



development/control, and activity/use relationship settings it exhibited.

### Factors Affecting Carrying Capacity

Corps staff people were interviewed to find out both the resource and social factors they believe affect carrying capacity. Persons interviewed were asked to indicate the importance of each factor in addressing carrying capacity. Here is an example of the survey results regarding factors considered to affect carrying capacity of *camping* areas:

#### Factors Affecting Resource Carrying Capacity

##### Very Important

- Level of control
- Level of development (e.g., paved roads/paths versus unpaved roads/paths)
- Resiliency of vegetation type
- Tree cover
- Resiliency of soils
- Slope/topography of campsite

##### Moderately Important

- Site drainage
- Climate/microclimate
- Degree of normal maintenance applied
- Group size
- Resiliency of wildlife
- Degree of off-season restoration applied to activity area
- Slope orientation

#### Factors Affecting Social Carrying Capacity

##### Very Important

- Proximity to the water
- Degree of control
- Level of support facilities
- Proximity to other activities
- Single purpose or multipurpose recreation area

##### Moderately Important

- Degree of maintenance
- Compatibility of nearby primary activities
- Similarity of visitor groups
- Scenic views of vistas
- Degree of campsite delineation
- Proximity to support facilities
- Configuration of area
- Quality/variety of natural landscape amenities
- Visual screening between campsites
- Safety measures
- Animals/dogs
- Remoteness/degree of solitude
- Distance traveled
- Charging of fees
- Frequency of visits
- Origin of user (urban, suburban, rural)

Number, type, and degree of man-made intrusions, or disturbance (power lines, buildings, noise, traffic, etc.)

Campsite selection opportunities

Density/type of vegetation

Distance from highway access point

Distance between campsites

Size of camping area

Increase in litter/trash

Picnicking in nonpicnic areas

Increase in resource facility destruction

Increase in noise

Shorter stays

Increase in crime

Occurrence of displacement/succession (changes in visitor characteristics)

Some of the major findings about indicators are:

- Many indicators can be used to determine when activity areas are overused or overcrowded.
- Many indicators are unique to a particular activity or recreation resource type.
- Indications of overcrowding are likely to occur before indications of resource overuse in regard to water surface activities such as boating and waterskiing.
- The most important indicators of *overcrowding* include increases in the number of complaints, conflicts between users, and crowded support facilities.
- The most important indicators of *overuse* include ground cover wearing away, compacted soils, and absence/change in aquatic life.
- Some indicators can be seen immediately upon change of social or resource condition; other indicators require more time to be recognized.
- Some indicators are easier to measure than others, particularly those signifying resource change. Other indicators, especially those showing overcrowding, appear to be more speculative and difficult to determine.

### Techniques Used to Influence Carrying Capacity

Corps personnel in the project areas surveyed were asked what techniques they have used in the past or are using now to influence or control recreational carrying capacity:

- A wide variety of techniques have been used to affect carrying capacity, control use, and ensure visitor safety.

- Generally, the techniques reported can be grouped into five categories: (a) program of public education and awareness; (b) manipulation of activity relationships; (c) application of updated planning and design principles; (d) initiation of stricter rules and regulations; and (e) more aggressive, systematic maintenance, and restoration practices.
- Some of the techniques are very direct and very noticeable to the recreation public; others are subtle.
- Many techniques are general and have not been applied to specific activities alone; camping has received the most attention in terms of the number of techniques applied to a specific activity.
- Most of the techniques identified during the Management/Site Survey were reported to be effective.
- One of the most effective methods of reducing resource *overuse* reported in many of the project areas was channelizing vehicular traffic and providing designated campsites and impact areas—those changes have solved many earlier overuse problems.
- With the exception of using control gates, few techniques to directly control overcrowding were discovered; most crowding control techniques are oriented to public awareness, rules and regulations, and maintenance and restoration.
- The more recent practice of separating camping from day-use activities reportedly had reduced user conflicts and enhanced the recreational experience in many areas.
- Reservation and permit systems have been used largely for group activities.

Factors and their related importance were listed for each of the thirteen recreation activities studied. Although the factors differed by activity, some overall findings regarding the factors are:

- The Management/Site Survey confirmed that many factors affect the resource and social carrying capacity of a given activity area.
- Corps personnel recognized the need to identify and examine carrying capacity factors prior to determining an area's carrying capacity.

- Identifying the factors and determining their relative importance were more difficult for social carrying capacity than for resource capacity.
- More factors were identified as affecting social carrying capacity than resource capacity.
- Social carrying capacity factors were deemed more important than resource factors regarding water-oriented activities (e.g., boating, swimming, waterskiing).
- For many recreation activities, the most important *social* carrying capacity factors include similarity of visitor groups, density of vegetation, level of development/support facilities, compatibility of nearby primary activities, proximity to the water, and proximity to support facilities.
- Several important *resource* carrying capacity factors common to many activities include topography/degree of slope, resiliency of vegetation, level of development, and stability of beach or trail.

### Indicators of Overuse and Overcrowding

What tells a resource manager that a recreation area is overused or overcrowded? Which signs or indicators are most useful in determining resource change and visitor satisfaction? Corps staff interviews covered the subject of indicators as they relate to overuse and overcrowding in each recreation activity studied. Here is an example of the indicators found to be important for **picnicking** as a result of the survey:

#### Indicators of Overuse

##### *Very Important*

Ground cover wearing away

##### *Moderately Important*

Compacted soils

More stray dogs

Amount of toilet paper and towels used

Amount of water use

Damaged trees and/or undergrowth

Increased erosion/sedimentation

Need for replacement of support facilities before normal life period

Increased litter/trash

Increased runoff

Rodent infestation

## Indicators of Overcrowding

### *Very Important*

Crowded support facilities

### *Moderately Important*

Increase in number of complaints

Increase in use levels

Arguments/conflicts between picnickers

Increase in number of accidents involving vehicles

Fewer returnees

Techniques to control overcrowding and overuse were not needed at a number of the recreation areas visited within Corps projects because the areas were well balanced or underused.

## Summer Visitor Survey Initiated

The Visitor Survey is designed to obtain visitors' perceptions of overcrowding and overuse, to determine relative importance of carrying capacity factors as viewed by visitors, and to receive visitor reactions to various carrying capacity control techniques. On-site interviews of visitors at the project areas were initiated in May and will continue through June and July of this year.

A team of professionals from URDC are interviewing visitors participating in the thirteen activities selected for research study. The specific locations (activity areas) within each Corps project area and the number of interviews desired per location have been determined and will be followed in conducting the survey.

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## *From the Field*

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### FIRST PLACE AWARD

U. S. Army Corps of Engineers Resident Engineer for Greers Ferry Lake, Carl Garner, and Greers Ferry Lake and Little Red River Association President Clay Gring attended the 7 December 1978 Silver Anniversary Keep America Beautiful, Inc. (KAB), National Awards Banquet. Garner and Gring were representatives of the Greers Ferry Lake and Little Red River Annual Cleanup, which received KAB's first place award in Category 6 - Government Agency.

### Keep America Beautiful, Inc.

Keep America Beautiful, founded in 1953, is a national nonprofit, nonpartisan public service organization which works with citizen groups, government agencies, academic institutions, labor, and private industry to stimulate individual involvement in improving the environment.

Each year the KAB National Awards Program meets to recognize organizations and individuals whose efforts to maintain and improve the environment have been judged to be outstanding by a panel of judges knowledgeable in environmental and public affairs. By focusing attention on these individuals and organizations, KAB honors their achievements and hopes they will serve as examples for others interested in improving the quality of life.

## Description of Program

Greers Ferry Lake, located in the foothills of the Ozark Mountains in North Central Arkansas, has 40,000 surface acres and 276 miles of shoreline—and 4.5 million visitors annually. The lake was formed in 1964 and by 1970 litter had reached what was considered an intolerable level. At that time, the Resident Engineer sought the removal of litter from the 276-mile shoreline and the lake bottom near the parks through community participation on a voluntary basis by Greers Ferry Lake and Little Red River Association. In 1972 their objective became threefold: (a) remove litter and keep the river clean; (b) involve the public and improve community relations; and (c) provide an ongoing educational program on litter prevention and a better appreciation for the environment. The Association planned to accomplish these objectives through increased participation in cleanup and maintenance of Greers Ferry Lake, an awareness campaign in the news media, public affairs announcements, and publication and widespread distribution of cleanup brochures.

Since the annual cleanup campaigns rely solely on volunteer participation, both from the Resident Office and the community, success depends on a good organization and a well-developed and executed plan. Experience from previous events is used in formulating and upgrading the plan for each succeeding year. The plan, in general, is coordinated and directed by the Resident Engineer.

Representatives of the Association, Corps of Engineers rangers, community clubs, and business firms chair committees that are each assigned a phase of planning and execution. Planning, including organizing, public appearances, distribution of brochures, etc., is conducted throughout the year with all-out efforts during the two months preceding the event. During this period, three news releases are sent to over 200 newspapers and to television and radio stations in Arkansas and surrounding states. Appearances on the three major television stations in Little Rock, Arkansas, and two in Memphis, Tennessee, and presentations on a number of radio stations, including Arkansas Radio Network,



*Left to right, Carl Garner, Resident Engineer, Greers Ferry Lake; John Volkhardt, Chairman, Board of Directors, KAB; Clay Gring, President, Greers Ferry Lake and Little Red River Association; and Roger Powers, President, KAB*



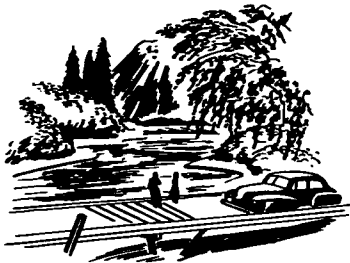
*Garner and Gring receive congratulations from Lieutenant General J. W. Morris, U. S. Army Chief of Engineers*

are used to publicize the event. Rangers present programs and challenges at five colleges and eight high schools. All local Explorer Troops in Arkansas and Memphis, Tennessee, are invited. Local county judges and mayors proclaim the appointed date as official "Cleanup Day." More than one hundred interested and concerned business firms and individuals throughout Arkansas contribute money and numerous supplies for the fish fry and the publication of the brochure.

On the day of the event, community leaders, Greers Ferry Resident Office employees, Association members, and marina concessionaires, equipped with zone maps of the lake and river, portable radios, and registration forms, man the check-in zone headquarters. As the voluntary workers arrive, names and number in party are recorded, cleanup areas assigned, map and instructions issued, and boat transportation is provided. In 1978, approximately 1,300 volunteers consisting of scouts and explorers, National Guardsmen, hundreds of college and high school students, civic groups, scuba clubs, members of local and state news media, lake guides, businessmen, and hundreds of families of all ages picked up tons of litter.

In the late afternoon and evening, all participants and their families gather at the Narrows Park where they enjoy a free fish fry and entertainment and visit with old friends and new acquaintances. Musical, vocal, and other groups from throughout Arkansas and Tennessee provide the entertainment at the fish fry. The lake and river are again nearly as clean as nature made them and the litter is forever hidden in a sanitary landfill.

The Greers Ferry Lake and Little Red River Cleanup is an excellent example of what can be done when Federal agencies, State agencies, local organizations, private businesses, nonprofit organizations, and the general public present a unified front against a common problem. The understanding and relationship between the Corps of Engineers, the State of Arkansas, and the people of the area has been greatly improved. The community, largely through this project, is unified in its purpose of preserving the ecological and environmental assets of the area and state.



## Cleanup Results

Some interesting results of the cleanup are:

- The Arkansas Game and Fish Commission made a film of portions of the 1977 cleanup activities which is being used for educational purposes at schools and civil group meetings.
- Annual cleanup date is now on Arkansas and Memphis Scouts and Explorers calendar of events each year. Explorer Posts and Scout patches have been designed for those who participate.
- The cleanup project has been recognized at each of the Annual Governor's Environmental Congress meetings as one of the major community efforts in litter prevention in the State of Arkansas.

For further information about this program or information about how to start your own program, please contact Carl Garner, Resident Engineer, Greers Ferry Resident Office, Heber Springs, Arkansas 72543; telephone 501/362-2416.



## VPIS IDEAS

One of the fastest growing programs involved in Corps Recreation-Resource Management is that of Visitor Perception and Interpretive Services (VPIS). Interpretation is now recognized as a legitimate and important aspect of the Corps mission to serve the general public. As more and more Corps projects delve into new and creative interpretive programs, there has arisen a need to exchange information concerning these programs with other Divisions, Districts, and projects. RECNOTES has responded to this need. In future issues of this publication, there will be a special section called "VPIS Ideas." This section will contain articles dealing with interpretation and environmental education. Hopefully, these articles will prevent duplication of interpretive effort throughout the Corps and will inspire Corps recreationalists to new heights of interpretive creativity. Send in those articles! As an information exchange, "VPIS Ideas" cannot work without your input. Let's give "VPIS Ideas" a rousing start. Tell us what your Division, District, or project is doing in the way of interpretation. We need *your* ideas.

## RECNOTES INFO EXCHANGE

Help! We need your input for inclusion in this publication to aid in the dissemination of information concerning research activities, special studies, innovative solutions to recreation problems, and upcoming events to all Corps elements. The need for improved communications between Corps Division, District, and project offices and other agencies to avoid duplication of research efforts is imperative. Without your assistance we cannot do this.

## RECENT PUBLICATIONS

Regional Science Research Institute, *Modeling Recreation Use in Water-Related Parks*, Technical Report R-78-1, October 1978, U. S. Army Engineer Waterways Experiment Station, Vicksburg, Miss. (Copies available from NTIS.)

Nonreservoir water resource development projects are becoming increasingly important elements of the Corps' Civil Works Program. Various statutory and administrative authorities require the Corps to consider the recreation potential provided by nonreservoir projects such as channels, levees, beach erosion control, and inland and coastal navigation facilities.

The planning and design of nonreservoir projects is hampered by the lack of standard procedures and techniques for use prediction, benefit estimation, and the development of conceptual recreation plans. Recently completed research by the Corps' Sacramento District involved the analysis of supply and demand of urban-oriented nonreservoir recreation using data from a single geographic locale. The purpose of the study was to further test and evaluate the general model formulation developed by the Sacramento District in other geographic areas and on other types of nonreservoir projects.

A thorough review of literature was followed by a test of several models including those already completed by the Sacramento District. Recreation visitation data collected at 30 New York State Parks were used in the analysis. The results are somewhat weaker than those obtained by the Sacramento District, attributable 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. The results do, however, support previous findings as to the most useful variables for modeling recreation visitation.

Midwest Research Institute, *Development of Improved Decision-Oriented Recreation User Information System*, Technical Report R-78-2, October 1978, U. S. Army Engineer Waterways Experiment Station, Vicksburg, Miss. (Copies available from NTIS; No. AD A062 795/OGA.)

As a result of the growing number of visitors entertained at Corps projects annually, planners and managers

need information about the recreation activities, facilities, and preferences of these users. To provide for these needs, Midwest Research Institute (MRI) undertook a research project to improve the visitation input data to the Recreation Resources Management System (RRMS) and evaluate the need for an overall recreation information system.

In a separate handbook, MRI proposed implementation of a standardized survey and visitation estimation procedure. In addition to describing the methodology, MRI evaluated the manpower, training, equipment, and quality control measures needed to support a standardized procedure.

An important information need Corps-wide is to forecast the impact of national and regional trends in terms of recreation participation growth, sale of various types of recreation equipment and other such factors that affect use of park areas. To accomplish this task, MRI proposed developing a supplemental recreation information system. Utilizing and interfacing with the existing RRMS and SIRAP, a supplemental system would provide planners and managers with better tools to handle basic functions such as project feasibility, site planning, management, etc. This report describes the functions involved in improvement of visitation data and development of an overall information system, and examines the advantages and disadvantages associated with four administrative scenarios. The resulting conclusion is that WES should expand its role to include improvement of the visitation data and undertake development of a supplemental information system.

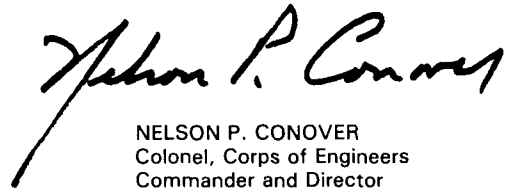
A final part of the report identifies and discusses major administrative aspects associated with this conclusion: organizational structure for implementation, manpower requirements, staff capabilities needed, potential contracting needs, training and standardization, implementation schedule, apportionment of cost among various Corps functions, and other legislative and administrative constraints.

Midwest Research Institute, *A Handbook for Conducting Recreation Surveys and Calculating Attendance at Corps of Engineers Projects*, Technical Report R-79-1, May 1979, U. S. Army Engineer Waterways Experiment Station, Vicksburg, Miss. (Copies available from NTIS.)

The handbook describes survey and analytical techniques that will enable the Corps of Engineers to standardize calculation of recreation attendance. A major finding in the final report of the Midwest Research Institute (Technical Report D-78-2) was that each Corps District and project essentially had developed its own procedure for collecting visitation data for the Recreation Resource Management System (RRMS). The procedures described in this handbook utilize the best of those techniques with several minor changes that will improve the quality of visitation data. It is recognized that Districts and projects require additional visitor information regarding recreation areas, user preferences, etc.

EC 1130-2-175, issued 1 June 1979, transmitted the handbook for guidance and implementation to all Divisions and Districts having Civil Works responsibilities.

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 welcome 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, 636-3111, Ext. 3657.



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