distance to allow between the screen and the last row of seats.

c. Take the room width and allow 3 ft on either side for aisles. Subtract the width of the aisles from the total width of the room.

d. Multiply the seating depth from steps *a* and *b* by the width from step *c*. This will give you the maximum floor space usable for seating.

e. Allow at least 4 sq ft for each person. Divide the total area from step *d* by four. This will give you the number of people you can comfortably seat.

f. The next step is determining marginal seats which should be eliminated. From each side of the screen, measure a distance equal to one third the screen width. From these points on the screen surface, draw lines toward the side walls according to the following angles:

(1) 90 deg for a matte surface screen (front projection).
(2) 60 deg for a lenticular screen (front projection).
(3) 50 deg for a beaded front projection screen or a good rear projection screen.

The lines drawn will eliminate some seats from the front corners.

Acoustics

Acoustics often make the difference between a thrilling "live" sounding experience and just another slide show. Of course, you will not be able to control the acoustics in an amphitheater to any extent, but you can in an indoor setting such as a visitor center.

Usually the problem in most rooms is flutter, or echo. This produces a "live" sound. Sound from your speakers bounces around the room until it is totally absorbed by something (carpet, people, wallcovering, etc.). This makes it impossible for the speakers to provide good fidelity, which is especially important if the soundtrack is recorded in stereo or quadraphonic sound. To solve this problem, add sound-absorbing material to the room until the flutter is eliminated. This can be accomplished reasonably cheap by placing a 2- by 4-in. frame against one or more walls of the room. The frame is then filled with 3-1/2-in. of building insulation and covered with a decent color burlap or other inexpensive soft material. Similar frames can be hung from the ceiling. The frames break up the straight lines of the walls and ceilings, making them extremely sound-absorbent. If funds are available, place drapes all around the room. These not only make the room nearly acoustically ideal, but give it the appearance of an audiovisual room. These acoustical treatments should be done before installation of the audio system so the speakers can be balanced for the room acoustics (this is assuming you have an equalizer to adjust frequencies).

Projection Distance

One of the most frequently asked questions is "how big an image will I get with my slide or movie projectors?" The actual size of the image is a factor of projection distance and focal length of the lens. The following projection distance table (in feet) can help determine your setup.

Unfortunately, selecting the projection distance is not as easy as matching lens to screen height. The screen-to-projector distance may put the projectors in the middle of the audience. This would eliminate the best seats in the house. Also, the various focal-length lenses do not necessarily represent the best level of illumina-

Focal Length of Lens, in.	*Screen Image Height, in.*				
	40	*48*	*56*	*80*	*96*
1.4	5-1/2 ft	6-1/2	7-1/2	10-1/2	12-1/2
2.0	8	9	10-1/2	15	18
3.0	11-1/2	14	16	23	27
4.0	15-1/2	18-1/2	21-1/2	30-1/2	36-1/2
5.0	19-1/2	23	27	38	45-1/2
7.0	27	32-1/2	37-1/2	53	64
9.0	35	41-1/2	48-1/2	69	82
11.0	42-1/2	51	59	84	100
4-6 zoom	15-1/2-23-1/2	18-1/2-27-1/2	21-1/2-32	30-1/2-47-1/2	36-1/2-55

tion on the screen. As the intensity of the light projected to the screen is reduced, so is the brilliance of the image. Finally, the optics in lenses with short or long focal lengths are more costly than lenses with standard lengths.

Front Versus Rear Screen Projection

You will need to decide whether to use front or rear screen projection. Front view offers the advantages of:

- Flexibility in selection of lens.
- Maximum projected brightness due to normal lens focal length.
- Screen material is cheaper and produces a brighter image than rear-view material (plastic or glass).

About the only disadvantage to front view is handling the projectors and programming equipment. However, there are booths with soundproof glass available to solve part of this problem.

Rear-view projection has the advantage of providing soundproofing and removal of the equipment from sight. The disadvantages of rear view are that:

- It usually requires a wide-angle lens, which reduces image brightness.
- Screen material is expensive.
- Projected image must pass through screen material, which further reduces brightness of the image.

Lighting

Obviously, there should be total or near total darkness during the presentation. This can be controlled manually or programmed onto your tape so that the house lights are dimmed automatically at the start of the show. Hopefully, there will be no natural light in the presentation room. If so, eliminate it by curtains or whatever is available.

It is much more effective, professional, and courteous to dim the house lights rather than abruptly turn them off and on. The lights should gradually brighten at or near the end.

Be careful, especially in rear projection arrangements, with reflected light. The rear projection screen is usually glass or glossy plastic and cannot absorb every last ray of light. The screen, therefore, reflects a very small amount of projected light back into the projection room. Ideally, the projection room and everything in it should be painted flat black. Also, the screen, if possible, should not extend all the way to the ceiling. Reflected projector light will bounce off the ceiling and produce a glow along the extreme top edge of the screen.

EQUIPMENT

Equipment merely provides the means to achieve creativity in communications. The purpose of this section is to briefly describe some of the types of equipment currently in use. The use of one brand over the other is not advocated. However, mention will be made of the innovative characteristics of each.

The most popular type of slide projector is the Kodak Ektagraphic, though other manufacturers market projectors that use similar operation mechanisms. The Ektagraphics have large fans to reduce heat buildup for extended life. It is recommended that you use 80-slide Kodak Ektagraphic universal slide trays. The 140-slide trays cannot accommodate glass-mounted slides.

Projector racks should be extremely sturdy and have adjustments for critical alignment. Programmer manufacturers usually offer "stackers" for projectors, but these units seldom offer accurate alignment features.

Choosing the sound system is the most subjective undertaking you will encounter. The system could consist of an eight-track recorder, amplifiers, loudspeakers, equalizers, crossover networks for the speakers, microprocessor computer programmer, dissolve modules, and miles of wire. Try to obtain equipment which offers enough features to satisfy your needs and fits your budget. Be sure the amplifier(s) has enough power, and speakers which can fill the presentation room. The equipment should have enough power so that the system will not have to be constantly straining to provide sufficient volume. Select amplifiers and speakers which provide a very "flat" or natural response, not too bassy or too tinny. This will make the sound effects closer to natural.

What is the best programmer on the market? Again, this is a matter for the particular situation. Programmers are like cameras, whichever one is easiest for you to operate may be the right one. If you are starting to buy equipment, the following manufacturers list may help:

Arion
825 Boone Ave. N.
Minneapolis, MN 55427

Audio-Visual Laboratories
500 Hillside Ave.
Atlantic Highlands, NJ 07716

Clear Light Productions
PO Box 91
Newton, MA 02158

Columbia Scientific Industries
PO Box 9908
Austin, TX 78766

EEG Enterprises
82 Rome St.
Farmingdale, NY 11735

Mackenzie Laboratories
5507 Peck Rd.
Arcadia, CA 91006

Spindler & Sauppe'
13034 Saticoy St.
N. Hollywood, CA 91605

Wollensak/3M Co.
3M Center, Bldg. 223-5E
St. Paul, MN 55101

The least expensive programmers are the tone-control units, while the most expensive programmers contain electronic microprocessors. Give thought to your future needs for a programmer. The inexpensive tone may be all that is needed now, but you may expand your AV programs such that you need the features of a computer programmer. The best way to decide on which programmer to buy or rent is to ask for a demonstration. Sometimes, programmer manufacturers put these demonstrations on at the request of AV dealers who are considering handling a certain brand. In that case, you can get hands-on experience with the programmer dissolve units and other related systems equipment. If you are lucky enough to see more than one of these demonstrations, then you can readily observe the differences in programming equipment.

Cameras and Accessories

Cameras come in an almost incomprehensible variety, from automatics to manuals. Just like programmers, you must decide which one is best for your needs. Handle all the cameras you are considering, discovering how each operates.

Basically, there are two lines of cameras, the amateur and professional series. Most manufacturers provide both lines. Purchase or rent one of the professional quality system cameras; they are better able to withstand heavy use. An automatic mode camera is also recommended. This feature will be invaluable in photographing fast-moving objects under changing light conditions.

One recommended camera system is given earlier in this supplement under "Photographic Equipment." However, you may either need more or less equipment. If you do not have some previous photographic experience, seek the advice of somebody who has produced an AV presentation. To keep all the camera equipment clean and organized, use a Zero Halliburton aluminum case or a professional quality gadget bag.

To repeat an important point, the selection of a camera and system will depend on your personal preference for the positioning of controls, physical size and weight, metering system, ease of operation, automatic versus manual, and availability of useful and compatible accessories.

Video

Video seems to be the most popular medium of the future and should be considered for AV productions. The equipment for video is relatively inexpensive, especially when you realize its multitude of applications. No other medium can presently match it for the ease of portability. The quality of the recorded images and audio will continue to be improved over the next several years until video rivals the standards established by 35 mm slides and 16 mm motion pictures.

OUTDOOR ENVIRONMENTAL CONDITIONS

An outdoor setting will almost totally change the production and presentation ideas. The natural elements, wind, cold or heat, insects, and noise, all contribute to making the presentation difficult. There are many other obstacles to contend with such as vehicle noise and headlights, rude visitors from across the way, and the physical limitations of the presentation site.

Usually equipment cannot be left out in the field due to vandalism and exposure to weather. AV equipment is generally very delicate, incapable of taking needless abuse. This includes the screen, even if it rolls up into its own lockable case. Insects are drawn to the screen, projector lights, and lens. Insect fogging devices are helpful about 15 to 30 min before the show.

As stated earlier, it is not a good idea to produce extravagant presentations for the outdoors, at least not on a continuous basis. The difficulty with portability alone is enough reason. Usually a two- to four-projector show, with or without movie, is about all you will want to attempt on a regular schedule.

COLLEGES AND UNIVERSITIES OFFERING COURSEWORK IN INTERPRETATION

A Supplement to

A GUIDE TO CULTURAL AND ENVIRONMENTAL INTERPRETATION IN THE U.S. ARMY CORPS OF ENGINEERS

Abstract

This supplement contains a list of colleges and universities with programs in interpretation. The list will provide sources for Corps personnel to use in obtaining additional information and special assistance in interpretation and to recruit potential employees qualified to perform interpretation duties.

COLLEGES AND UNIVERSITIES OFFERING COURSEWORK IN INTERPRETATION*

A Guide to Cultural and Environmental Interpretation in the U.S. Army Corps of Engineers

INTRODUCTION

This publication is one of a series of supplements to "A Guide to Cultural and Environmental Interpretation in the U.S. Army Corps of Engineers" (U.S. Army Engineer Waterways Experiment Station (WES) Instruction Report R-81-1). During the review of earlier drafts of the guide, Corps personnel noted informational needs in the area of interpretation beyond the scope of the Instruction Report. One of the identified needs was a list of colleges and universities with programs and expertise in interpretation. One justification for this list was that, occasionally, Corps personnel with interpretive duties need additional information or special assistance beyond that which is readily available. In addition, Corps personnel may also need to know sources for hiring interpreters outside of the agency. The purpose of this supplement is to fulfill these needs.

The list of colleges and universities included as this supplement was taken from three sources:

a. Association of Interpretive Naturalists. 1981. Personal Communications, Derwood, Md.

b. Hartmann, L. A. 1980. "Interpretive Training: A National Survey of Colleges and Universities," Unpublished M. S. Thesis, Michigan State University, East Lansing, Mich.

c. National Recreation and Parks Association. 1979. *Recreation and Park Education Curriculum Catalog,* Society of Park and Recreation Educators, Arlington, Va.

The list is based on the best information available and covers a majority of the current interpretation curricula. With recent budget cuts and the continuous shifting of emphasis in college curriculum development, it is nearly impossible to publish a list that will not be somewhat outdated by the time it reaches the readers' hands. Some colleges and universities that no longer offer coursework in interpretation may have been included, while others that offer such programs may have been unintentionally omitted.

To simplify the location of interpretation programs and expertise, colleges and universities have been listed by Corps of Engineers (CE) Divisions and Districts

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* This supplement was written by Dr. Dennis Propst of Shepherd College, Shepherdstown, W. Va., under an Intergovernmental Personnel Act Agreement with the U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.

within which they are geographically located. It is strongly recommended that Division, District, and project personnel modify this list to meet their own needs. For example, project personnel may want to add the name of a nearby college with an interpretation curriculum that is not on this list. Furthermore, there may be a nearby institution that does not have a program in interpretation per se, but may be able to offer assistance in other ways (amphitheater plays performed by students in a dramatic arts department, mounted specimens for exhibits on loan from a biology department, special photographic work, etc.). Such institutions should be added to the list contained in this supplement.

No effort has been made to evaluate the quality of individual programs listed in this supplement. The purpose was merely to supply addresses and appropriate contacts where possible. It will be up to the Divisions, Districts, and projects to make the contacts and identify and evaluate those programs and individuals with expertise most closely related to specific needs.

Finally, there are other sources of technical expertise in interpretation outside of colleges and universities. Corps personnel desiring the services of consultants or other sources of technical information in interpretation should contact one or more of the following sources:

The Association of Interpretive Naturalists, Inc.
6700 Needwood Road
Derwood, Md. 20855

Western Interpreter's Association
P. O. Box 28366
Sacramento, Calif. 95828

Interpretation Canada
Box 160
Aylmer
Province of Quebec
J9H 5E5

LOWER MISSISSIPPI VALLEY DIVISION

Memphis District

University of Tennessee at Martin — Program Coordinator, Park and Recreation Administration, University of Tennessee at Martin, Martin, Tenn. 38238

New Orleans District

Northwestern State University of Louisiana — Physical Education and Recreation, Northwestern State University of Louisiana, Natchitoches, La. 71457

St. Louis District

George Williams College — Interpretive Services Administration, Department of Leisure and Environmental Resources Administration, George Williams College, 555 Thirty-First Street, Downers Grove, Ill. 60515

Southern Illinois University - Carbondale — Department of Recreation, Southern Illinois University - Carbondale, Carbondale, Ill. 62901

MISSOURI RIVER DIVISION

Kansas City District

Kansas State University — Chairman, Natural Resource Management Curriculum, Department of Forestry, Kansas State University, Manhattan, Kans. 66506

University of Missouri — Project Director - Recreation Extension, Department of Recreation and Park Administration, 624 Clark Hall, University of Missouri, Columbia, Mo. 65211

Omaha District

Colorado State University — Department of Recreation Resources, Colorado State University, Fort Collins, Colo. 80523

University of Northern Colorado — Outdoor Education Extension Program, Box 1035, Greeley, Colo. 80639

University of Nebraska at Lincoln — Department of Recreation and Leisure Studies, University of Nebraska at Lincoln, Lincoln, Nebr. 68588

University of Wyoming — Department of Recreation and Park Administration, University of Wyoming, Box 3402, University Station, Laramie, Wyo. 82071

NORTH ATLANTIC DIVISION

Baltimore District

Catonsville Community College — Coordinator of Leisure Studies and Activities, Catonsville Community College, 800 South Rolling Road, Baltimore, Md. 21228

Cornell University — Department of Environmental Education - Stone Hall, Cornell University, Ithaca, N. Y. 14853

Hood College — Recreation and Leisure Studies Program, Hood College, Frederick, Md. 21701

Pennsylvania State University — Department of Recreation and Parks, College of Health, Physical Education, and Recreation, 267 Recreation Building, Pennsylvania State University, University Park, Pa. 16802

State University of New York at Cortland — Department of Recreation Education, State University of New York at Cortland, Cortland, N. Y. 13045

University of Maryland at College Park — Department of Recreation, University of Maryland, College Park, Md. 20742

New York District

Johnson State College — Department of Environmental Studies, Johnson State College, Johnson, Vt. 05656

University of Vermont — Recreation Management Program, School of Natural Resources, University of Vermont, Burlington, Vt. 05405

Philadelphia District

State University of New York Agricultural and Technical College of Delhi — State University of New York Agricultural and Technical College of Delhi, Delhi, N. Y. 13753

NORTH CENTRAL DIVISION

Chicago District

Western Illinois University — Department of Recreation and Park Administration, College of Health, Physical Education, and Recreation, 403 Western Hall, Western Illinois University, Macomb, Ill. 61455

Detroit District

Central Michigan University — Department of Recreation and Park Administration, Central Michigan University, Mount Pleasant, Mich. 48859

Michigan State University — Department of Park and Recreation Resources, Michigan State University, East Lansing, Mich. 48824

University of Michigan — Department of Natural Resources, University of Michigan, Ann Arbor, Mich. 48104

Rock Island District

University of Wisconsin - Madison — Department of Forestry, College of Agriculture and Life Sciences, 116 Agriculture Hall, 1450 Linden Drive, University of Wisconsin - Madison, Madison, Wis. 53706

St. Paul District

University of Wisconsin - River Falls — Department of Plant and Earth Science, University of Wisconsin - River Falls, River Falls, Wis. 54022

University of Wisconsin - Stevens Point — College of Natural Resources, University of Wisconsin - Stevens Point, Stevens Point, Wis. 54481

NEW ENGLAND DIVISION

Greenfield Community College — Recreation Leadership Department, Center for Environmental Awareness, Greenfield Community College, Greenfield, Mass. 01301

Northeastern University — Department of Recreation and Leisure Studies, 3 Dockser Hall, Northeastern University, 360 Huntington Avenue, Boston, Mass. 02115

University of Massachusetts - Amherst — Department of Landscape Architecture and Regional Planning, 109 Hills North, University of Massachusetts - Amherst, Amherst, Mass. 01003

University of New Hampshire — Recreation and Parks, 227 Hewitt Hall, Durham, N. H. 03824

University of Vermont — School of Natural Resources, University of Vermont, Burlington, Vt. 05402

NORTH PACIFIC DIVISION

Portland District

Oregon State University — Department of Resource Recreation Management, Oregon State University, Corvallis, Oreg. 97331

University of Oregon — Department of Recreation and Park Management, University of Oregon, Eugene, Oreg. 97405

Seattle District

University of Montana — Recreation Management Degree Program, School of Forestry, University of Montana, Missoula, Mont. 59812

University of Washington — College of Forest Resources, University of Washington, Seattle, Wash. 98105

Western Washington University — Coordinator, Center for Leisure Studies, Western Washington University, Bellingham, Wash. 98225

Walla Walla District

University of Idaho — Wildland Recreation Management Program, College of Forestry, Wildlife, and Range Sciences, University of Idaho, Moscow, Idaho 83843

Washington State University — Department of Forestry and Range Management, Washington State University, Pullman, Wash. 99164

OHIO RIVER DIVISION

Huntington District

Marshall University — Park Resources and Leisure Services, Marshall University, Huntington, W. Va. 25701

The Ohio State University — Division of Environmental Education, The Ohio State University, 124 W. 17th Avenue, Columbus, Ohio 43210

Louisville District

Ball State University — Department of Natural Resources, Ball State University, Muncie, Ind. 47306

Eastern Kentucky University — Department of Recreation and Park Administration, Begley Building, Eastern Kentucky University, Richmond, Ky. 40475

Indiana State University — Department of Recreation, 220 Reive Hall, Indiana State University, Terre Haute, Ind. 47809

Indiana University at Bloomington — Department of Recreation and Park Administration, School of Health, Physical Education, and Recreation, Indiana University at Bloomington, Bloomington, Ind. 47401

Morehead State University — Department of Health, Physical Education, and Recreation, 200 Laughlin Health Building, Morehead State University, Morehead, Ky. 40351

Purdue University — Department of Forestry, Purdue University, West Lafayette, Ind. 47907

Western Kentucky University — Department of Physical Education and Recreation, Western Kentucky University, Bowling Green, Ky. 42101

Nashville District

University of Tennessee at Knoxville — Department of Forestry, Fisheries and Wildlife, P. O. Box 1071, University of Tennessee at Knoxville, Knoxville, Tenn. 37916

Warren Wilson College — Environmental Interpretation Program, Warren Wilson College, P. O. Box 5014, Swannanoa, N. C. 28778

Pittsburgh District

Slippery Rock State College — Department of Parks and Recreation, Slippery Rock State College, Slippery Rock, Pa. 16057

SOUTH ATLANTIC DIVISION

Mobile District

University of Southern Mississippi — School of Health, Physical Education, and Recreation, University of Southern Mississippi, Southern Station, Box 5142, Hattiesburg, Miss. 39401

Savannah District

Clemson University — College of Forest and Recreation Resources, Clemson University, Clemson, S.C. 29631

Wilmington District

North Carolina State University at Raleigh — Department of Recreation Resources Administration, 4008 Biltmore Hall, North Carolina State University at Raleigh, Raleigh, N. C. 27650

Virginia Polytechnic Institute and State University — School of Forestry and Wildlife Resources, Virginia Polytechnic Institute and State University, Blacksburg, Va. 24061

University of North Carolina at Greensboro — Department of Outdoor/ Environmental Education, University of North Carolina at Greensboro, Greensboro, N.C. 27412

SOUTH PACIFIC DIVISION

Los Angeles District

University of Arizona — School of Renewable Natural Resources, University of Arizona, Tucson, Ariz. 85721

San Diego State University — Department of Recreation, San Diego State University, San Diego, Calif. 92182

Sacramento District

California State University - Chico — Department of Recreation Administration, California State University - Chico, Chico, Calif. 95929

California State University - Sacramento — Department of Recreation and Park Administration, California State University - Sacramento, 6000 Jay Street, Sacramento, Calif. 95819

Lassen Junior College — Department of Wildlife Recreation, Lassen Junior College, Susanville, Calif. 96130

University of Nevada at Reno — Division of Renewable Natural Resources, College of Agriculture, University of Nevada at Reno, 1000 Valley Road, Reno, Nev. 89557

San Francisco District

California State University - Humboldt — Department of Natural Resources Planning and Interpretation, School of Natural Resources, California State University - Humboldt, Arcata, Calif. 95521

SOUTHWESTERN DIVISION

Albuquerque District

University of New Mexico — Coordinator, Recreation Program, Johnson Gym 112, University of New Mexico, Albuquerque, N. Mex. 87131

Fort Worth District

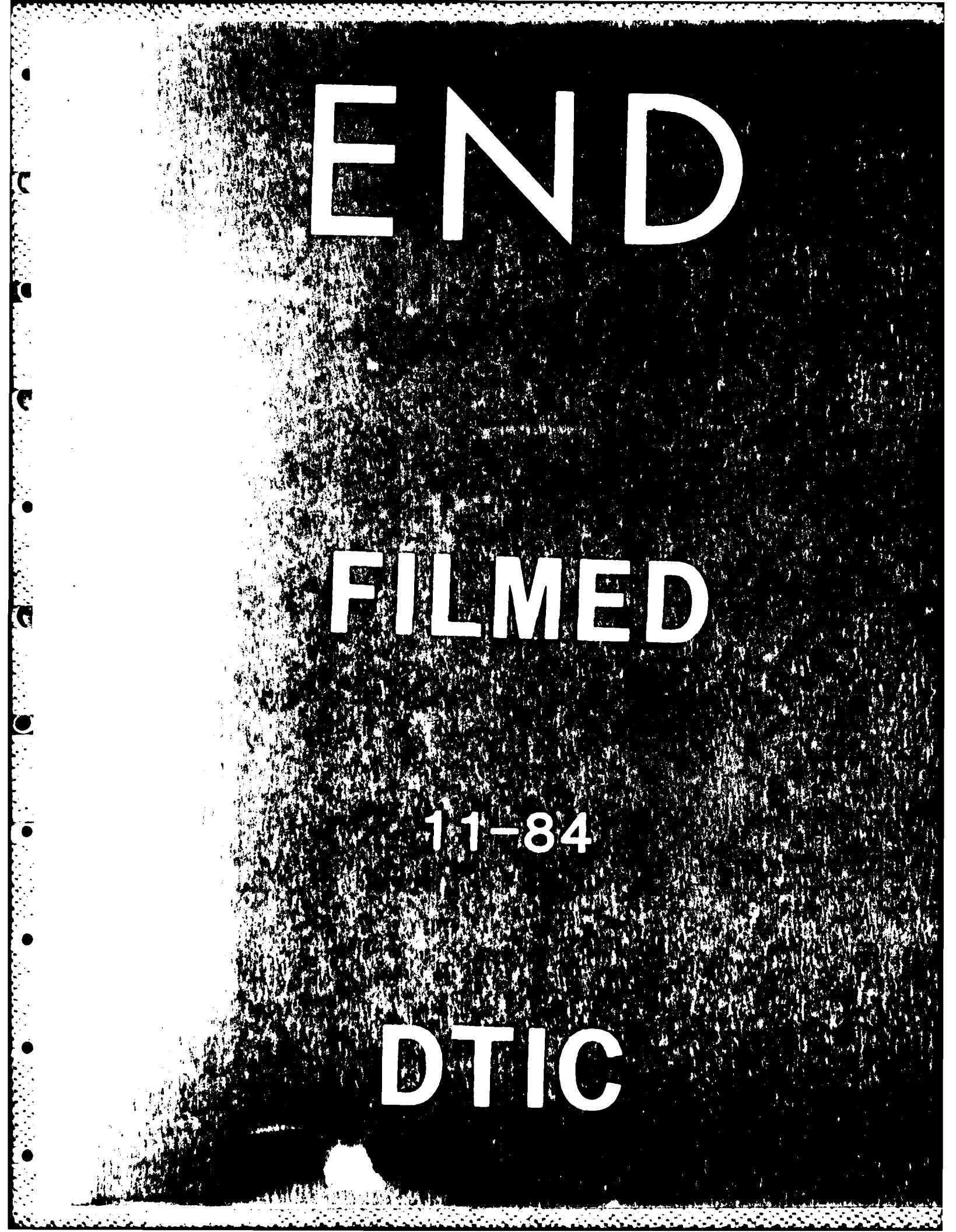
Stephen F. Austin State University — School of Forestry, Stephen F. Austin State University, Nacogdoches, Tex. 75962

Texas A & M University — Department of Recreation and Parks, Texas A & M University, College Station, Tex. 77843

Texas Tech University — Department of Park Administration and Landscape Architecture, Texas Tech University, Lubbock, Tex. 79409

Little Rock District

Arkansas Tech University — Department of Recreation and Park Administration, Arkansas Tech University, Russellville, Ark. 72801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