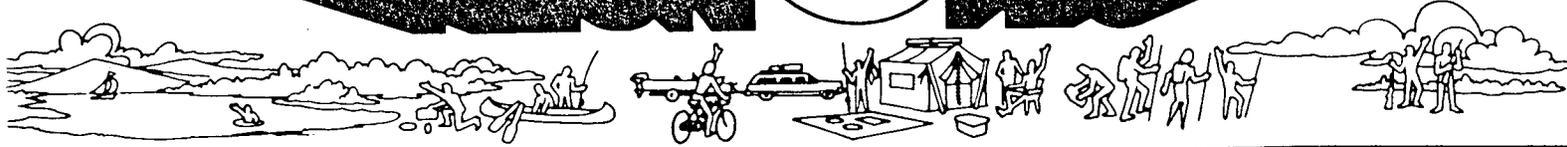




# RECNOOTES

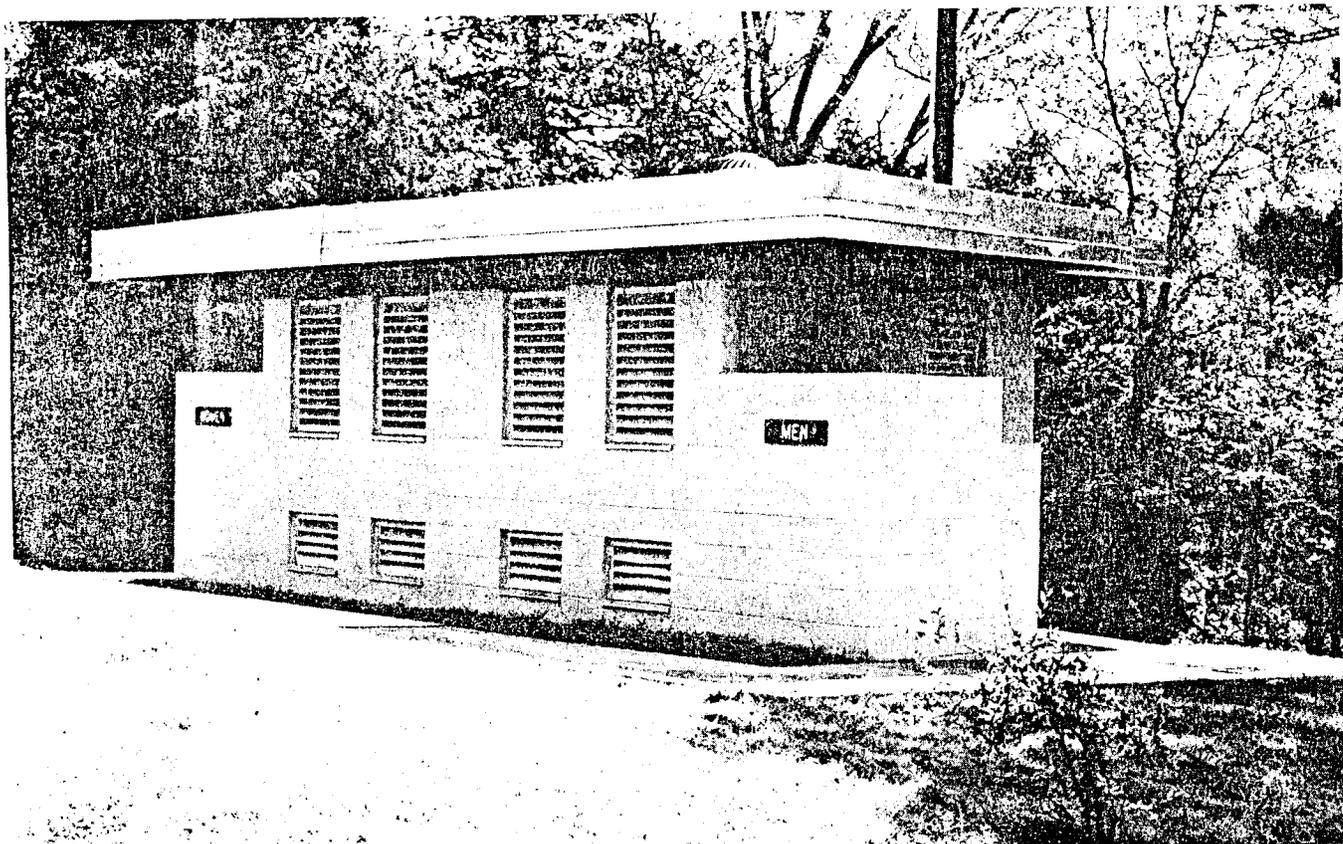
RECREATION  
RESEARCH  
PROGRAM



VOL R-81-1

U. S. ARMY CORPS OF ENGINEERS INFORMATION EXCHANGE BULLETIN

October 1981



## PLANNING AND DESIGN CRITERIA FOR RECREATION ROADS AND SANITARY FACILITIES

*Michael R. Waring\**

The Recreation Roads and Sanitary Facilities Work Unit is approaching the end of the second year of study. The main objective is to determine which general *levels* of design are the most cost-effective in various situations. Data are being or have been collected in the areas of management objectives and constraints, actual facilities costs, and visitor preferences. Also data were collected on innovative/alternative design practices for roads. The following is a description of the work accomplished to date.

### Management Objectives and Constraints

Questionnaires were mailed to personnel in selected project and District offices throughout the country. The questionnaire was designed to identify:

- Constraints to providing recreation roads and sanitary facilities, such as local, State, and Federal health and safety codes; District/Division/Corps memoranda or directives; and other Federal or State laws (such as handicap design requirements).
- Problems in planning and designing the roads and sanitary facilities.

\*Waring is an Outdoor Recreation Planner assigned to the Resource Analysis Group, Environmental Resources Division of the WES Environmental Laboratory.

- Aspects of various designs that are the most costly.

Analysis of responses to these questionnaires is scheduled for early FY 82.

### Facility Costs

Cost data for various types of sanitary facilities have been collected from a large number of Districts. From these data, cost functions for both vault and waterborne toilet systems have been developed. The following article by Walski and Lamm provides more information on the cost functions and their use.

### Visitor Preferences

A survey to determine visitor preferences for various levels of development of roads and sanitary facilities is being conducted this summer. Projects included in the survey are Greers Ferry Lake, Hartwell Lake, Shenango River Lake, Lake Shelbyville, Dworshak Dam and Reservoir, and McNary Lock and Dam (Figure 1).

The sanitary facilities survey design is based on the Contingent Valuation Method (CVM) in order to obtain the marginal value or worth for various aspects of sanitary facilities. Respondents were given several choices between types of basic facilities (waterflush versus vault) and interior and exterior architectural treatments; materials (low

versus high). They were then asked to assign a value, in dollars, what their choice was worth to them. Data on roads were collected by the interviewers during the process of collecting the sanitary facility data.

Results of these surveys will not be analyzed until this fall. However, based on initial observations, respondents assigned dollar values that appear to be correlated with the type (or level of development) of recreation areas.

### Road Design Practices

Data on innovative/alternative design practices for recreation roads were gathered and analyzed during the past year. The study included an analysis of State and other Federal agency design practices and a survey of materials used in road construction.

Preliminary results indicate that construction of roads with innovative/alternative materials is not cost effective at this time. However, due to economic and energy trends, at some point in time these materials may become very economical to use.

The preliminary results indicated that other agencies have planning techniques that have the potential for reducing the cost of recreation roads. The U.S. Forest Service, for example, uses an automated road planning procedure for low-volume road systems that may have particular applicability to Corps recreation road design.



Figure 1. Project locations of visitor-preference surveys

These results have been reviewed by the Office, Chief of Engineers, and are scheduled for publication as a Waterways Experiment Station (WES) Miscellaneous Paper.

### Summary

The results of the three major study tasks—management objectives and constraints, visitor

preference, and facility costs—will be correlated to determine the level and types of design that are the most cost-effective in various situations. A user's manual will be published in FY 83 to guide the planner or designer in selecting the most cost-effective alternatives to meet specific requirements of a recreation site. Actual facility designs would fall within a general range for the selected alternatives in order to be most cost-effective.

## SELECTING COST-EFFECTIVE SANITARY FACILITY DESIGNS FOR RECREATION AREAS

(Or "How Much is that Outhouse in the Window?")

*Thomas M. Walski and Anita L. Lamm\**

In preparing a general design memorandum or reservoir master plan, the CE planner often is in the unenviable position of trying to select the type of design and to estimate the cost of recreation facilities with only a minimal amount of data on which to base the decisions. The planner cannot easily calculate the tradeoffs between different types and sizes of buildings, nor are data readily available on users' willingness-to-pay for various levels of service. As a result, the CE planner can never be certain that resources are properly allocated to recreational facilities.

### Allocating Recreation Resources

Allocating recreation resources is a two-part problem—the first is determining the users' willingness-to-pay and/or preference for the facilities; the second is in estimating the costs for various levels of service. This problem is being addressed for recreation sanitary facilities as part of the Recreation Research Program at the WES.

A questionnaire is being used to determine recreation users' willingness-to-pay for different types of sanitary facilities. In addition, the costs for the various levels of service will be published in a WES Miscellaneous Paper on the cost of sanitary facilities for recreation areas. The responses to the user survey will be compiled and published later, but the results of the cost study are available to provide planners with an easy-to-use accurate method for predicting costs of sanitary facilities.

### Cost Functions

The Environmental Engineering Division at WES has prepared cost functions for typical sanitary

facilities at recreation areas ranging from procurement of water to disposal of wastewater. The components in providing sanitary service and the facilities required are shown schematically in Figure 1. The steps in preparing the planning level cost estimate are shown in Figure 2. In some cases, steps can be skipped (e.g., no treatment required if treated water is purchased), while several items of information may be required at some steps.

Use of the cost functions enables the planner, working with designers and estimators, not only to prepare the cost estimates required for planning reports quickly and accurately, but, more importantly, to evaluate the tradeoffs between different designs and sizes of buildings based on life-cycle costs. Note that the methods contained in the report are intended to aid in selecting types of facilities and making the types of estimates required in survey reports, but do not usurp the role of the designer or estimator in preparing design memorandum, plans and specifications, and government estimates. By assisting in selecting the best facility to meet user needs early in the planning study, the designers' work should actually be easier since many of the "what if" questions have been answered.

With this technique it is now possible to screen a broad array of recreation facility layouts and answer the "what if" questions before they arise. With the cost functions, the planner will not be caught off guard if the District Engineer asks, "How much will it cost if we use four toilets instead of six?" or "What if we use cedar shingles instead of asphalt?"

### Example Problem

To illustrate use of cost functions for planning studies, an example is presented of a planner who must select and estimate the cost of a comfort station at a recreation area for the Resource Conservation Recreation Development Appendix to

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\*Walski is a Research Civil Engineer assigned to the Water Resources Engineering Group, Environmental Engineering Division of the WES Environmental Laboratory; Lamm is a Civil Engineer in the same organization.

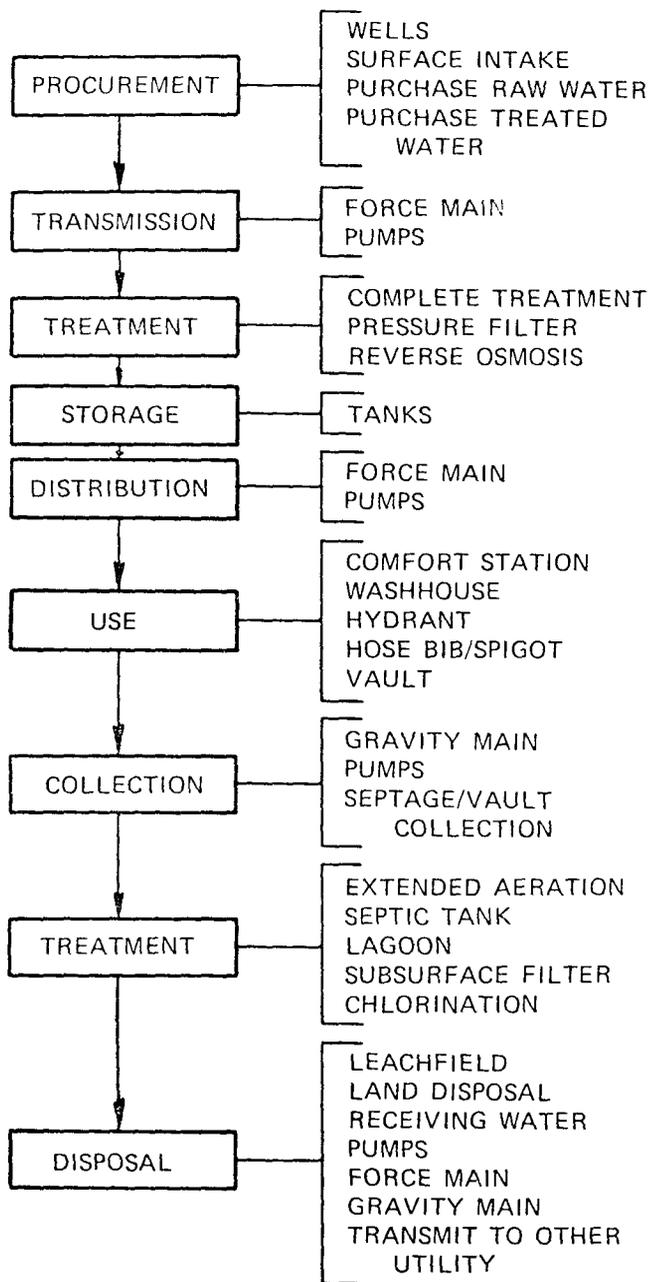


Figure 1. Processes and components in sanitary facilities at recreation areas

a Phase II General Design Memorandum. Suppose the planner needs an estimate of the cost of a six- or eight-toilet waterborne comfort station or vault toilet.

Using the cost functions, the planners can quickly prepare typical life-cycle cost estimates for each type of building as shown in Figure 3. The first estimate represents a spacious building with an elaborate design while the second represents a small building with a simple design. The costs shown in Figure 3 were based on an interest rate of 7 percent; an allowance for supervision, inspection,

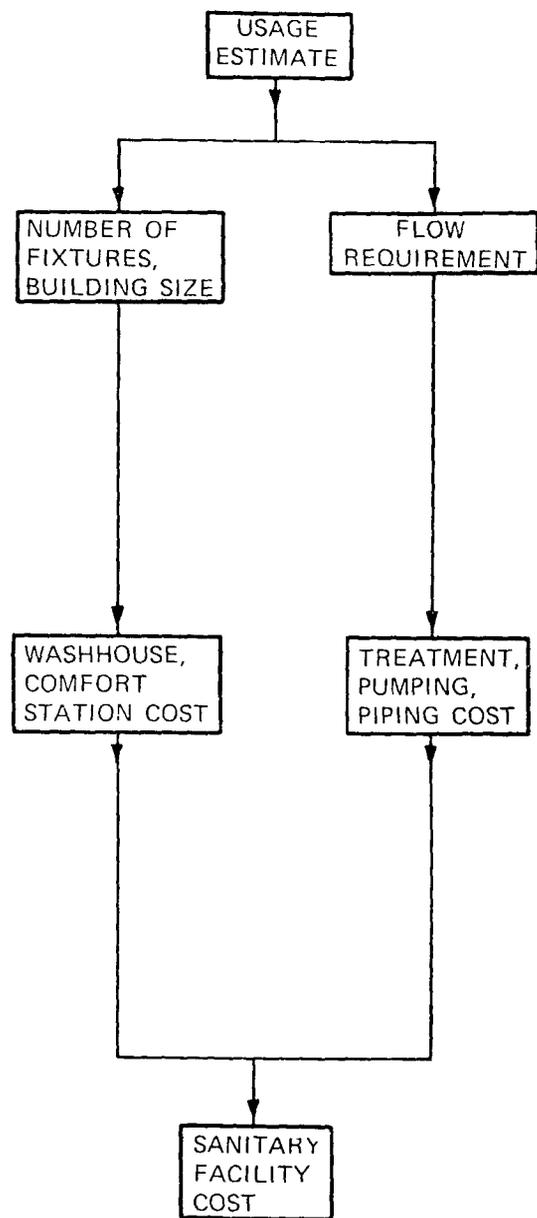


Figure 2. Overview of estimating cost of recreation area sanitary facility

engineering, and design of 25 percent; and a design life of 50 years. The water and waste costs were based on a 100-ft well, a package complete water treatment plant, a storage tank, an extended aeration wastewater treatment plant, 6000 ft of pressure pipe, and a 1000-ft sewer.

Figure 3 helped the planner visualize the tradeoffs in providing different levels of sanitary facilities. Figure 3 shows that the most important decision affecting cost is whether to have waterborne facilities. Other decisions, such as number of toilets, have a lesser effect. Note that the costs for water supply and wastewater treatment are highly site specific. The costs in Figure 3 are examples and not

## RRP REPORTS

R. E. Coughlin, D. Berry, and P. Cohen. 1978. "Modeling Recreation Use in Water-Related Parks," Technical Report R-78-1, prepared by the Regional Science Research Institute for the Environmental Laboratory, U.S. Army Engineer Waterways Experiment Station, CE, Vicksburg, Miss. (Out of print; NTIS No. AD A071 898).

Distribution: OCE; Division and District Libraries.

Earlier work of the U.S. Army Corps of Engineers on the recreation use of reservoir parks is extended to nonreservoir parks. A thorough review of the literature was followed by a test of several models including those already tested by the U.S. Army Engineer District, Sacramento. For the test, data from New York State Parks were used. The results were somewhat weaker than those obtained by the Sacramento District, which was attributed, in part, to the fact that the data were collected for another purpose and did not contain as many observations as would be desirable for a spatial analysis of this type.

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R.M. Mischon and R.C. Wyatt. 1978. "Development of Improved Decision-Oriented Recreation User Information System," Technical Report R-78-2, prepared by the Midwest Research Institute for the Environmental Laboratory, U.S. Army Engineer Waterways Experiment Station, CE, Vicksburg, Miss. (Out of print; NTIS No. AD A062 795).

Distribution: OCE; Division and District Libraries.

As a result of the growing number of visitors at Corps projects, planners and managers need information concerning the recreation activities, facilities, and preferences of these users. To provide these needs, research was performed to improve visitation input data for the Recreation Resource Management System (RRMS) and to evaluate the needs for an overall recreation information system. There were five major tasks identified as needed to implement the authors' recommendations regarding improving visitation data and development of an overall recreation information system: (1) research and analysis; (2) collection and storage of data; (3) generation of computer software requirements; (4) training and quality control; and (5) reporting.

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R.M. Mischon and R.C. Wyatt. 1979. "A Handbook for Conducting Recreation Surveys and Calculating Attendance at Corps of Engineers Projects," Technical Report R-79-1, prepared by the Midwest Research Institute for the Environmental Laboratory, U.S. Army Engineer Waterways Experiment Station, CE, Vicksburg, Miss. (Out of print; NTIS No. AD A068 677).

Distribution: OCE; Division and District RRP designated representatives; Division and District Operations and Planning Branches; Project Offices.

Survey and analytical techniques are described that will produce standardized estimates of recreation visitation. Earlier research concluded that each Corps District and project essentially had developed its own procedures for collecting visitation data for the Recreation Resource Management System (RRMS). The procedures in the handbook utilized the best of these techniques with several minor changes to improve the quality of the visitation data.

Urban Research and Development Corporation. 1980. "Recreation Carrying Capacity Design and Management Study," Technical Report R-80-1, prepared for the Environmental Laboratory, U.S. Army Engineer Waterways Experiment Station, CE, Vicksburg, Miss. (Limited copies available; NTIS No. AD A090 704).

Distribution: OCE; Division and District RRP designated representatives; Recreation Research and Demonstration Units; Project offices.

The increase in use of Corps recreation facilities and prospects of even greater demand have brought about two major consequences and concerns: resource overuse and user overcrowding. More definitive recreation carrying capacity design and management guidelines are needed to preserve recreation qualities while offering a range of recreation opportunities.

Findings and recommendations of the Recreation Carrying Capacity Design and Management Study are presented. Results of site analyses, management interviews, and user surveys are included for the 11 Corps projects that were studied. Methodologies for determining recreational carrying capacity levels were developed, as well as carrying capacity design and management techniques for use in preventing and correcting problems of overcrowding, overuse, and underuse of recreation resources. Demonstrations are given to show how carrying capacity guidelines can be developed and applied.

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Walter H. Bumgardner. 1980. "Development of a Methodology for Preparing Performance Standards for Operation and Maintenance Activities at Corps of Engineers Recreation Areas," Miscellaneous Paper R-80-2, prepared by the University of Southern Mississippi for the Environmental Laboratory, U.S. Army Engineer Waterways Experiment Station, CE, Vicksburg, Miss. (Limited copies available; NTIS No. AD A091 560).

Distribution: OCE; Division and District RRP designated representatives; Recreation Research and Demonstration Unit Project Offices.

The quantity and quality of operation and maintenance (O&M) activities at U.S. Army Corps of Engineers Civil Works Projects can be significantly increased through systematic application of work performance standards. Criteria for preparing O&M standards were identified and evaluated. Existing Corps procedures, those used by other agencies, and potentially useful new procedures were evaluated and incorporated into recommended procedures.

A methodology is described and illustrated for local preparation of O&M standards. Supporting rationale and optional techniques and sources of information are suggested for completing components of individual O&M standards. Example standards, developed from surveillance of maintenance activities at Corps projects, are illustrated.

A quality control plan is recommended for ensuring that O&M activities performed by contractors adhere to Corps-established criteria. Performance inspections, time frames of inspections, and identification of personnel to perform inspections are discussed. Options are examined for recouping costs of unsatisfactorily completed work. Recommendations are given for implementing a standards program and furthering the Corps' research on this topic.

Robert V. Abbey and Dennis B. Propst. 1981. "A Methodology for the Systematic Collection, Storage, and Retrieval of Trend Data for the Army Engineers Recreation Program," Miscellaneous Paper R-81-1, U.S. Army Engineer Waterways Experiment Station, CE, Vicksburg, Miss. (Limited copies available; NTIS No. AD A098 274).

Distribution: OCE; Division and District Libraries; Division and District Planning and Operation Branches; Project Offices.

Past, current, and proposed recreation information systems developed to assist Corps personnel in solving daily management and planning problems were reviewed. The Corps systems designed to collect and store trend data are still in their infancy and are being managed by the Recreation Research Program at the U.S. Army Engineer Waterways Experiment Station (WES). The trend data described in this report were collected as part of a pilot study at three Corps campgrounds during the summer of 1979. The report also describes the systems of the Research and Demonstration Units (RDU) and of other agencies that collect, store, and utilize recreation user information.

The need to develop additional means of collection trend data is based, in part, on the weaknesses of past Corps of Engineers recreation information systems. These problems, as well as the steps the Corps is taking to gather more reliable visitation and other trend data, are described in the report.

A major product of the proposed recreation user system will be the forecasting of national and regional trends in terms of recreation participation, sales of recreational equipment, and other factors that affect recreation use. Part of this system, the collection of more reliable visitation data, has already been implemented. The mechanics of the proposed recreation user system, potential uses, and relationship to existing systems are herein described.

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William J. Hart. 1981. "Recreation Research and Demonstration System: Its Selection, Operation, and Potential Utility," Technical Report R-81-1, U.S. Army Engineer Waterways Experiment Station, CE, Vicksburg, Miss. (Limited copies are available; NTIS No. AD A099 751).

Distribution: OCE; Division and District RRP designated representatives.

A Recreation Research and Demonstration System (RRDS) consisting of 24 Recreation Research and Demonstration Units (RRDUs) and 9 Recreation Use Monitoring Stations (RUMSs) has been activated. The purpose of the demonstration system is to provide permanently designated outdoor laboratories for the conduct of research in the physiographic, social, economic, and institutional aspects of recreation and related natural resources.

The RRDS represents a stratified 6-percent sample of Corps water resource development projects for which the Corps exercises operational control over the recreation and related natural resources (RRDUs) plus representative examples of important recreation projects for which the Corps is not now credited with responsibility (RUMs). The sample accurately mirrors the size, geographic distribution, attendance, and administrative mode found in the Corps-wide system of recreation projects.

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Urban Research and Development Corporation. 1980. "Recreation Carrying Capacity Handbook Methods and Techniques for Planning, Design, and Management," Instruction Report R-80-1, prepared

for the Environmental Laboratory, U.S. Army Engineer Waterways Experiment Station, CE, Vicksburg, Miss. (Being reprinted; NTIS No. AD A096 446).

Distribution: OCE; Division and District Libraries; Division and District Planning and Operation Branches; Project Offices.

The increase in use of Corps recreation facilities and the prospects of even greater demand have brought about two major consequences and concerns: resource overuse and user overcrowding. More definitive recreation carrying capacity design and management guidelines are needed to preserve recreation qualities while offering a range of recreation opportunities. This report presents a methodology for determining recreation carrying capacity levels based on the results of user surveys and site analyses. Carrying capacity planning, design, and management techniques are included for use in preventing and correcting problems of overcrowding, overuse, and underuse of recreation resources. Demonstrations are used to show how carrying capacity guidelines can be developed and applied.

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Dennis Propst and Joseph Roggenbuck. 1981. "A Guide to Cultural and Environmental Interpretation in the U.S. Army Corps of Engineers," Instruction Report R-81-1, Environmental Laboratory, U.S. Army Engineer Waterways Experiment Station, CE, Vicksburg, Miss.

Distribution: OCE; Division and District Libraries; Division and District Planning and Operation Branches; Project Offices.

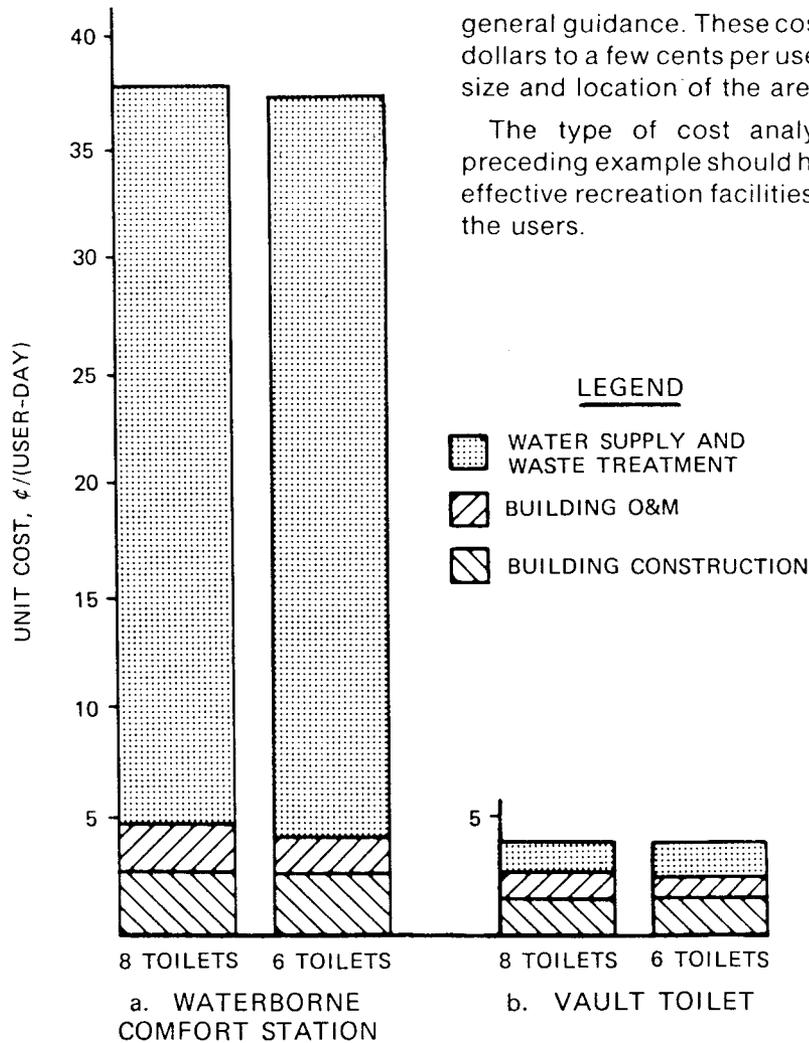
The goal of the Corps' Visitor Perception and Interpretives Services Program is to "inform and educate the public with regard to the purposes and concept of operation of the water project and the historical and natural features of the area." This manual is designed to assist Corps personnel in developing and implementing interpretive services at water resource projects. Subject areas include designing interpretive objectives, selecting appropriate messages to convey, understanding the visitor, choosing the appropriate media, selecting interpretive personnel, and evaluating interpretive services. References are listed for each of the topics.

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Dennis Propst, 1981. "Impact of the Energy Crisis on Corps of Engineers Recreation Program," Miscellaneous Paper R-81-2, Environmental Laboratory, U.S. Army Engineer Waterways Experiment Station, CE, Vicksburg, Miss.

Distribution: OCE; Division and District Libraries; Division and District Planning and Operations Branches.

Increases in fuel costs and sporadic shortages in fuel supplies have had an impact on recreation use of Corps projects. Literature was reviewed with regard to the impact of energy prices and supplies on visitation and recreation use patterns at non-Corps recreation areas. In addition, visitation figures for Corps projects were examined for the years of 1977 through 1979 to determine whether there was any correlation between 1979 fuel shortages and price increases and Corps visitation trends. Due to the quality and detail of Corps recreation data, only the broadest statements on future trends could be made. Energy-related trend forecasts were that recreation use would generally continue to increase steadily at Corps recreation areas due to their proximity to population centers and that visitors would tend to stay longer at one destination.



general guidance. These costs can vary from several dollars to a few cents per user-day depending on the size and location of the area.

The type of cost analysis illustrated by the preceding example should help the CE provide cost-effective recreation facilities in line with the needs of the users.

Figure 3. Life-cycle cost estimates for two types and sizes of buildings

## RECREATION RESEARCH PUBLICATIONS

Inserted in this issue of RECNOTES are abstracts of all RRP publications plus two reports that are in preparation. The basic distribution and NTIS ID number for each report are shown on the insert.

Because only limited numbers of reports are published, Corps employees should first check with District or Division libraries for a loan copy. The few copies remaining after initial distribution are available on a first-come first-served basis by writing U. S. Army Engineer Waterways Experiment Station, ATTN: Program Manager RRP, P. O. Box 631, Vicksburg, Mississippi 39180. When local supplies are exhausted, copies can be purchased from NTIS (National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22151).

### Help Wanted

We would like to publish articles from the field. Anything of Corps-wide recreation interest will be considered: notes, reviews, upcoming events, problems and solutions, or research. As noted in the first issue of RECNOTES, a research program that does not promptly respond to the people on the firing line is not much good, but the program staff finds it hard to respond to a vacuum. So, please, share anything you have concerned with outdoor recreation.

## UPCOMING EVENTS

Workshops. U.S. Forest Service, Pacific Northwest Region, P.O. Box 3623,

The Pacific Northwest Region, U.S. Forest Service, Washington State Department of Ecology sponsors two workshops in Environmental Education in Resource Management. The workshops are held in March at the University of Washington. Topics include techniques for developing resource groups and public involvement, environmental education programs/aids, and environmental site area planning. The week-long workshops include participants and staff from the U.S. Forest Service, National Park Service, Soil Conservation Service, U.S. Fish and Wildlife Service, and Washington State Parks, as well as teachers from the Washington and Oregon area. Interaction among the participants and staff makes the workshops a very important learning experience for anyone interested in environmental education.

Visitor Assistance Program. 20-28 Oct 81, 1-9 Dec. 81, 12-20 Jan 82. Training Course, University of Southern Mississippi, Hattiesburg, MS.

The course is designed to develop an awareness of the Corps of Engineers' Resource Management and Visitor Assistance Program and to prepare the trainees for the special requirements in the performance of their official duties. Topics to be covered include: History and Mission, Authority and Responsibility, Rangers Responsibility, Ranger Equipment, Interpersonal Relationships, Recreation Area Design, and Special Topics. (NOTE: Recreation Area Design will be taught by RRP staff at WES.)

If interested in attending the course, initiate a request through your Training Officer.

## RESEARCH IN INTERPRETATION

*Janet Fritschen\**

Interpretation is any communication process designed to reveal meanings and relationships of our cultural and natural heritage to the public (primarily) through firsthand involvement with an object, artifact, landscape, or site.\*\*

In the June 1980 issue of RECNOTES, a new work unit on visitor perception, or interpretation, was introduced. The first effort in this work unit was to produce a guidebook on interpretation, "A Guide to Cultural and Environmental Interpretation in the U.S. Army Corps of Engineers," which is in press (WES Instruction Report R-81-1). The instructional report contains information on:

- ★ Designing objectives
- ★ Selecting appropriate messages to convey to visitors.
- ★ Understanding users of interpretation services (Figure 1).
- ★ Choosing appropriate media.

- ★ Selecting and training interpretive personnel.
- ★ Evaluating interpretive services.

To gather Corps-wide information about interpretation and those who have interpretation duties, a questionnaire was produced that has been mailed to all appropriate people. Some of the information from responses to the questionnaire, such as innovative and effective programs, will be communicated to interpreters. Data on information and training needs will be used to direct future research efforts. If you have received a questionnaire and not yet completed it, please do so as soon as possible.

Also in progress are three research contracts to determine the effectiveness of interpretation as a management tool to decrease unintentional vandalism, to disperse recreational use, and to increase visitor safety. The field work is being conducted at three Corps lakes: John H. Kerr, Wilmington District; Shenango, Pittsburgh District; and Detroit, Portland District.

The results from the three management studies and the interpretation questionnaire will be communicated through future issues of RECNOTES and other publications of the Recreation Research Program (RRP).

\*Fritschen is an Outdoor Recreation Planner assigned to the Resource Analysis Group, Environmental Resources Division of the WES Environmental Laboratory.

\*\*B. Peart. 1978. "Definition of Interpretation," *Interpretation Canada*, Vol 5, No. 2, pp 3-6, Aylmer, Quebec, Canada.

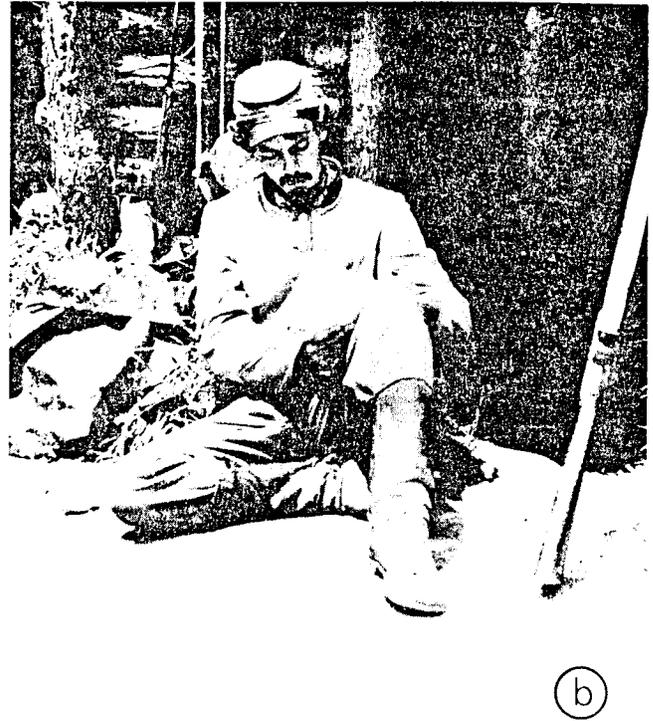


Figure 1. Interpretation programs should be designed for the visitor: (a) the elderly; (b) historical interest; (c) the handicapped; (d) children (photos taken from WES Instruction Report R-81-1, courtesy of the Vicksburg District (b and d), Hartwell Lake (a), and Albuquerque District (c)).

This bulletin is published in accordance with AR 310-2. It has been prepared and distributed as one of the information dissemination functions of the Environmental Laboratory of the Waterways Experiment Station. It is primarily intended to be a forum whereby information pertaining to and resulting from the Corps of Engineers' nationwide Recreation Research Program can be rapidly and widely disseminated to OCE and Division, District, and project offices as well as to other Federal agencies concerned with outdoor recreation. Local reproduction is authorized to satisfy additional requirements. Contributions of notes, news, reviews, or any other types of information are solicited from all sources and will be considered for publication as long as they are relevant to the theme of the Recreation Research Program, i. e., to improve the effectiveness and efficiency of the Corps in providing recreation opportunity at its water resource development projects. This bulletin will be issued on an irregular basis as dictated by the quantity and importance of information to be disseminated. Communications are welcomed and should be addressed to the Environmental Laboratory, ATTN: A. J. Anderson, U.S. Army Engineer Waterways Experiment Station, P.O. Box 631, Vicksburg, Mississippi 39180, or call AC 601, 634-3657 (FTS 542-3657).

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